Language shift and Traditional Medicinal Plant Knowledge, in Tilantongo, the Mixteca, Mexico

PhD thesis in ethnobiology

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Abstract

This thesis examines the relationship between traditional environmental knowledge (TEK) and language shift in the Mixtec community of Tilantongo in Oaxaca, Mexico. TEK recognizes the link between biological and cultural diversity, while in the discourses of endangerment, language has been put forward as the organic link between culture and environment. Studying what happens to TEK when a community experiences language shift will enhance our understanding of how the diversities (biological, cultural and linguistic) that make up life interact, potentially advancing the biocultural diversity theory and helping us formulate more informed responses to the endangerment crises that we are facing today. This thesis shows that when language shifts, medicinal plant knowledge shifts as well and while doing this it changes. The medicinal plant knowledge in Spanish is more prevalent in Tilantongo than that in Mixtec. As language shift entails the endangerment of the original language, medicinal plant knowledge shift entails the endangerment of the original knowledge framework. Some elements are transferred into the new language and the new medicinal plant knowledge framework, while others are not. This is related to the focus of the discourses that differ between the original and the new language, reflecting changes in the social and physical environment. This thesis focuses on medicinal plant knowledge as a conglomeration of several TEK domains. This reinterpretation has consequences for how we study and approach medicinal plant knowledge, TEK, and biocultural diversity. Medicinal plant knowledge is intrinsically linked to other domains of TEK related to cosmovision, illness etiology, religion and the hot cold system. The hot cold classification system is an integral part of how people think about their environment and the interactions it has with the human body, including medicinal plants and their use. I suggest that the hot cold classification system also constitutes a TEK system and that the key to understanding it is to situate it and study it within the framework of TEK.

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1. Theoretical background and literature review

1.1. Introduction

This thesis revolves around the research question 'What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community?' I am going to look at the theory of biocultural diversity and whether it could develop into a theoretical framework within the discipline of ethnobiology. The discipline of Ethnobiology lacks a unifying theoretical framework (Albuquerque and Hanazaki 2009; Ellen 2006; Ford 1978; Gaoue *et al.* 2017), yet the biocultural diversity theory has been developing as one of the guiding principles of the discipline (Ellen, 2006: 16). Biocultural diversity theory builds upon the linguistic relativity hypothesis and ecolinguistics through its recognition of the way in which language, culture and environment are interlinked and likely co-evolved. The study of traditional environmental knowledge (that recognizes the link between biological and cultural diversity, environment and culture) in a Mixtec community which is experiencing language shift will give an unique insight in the way in which language, culture and environment interact and whether changes in one diversity imply changes in the others. This could advance the theory of biocultural diversity, potentially helping to develop this theory in an overarching theoretical framework within the discipline of Ethnobiology and helping us formulate more informed responses to the endangerment crises that we are facing today.

Ethnobiology is an important branch of anthropology that stands at the intersection between nature, culture and society. It has contributed to our understanding of category formation, classification, knowledge transmission and the evolution of the mind (the relationship between category and word is not straightforward, ecological knowledge can be understood and transmitted without constantly converting it into language) and has provided a crucial empirical link connecting anthropology with psychology and cognitive science (Ellen 2006, Berlin 1992, Atran 1990). Theory building within Ethnobiology has great potential for the overarching discipline of anthropology. Ethnobiology combines within one discipline a vast array of methodologies. The methodologies of ecology, anthropology, botany, biochemistry, conservation, geography, medicine, linguistics and archaeology are all valid (http://ethnobiology.org/about-ethnobiology/what-is-ethnobiology; http://www.kew.org/science/eblinks/educ.html). Ethnobiology is therefore the ideal discipline to explore the unresolved contradictions inherent in an unusually wide array of theories and orientations (Ellen, 2006: 19-20). Developing the biocultural diversity theory as a theoretical framework within ethnobiology would enable us to place the different aspects of human- environment relations in a model that synthesizes the evolutionary, cultural, biological, linguistic and cognitive approaches into one comprehensive explanatory framework, advancing the discipline of anthropology.

1.2. Current trends and the development of ethnobiology as a discipline

The history of ethnobiology (which encompasses ethnobotany, ethnozoology, ethnomycology etc.) as a discipline is complicated due to the multidisciplinary character of the field. In order to understand the concepts and theories that inform the field of ethnobiology I will give a brief overview of the development of the field and the directions it has taken. The term ethnobotany was first applied in 1895 by Pennsylvanian botanist Harsberger to denote the study of plants used by aboriginal people. It replaced the term aboriginal botany coined by the botanist Powers 25 years before and was taken aboard by ethnologists interested in the study of the relationships between people and plants. At that time anthropology was developing as a discipline, while botany was already established as a science. Even though the term ethnobotany was used by both botanists and anthropologists, a theoretical divide existed between the two groups. Botanists emphasized the economic or utilitarian relationship between plants and people (scientifically

identified plants with Indigenous plant uses), while anthropologists emphasized the cognitive relationship between people and plants (the way in which different cultures conceptualize, categorize and classify their environment, including plants). In the century that followed scholars have kept discussing the direction that ethnobotany and ethnobiology should take and redefining the concept of ethnobotany to fit these new directions (Ford, 1978).

Hunn (2008: 15-17) distinguishes four phases within the field of ethnobiology. The first is pre-theoretical ethnobiology, which as an intellectual endeavour dates to before recorded history while as a systematic written exercise to at least the 16th century. The second is cognitive ethnobiology, which begins with Harold Conklin's (1954) Hanunóó ethnobotanical systematics analysis and inspired a general cognitive theory of ethnobiological classification that was formed in 1974 in Brent Berlin's Tzeltal Maya research. The third is ecological ethnobiology, which sought to characterize local knowledge of plants and animals in its context of practice; knowledge used in dealing with issues of day-to-day survival in difficult environments by hunter-gatherers, fishermen and farmers. It relates to traditional environmental knowledge and traditional resource management and asks the question whether a detailed awareness of local biodiversity encourages conservation of that diversity? Ethnobiology in the fourth phase recognizes that the subjects of ethnobiological scrutiny, Indigenous peoples, must be involved as full partners in any legitimate ethnobiological enquiry. Berlin (1992: 4) distinguishes between the use of nature (economic perspective) before the 1950s and the view of nature (cognitive perspective) afterwards. Even though we distinguish between the economic and cognitive perspective, a brief flicker through the ethnobotanical literature shows that these perspectives tend to exist simultaneously and overlap in most studies and this dissertation is a case in point. In practice there is no clear divide.

Since the 1980s ethnobiology has started taking another direction. Before the mid-1980s almost all studies associated with ethnobiology were focused either on ethnographic descriptive reports or on ethnobiological theory building (Zent, 2008: 15; Conklin 1954; Berlin, Breedlove and Raven 1974); these studies have shown that folk classification systems share many characteristics with scientific classification systems and often contain more in-depth and specific information. This has led to the formation of the theory of a shared panhuman cognitive ethnobiological faculty (Atran 1990; Berlin 1992). Since then there has been a shift in the focus of ethnobiological studies; quantitative methods have been employed to study changes in traditional environmental knowledge and the patterning of this knowledge (Zent 1999, 2001; Lizarralde 2001; Ross 2002; Zarger and Stepp 2004; Zent and Lopez-Zent 2004; Hunn 1999). The term quantitative ethnobotany was coined by Prance and co-workers in 1987 (Prance 1991 in Höft, Barik and Lykke 1999: 3). This can be equated with Hunn's third phase within ethnobiology. Reyes-García (2007a: 190) points out that although the study of variation in knowledge between individuals of the same group is relatively new in ethnobotany (first few studies took place in the 70s and others started appearing more regularly after 2000), it is not new in anthropology (where systematic cultural variation was pointed out as early as 1936 and became a popular idea since the 1960s). The same can be said for the study of the processes of change within Indigenous societies of which the importance was observed by anthropologists such as Malinowski and Radcliffe-Brown (Kuper, 1983: 33-34).

There is no single methodology for the study of interrelationships between humans and plants. The lack of standardization of methodology within quantitative ethnobotanical studies (Medeiros *et al.* 2011; Albuquerque and Hanazaki 2009; Reyes-García 2007a) does however pose a problem. Lack of uniformity in what exactly is meant with individual ethnobotanical knowledge (differentiation between different ethnobotanical knowledge domains), different distinctions between theoretical and practical knowledge, lack of uniformity of methods of data collection, as well as methods to check what the right answer is (informant consensus, cultural consensus, check with experts etc.) make it very difficult to compare studies and therefore to formulate a theory of what sets in motion creation, persistence and loss of traditional environmental knowledge in different cultures (Reyes-García 2007a). Albuquerque and Hanazaki (2009) write

that the discipline of ethnobotany lacks a theoretical framework. This does not mean that ethnobotany has not been informed by theories from other disciplines or that it has not formed its own theories; it does however mean that it lacks a unifying theory about the relations between humans and their environment. The authors propose consideration of the development of evolutionary theory (cultural, biological) in a theoretical framework to explain human-environment relations, while at the same time they ask the question whether the development of a unifying theory of ethnobotany is possible and desirable considering the multidisciplinary character of the discipline.

Gaoue *et al.* (2017) write that recent ethnobotanical research has over-emphasized the use of quantitative ethnobotany indices and statistical methods borrowed from ecology, yet under-emphasized the development and integration of a strong theoretical foundation. The exception is the extensive body of research in cognitive ethnobotany which is theoretically grounded. They go on to write that while progress has been made methodologically, there is a lack of theory-inspired research within the discipline. They write that Martin (2007: 23-25) proposed that this could be remedied using a hypothetic-deductive approach which includes developing testable hypotheses (from theory or general principles) on the drivers of the patterns in peoples' knowledge and use of their environment, collecting data using ethnographic methods and using statistical analysis to test if these data support these hypotheses. Gaoue *et al.* (2017: 269-287) write that the most promising hypothesis-driven approaches to date have come from testing whether patterns of human use of medicinal plants align with the predictions of the theoretical frameworks from ecology.

They give an overview of seventeen major hypotheses within ethnobotany which they divide into two groups. The first group deals with how and why people select plants for use, and is further sub-divided into three separate questions: is plant selection directly related to the demographic traits of the plant; is plant selection directly linked to its phytochemistry; and how social dynamics and human traits affect plant selection. The second group deals with the conservation and livelihood implications of plant use, and is sub-divided into two questions: what are the implications of plant selection to the people and the plant; and how do local people mitigate the negative effect of plant use. They write that these hypotheses could be enriched through further integration with relevant anthropological theories related to culture and human behavior and should be tested with a strong awareness of cultural context. They present these hypotheses because they postulate that providing a synthesis of them will focus future research in the field towards delineating the theoretical basis for plant selection and use by people.

Yet what about all the other theories and hypotheses that have formed the discipline and have been formulated by it? Even though Gaoue *et al.* stress how cognitive ethnobotany has a strong theoretical basis, they do not include these theories in their hypothesis overview[1]; classification systems and theories related to them are absent, along with theories related to the psychological and cognitive aspects of environmental perception and use. Theories relating to the relationship between language and ethnobotany are not mentioned at all. They write about the need to integrate theories from anthropology, but they do not include any that have previously been integrated, the most important of which, in the context of what they present, is intra-informant variation (which links to cognitive ethnobotany). They also do not suggest an overarching theoretical framework in which the hypotheses they present are contained, although they have a clear plant use selection focus. They only mention biocultural diversity under the hypothesis of cultural keystone species, writing that the cultural keystone species theory as a framework provides the opportunity to test hypotheses related to biocultural diversity (Gaoue *et al.*, 2017: 278). It appears however, that the biocultural diversity theory would work well as an

[1] They do reference Berlin (1973) under the hypothesis of cultural keystone species, writing that several hypotheses were developed to link species ethnotaxonomic diversity with their cultural importance (Gaoue *et al.*, 2017: 278).

overarching theoretical framework containing theories related to plant selection and use by people, as suggested as a focus for future research by Gaoue *et al.*

1.3. The theory of biocultural diversity

Biocultural diversity can be defined as the interlinked (and likely co-evolved) complex whole of the diversities - biological, cultural, and linguistic - that constitute life (Maffi and Woodley, 2010: 5-6; Pretty *et al*., 2009: 101). Harmon and Loh (2008: 3) write that biocultural diversity includes biological diversity at all its levels, from genes to populations to species to ecosystems; cultural diversity in all its manifestations (including linguistic diversity); the abiotic or geophysical diversity of the earth, including that of its landforms and geological processes, meteorology, and all other inorganic components and processes that provide the setting for life; and, importantly, the interactions among all of these.

The concept of biocultural diversity is a theory that is still waiting to gain mainstream recognition and acceptance (Maffi and Woodley, 2010: 13). This lack of recognition and acceptance can be explained through the separation of humanity (culture) from nature by a succession of influential historical writers whose thoughts subsequentially came to dominate the worldviews in the western world. Ellen (1996: 12) writes that both nature and culture are culturally construed as varying concepts depending on context. An individual can have conflicting definitions of nature and culture that exist simultaneously, while what constitutes nature or culture is fluid and changes over time. Ironically, each time we talk about the nature-culture dichotomy we reproduce it. The degree to which nature and culture are opposed and this forms part of a worldview varies in different cultures. Nature and the cultural conceptions of nature develop together. Ellen (1996: 30) writes that the reason the western paradigm is dominant, however, is because of historical infrastructural priority.

In 1992 De Groot wrote that the present-day dominant worldview is that of Man as master and possessor of nature. I use the term Man because this worldview is not inclusive and women as well as other people not included in Man with a capital M are perceived as part of nature to be controlled and used. This worldview is influenced by the Judeo-Christian tradition and Greek rationalism. Their communality lies in the idea of the superiority of Man over nature and the existence of nature for the use of Man. In the 4th century AD St Augustine of Hippo wrote about the separation between culture and nature within Man, placing the first above the other. His writings had a huge impact on medieval thought. Yet it was Descartes, who was influenced by St Augustine, whose writings strengthened the artificial division between nature and the human being further (De Groot 1992). There are scholars who point out that this artificial separation of humanity from nature has led to many of the environmental and social problems we are facing today (Maffi and Woodley, 2010: 4). The Cartesian worldview has been described as one of the roots of the environmental crisis. De Groot (1992: 478) wrote that changing people's worldviews is one of the pivots in the battle for a sustainable future.

Since the 1970s the notion that ecosystems do not evolve towards a static climax state but are in fact dynamic and that ecological disturbance forms an integral part of their very nature has been gaining ground. This ideological shift is closely related with the concept of anthropogenic landscapes emphasizing the interrelation and interaction of human cultural systems and natural systems over time and has had important implications for conservation biology and the perception of the place of the human in nature (López-Zent & Zent 2004: 80-81; Smith and Wishnie, 2000: 395). Humans (culture) are no longer separated from the environment (nature); it is recognized that the human is part of his/her environment and that both interrelate and form each other (Balée 1998; Carlson and Maffi 2004; Fairhead and Leach 1996; Johnson and Hunn 2010; Maffi and Woodley 2010; Posey 1999; Posey and Balée 1989). This theoretical shift has contributed to the formulation of the concept of biocultural diversity. The concept of biocultural diversity was introduced in the 1990s when the subject of language displacement

entered the public domain and a link was formed between language and biodiversity loss in the discourses of endangerment (Krauss 1992; Hale 1992; Maffi 2001, 2004; Muehlmann 2008).

The binary contrast between 'natural' and 'anthropogenic' is a construct which should rather be interpreted as a continuum (Johnson and Hunn, 2010: 3). An increasing number of studies have shown a remarkable correlation between the global distribution of biological and cultural diversity (linguistic diversity taken as a proxy for cultural diversity[2]) (Chapin, 1992; Stepp *et al*. 2004; Harmon and Loh, 2004). Is it coincidence that areas with the highest biological diversity tend to have the highest linguistic and cultural diversity or could it mean that the people who live in these areas have co-evolved with their environment and that their languages specialize in co-habiting with the myriad of life that surrounds them? (see Harmon 1996a: 100). The second explanation resonates with the biocultural diversity view. It also means that in a situation of language shift, the dominant language that people shift to does not have the same relationship with their original environment. Unless the people affected by language shift change the dominant language to incorporate everything that their original language contained, the new language will reflect changes in their relationship to their environment and culture. It is important to remember that often language shifts as part of a bigger paradigm of cultural and environmental shifts. This means that incorporation of all the elements from the original language into the language the community is shifting to is unlikely.

Research done by Atran and Medin lends some support to the second explanation. Atran and Medin (2008: 195-207) studied three different populations in the Petén region of Guatemala. They found that the Itza' (native Maya peoples of the Petén region) show awareness of ecological complexity and reciprocity, while their agroforestry practices favor forest regeneration. The Q'eqchi' (an immigrant Maya peoples from the Guatemalan highlands) acknowledge few ecological interrelationships and their agroforestry practices are insensitive to forest survival. The Ladinos (Spanish speaking people of mixed European and Indigenous descent, in the area for at least three generations) had intermediate knowledge and practices. Atran and Medin tentatively reason that Itza' and perhaps other Indigenous peoples with a long history of ecological maintenance might treat resources as intentional relational entities, instead of objects of a pay-off matrix as traditional decision and game theory suggests. This means that people's conceptualization of resources may make a difference in how they treat these resources. Other research suggests that overall patterns of knowledge and behavior amongst the native Lacandón versus immigrant Tzeltal and Tzotzil Maya into the area resemble that of native Itza' versus Q'eqchi'.

Atran and Medin's findings suggest that Indigenous peoples such as the Itza' have co-evolved with their environment and that their languages specialize in co-habiting with the myriad of life that surrounds them. This in contrast to immigrant groups of people who do not have the same relationship with that environment and do not tend to see that environment in the same way. Although the comparison with the Ladinos shows that other people can learn from the original people in an environment. In a later study of the Itza', changes in environmental practices and beliefs (away from the reciprocal co-habitation patterns observed before) have been

[2] Although linguistic diversity is often used as a proxy for cultural diversity, cultural diversity is likely to be higher than linguistic diversity, especially in this age of language shift. People's cultural identity is determined by themselves (see the right to self-determination in article 3 in the U.N. Declaration on the Rights of Indigenous Peoples). Considering the complexity of identity, language does play a role but it is not necessarily the deciding factor (people can identify themselves as Indigenous, even when they do no longer speak the language; one language can be spoken by many different cultural groups). Another issue to consider is how languages are defined: it is difficult to define a language versus a dialect, different institutions use different criteria on how much comprehensibility between variants defines them as languages versus dialects. People who are considered by outsiders to speak different dialects instead of languages can feel they belong to different cultural groups, hence the importance of self-determination and the likeliness of lower results when using linguistic diversity as a proxy for cultural diversity.

correlated with language loss, loss of long standing cultural forms, loss of ritual and a marked degradation of the ecological balance owing to massive immigration, deforestation, and the closing off of land by clandestine ranchers and drug traffickers (Le Guen *et al.* 2013: 776-780). This illustrates the tragedy of how we interact with the environment and how language shift is interlinked with peoples' changing relationship with their culture and their environment.

Linguistic diversity is related to the distribution of Indigenous peoples in the world (Harrison, 2007: 13; Lewis 2009, Harmon and Loh 2010). There is a growing recognition that cultural and biological diversity are often eroded by the same drivers and threats and that it is necessary to think of the conservation of biocultural diversity as an integrated goal (Maffi, Skutnabb-Kangas, and Andrianarivo 1999; Pretty *et al.*, 2009: 105-106). According to Pretty *et al.* (2009: 101) biological diversity is essential for ecosystem health as it increases its resilience by serving as an absorptive barrier, while cultural diversity increases the resilience of social systems by augmenting the human capability to adapt to change. Also, as was suggested above, linguistic diversity may serve as a means of specialization in co-habiting with a specific environment. This would mean that if the knowledge accumulated while co-habiting with a specific environment is not passed on, the balance of that specific eco-system becomes endangered. These ideas are represented by the theory of biocultural diversity, and as people's understanding of nature affects how they act on it (Atran and Medin, 2008; Le Guen *et al.*, 2013: 773), it seems now more important than ever that the biocultural diversity theory becomes accepted by the mainstream. It is therefore perhaps not surprising that the biocultural synthesis has been developing as one of the main guiding principles of ethnobiology (Ellen, 2006: 16). Could it become more? Could biocultural diversity become a theoretical framework for ethnobiology? It incorporates an evolutionary aspect as suggested by Albuquerque and Hanazaki and aims to integrate all aspects of interrelationships between humans and their environment. To answer this question, we need to understand how biological, cultural, and linguistic diversity interlink and what exactly is meant by the concepts.

1.4. Linguistic relativity, language ecology and the link between language, culture and environment

In the discourses of endangerment language was put forward as the organic link between culture and nature. In this representation of language, its internal structure, especially the lexicon, can be interpreted as a symbolic body of intimate relationships between speakers, communities and their environments (Maffi, Skutnabb-Kangas, and Andrianarivo 1999; Mühlhäusler 1996; Errington 2003). This idea can be traced back to Edward Sapir who wrote that the vocabulary of a language reflects the physical and social environment of its speakers (Sapir, 2001 (1912): 14). Sapir (2001 (1912)) argues that we perceive (the influence of) the physical environment through the lens of the social environment (culture) which are both reflected to a large extent in the language.

> 'Human beings do not live in the objective world alone,…but are very much at the mercy of the particular language which has become the medium of expression of their society…the "real world" is to large extent unconsciously built upon the language habits of the group…The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached' (Sapir, 1985 (1929): 162).

In the article 'The relation of habitual thought and behavior to language' Whorf (1991 (1939)) argues that language structures the way we experience and perceive the world. This is done implicitly, without us being aware of it, it influences the way we think about the world and the way we behave in it, this on its turn gets expressed through culture. Language and culture are in a mutual relationship of influencing one another, language however guides this relationship because it is a very slowly changing system[3] that imposes its rules implicitly and subconsciously on

[3] How does this view relate to situations of language shift, where one language can displace another in a very short span of time or could it be argued that it is not the language itself that changes, but its use?

the more flexible concept of culture[4]. There is no correlation or no diagnostic correspondence between language and culture but there are connections, which can be studied by looking at language and culture as a whole. Whorf also connects language and culture to the environment linking the structure of SAE (standard average European) languages and Hopi to the history, culture and environment of these languages. Whorf (1991 (1942)) stressed that it was not vocabulary (he exemplified this by pointing out that there are no fixed referents in English lexicon) but something akin to grammar that constructs our way of thinking. Different patterns (molded by abstract symbols) in different languages determine different modes of thinking, of perceiving the world.

The ideas developed by Sapir and Whorf relating to the principle of linguistic relativity led to the Sapir-Whorf hypothesis; language is the medium through which individuals think and therefore language conditions cultural thinking, the perception and the worldview of an individual. The hypothesis built upon the idea that linguistic models are unconscious and allow us to intuit cultural models forwarded by Boas in 1911 (Sherzer, 1987: 295). Whorf's methodology was criticized by Lenneberg (1953) who faulted Whorf's translation technique and suggested that linguistic and non-linguistic events need to be observed and described separately before evidence is applied to demonstrate any association between the events. Feuer (1953) argues that *a priori* one would not expect people who speak different languages to have different perceptions of fundamental elements that make up the universe, because correct understanding of these elements is necessary for survival (Carroll, 1991 (1955): 28).

Sherzer (1987) points out that the relationship between language and culture is at the same time a very basic and a very thorny subject within linguistics and anthropology. He suggests taking a discourse-centered approach to re-conceptualize the Sapir-Whorf hypothesis. In 'The relation of habitual thought and behavior to language' Whorf does not systematically distinguish between language structure (grammar) and language use (discourse). Whorf's grammatical categories that pattern thought unconsciously are optional ways to express meaning actualized in discourse. To Sherzer discourse is the nexus (the actual and concrete expression) of the language, culture, and society relationship while it is also the broadest and most comprehensive level of linguistic form, content and use. The process of discourse structuring is where the language-culture-individual-society nexus is expressed, mediated, created, and re-created. Semantic fields are created and developed through language use; language use in discourse creates and changes culture. Culture on the other hand is a mental construct that both influences language use as it is influenced by it.

Language ecology or ecolinguistics builds on and advances the Sapir-Whorf hypothesis by investigating the relationship between language, thought and the environment. Fill writes that there are two complementary approaches within ecolinguistics: 1. ecology as a metaphor for language in an environment (associated with Haugen) and 2. ecology in a biological sense, the role language plays in the growth of environmental problems and their possible solution (associated with Halliday). The ecosystem metaphor was used by Trampe and Strohner to show language and language use in its interaction with an environment and to elucidate the interactive process of exchange that takes place. Ecosystems are life systems and language world systems are systems of experience. In this approach the comparison between biological ecology and language leads to the following critical hypothesis: in the same way that the creativity of life is threatened by our current treatment of nature, the creativity of language is endangered by our present use of it[5]. More recently the ecosystem metaphor has been extended from language to cultural systems in general. This cultural ecology concerns itself with the evolution of cultural ecosystems from

[4] This flexibility of the concept of culture in contrast to other concepts can be found in other works, for example Ellen and Fischer (2013: 2) write that culture is more rapid, focused, and flexible than either genetic or physiological adaptation.

[5] Creativity of life and language seems to be a metaphor for a healthy existence for all, Fill appears to be referring to the threats to both, environmental degradation, and language shift.

natural systems with language as a kind of missing link. The ecosystem approach replaces the cause-effect approach by a dialectical approach recognizing the interplay of all factors concerned (Fill, 2001 (1998)).

Polzenhagen and Dirven (2008: 263) write that the biological model of language has a strong affinity with Neo-Whorfianism. The biological model of language is used in language ecology or ecolinguistics, as well as in the discourses of language endangerment and the arguments that support and build the biocultural diversity theory. Gumperz and Levinson (2000: 3) write that while the rise of the cognitive sciences in the 1960s abruptly discredited the Sapir-Whorf hypothesis, there has been a recent change in the intellectual climate towards an intermediate position on linguistic relativity. Cultural and linguistic diversity are now viewed within the context of what we have learned about universals, there is an emphasis on the socio-cultural context of human development while acknowledging underlying universal bases, an increased focus on meaning and discourse, as well as a recognition of how interpretive differences can be rooted as much in the systematic uses of language as in its structure. These intermediate positions on linguistic relativity, constituting new approaches of the subject, in the context of the advances and developments in the fields of psychology, linguistics, the cognitive sciences etc. are covered by the term Neo-Whorfianism.

According to Haugen (2001 (1972): 57) language ecology may be defined as the study of the interaction between any given language and its environment. The referential world to which the language provides an index is the environment of its lexicon and grammar. The true environment of a language is the society that uses it as one of its codes. Language only exists in the minds of its users, and it only functions in relating these users to one another and to nature, i.e. their social and natural environment. Halliday (2001 (1990): 179) adopts the Sapir-Whorf hypothesis by writing that our reality must be actively construed, and that language evolved in the process of, and as the agency of, its construal. Halliday argues that it is the grammar of a language that interacts in a complex way with environment, history and culture while it actively creates meaning and therefore guides our experience of the world. This is largely an unconscious process. Grammar is dynamic and evolves together with the changes within society, while at the same time its structure re-enacts the contradictions and complementarities that it imposes on the reality it is construing. Language is the product of the merging of the human consciousness with the material world. Halliday illustrates this by showing how modes of meaning changed in western societies and how different modes of meaning co-exist and shape power relationships within western society. Modes of meaning are forms of discourse, new forms of discourse create new trends and patterns in the grammar. He suggests that the changes that are taking place in the environment, relating to the overexploitation of the earth, also take place in language, but that we are unaware of them, not only because the changes are gradual but also beyond our conscious attention. He identifies growthism and classism as major ideological threats to the health of the earth, constructed in language. He writes that it is people's acts of meaning that transform language and that we should observe these and document the patterns of change so that we become conscious of the way in which we shape reality and the consequences of this (Halliday, 2001 (1990)).

Halliday's argument corresponds partially with critical discourse analysis, which declares that discourse is socially constructed as well as conditioned and that it is an opaque object of power in modern societies (Blommaert and Bulcean, 2000: 448). Asad (1979: 619) sustains that meaning is constructed and he criticizes that we do not question how different forms of discourse are produced and maintained as systems of authority. Ideology is being sensed as being mediated and structured by authoritative discourses. According to Asad just because certain modes of systematic discourse can be used to promote particular interests of certain groups, it does not mean that all these modes of discourse are just the expression of the positions that one supposes define those interests. Halliday's argument contributes to this question by emphasizing the largely unconscious nature of the social processes which are expressed and created through language, coded in its dynamic grammar. Mühlhäusler (2001 (1983)) provides support for Halliday's

argument by showing how SAE languages lack an adequate vocabulary and grammar to address environmental issues. The terms used are ambiguous and covert, which means that the public cannot fully consider the factors on which life on earth depends. He argues that therefore these factors will remain non-issues. Schultz (2001 (1992)) writes that words shift in shape and that this property can be exploited to convey emotions, but even when language is just used to convey information and concepts, because of this property it often conveys messages beyond what was intended or realized. She relates to Halliday by showing how in Australia the language used to talk about the environment is a language of exploitation that needs to be changed if society is to become sustainable.

Deutscher (2011: 150-152) criticizes Whorf for not providing adequate evidence for his claims of linguistic relativity and he accuses Whorf of attributing far-fetching cognitive consequences to differences in grammatical organization. He even goes as far as calling Whorf a fraud[6] and yet he advances the Sapir-Whorf hypothesis by arguing that language conditions our way of thinking, influencing our perception and worldview. He does however suggest that it be renamed the Boas-Jakobson hypothesis. He misrepresents the Sapir-Whorf hypothesis by writing it assumes that languages limit their speakers ability to express or understand concepts. He follows Humboldt and Jakobson in that he argues that languages differ not in what they are able to express but in what they encourage and stimulate its speakers to express (may convey versus must convey): different languages allow people to think anything yet at the same time they oblige their speakers to habitually think certain kinds of information. Habits of speech can settle into habits of minds with consequences for memory, or perception, or associations or even practical skills. He provides examples from the realm of color perception, gender systems in language (his gender systems consist of classifiers and personal pronouns) and geographic orientation. Experiments have shown that language does affect our cognitive processes in the areas of color recognition; certain color concepts can increase sensitivity to certain color distinctions (Kay and Kempton 1984; Winawer *et al.* 2007; Gilbert *et al.* 2006; Tan *et al.* 2008) and grammatical gender has an impact on associations (Konishi 1993; Sera *et al.* 2002; Ervin 1962; Boroditsky *et al.* 2003). While studies of speakers of languages with a geographic coordinate system show that these speakers learn to perfectly recognize and use the cardinal directions in everyday conversations and that the spatial coordinates in their language have consequences for memory patterns and orientation (Brown and Levinson 1993; Levinson 2003; Haviland 1993; Wassmann and Dasen 1998 in Deutscher 2011). Deutscher's argument resonates with Sherzer's, Halliday's and other eco-linguists discourse centered re-interpretations and advances of the Sapir-Whorf hypothesis: that habits of speech affect habits of mind, which affect much more than language.

1.5. Language displacement and biocultural diversity

Language shift or displacement can be defined as

> 'an extreme case of linguistic contact in which an entire language is borrowed at the expense of the other' (Campbell, 1994: 1960).

Because language plays such an important role in shaping our world and creating our relationships with the environment, both social and natural, the question is what happens to the perception of the world and the relationship to the environment of people whose language is in a process of displacement. This question relates directly to the theory of biocultural diversity which suggests that because of the intrinsic way that different diversities interlink, displacement of one

[6] Monaghan (2011: 227) writes that over the years Whorf has almost been as large a target for criticism as Margaret Mead. Deutscher's Whorf bashing has been found surprising by linguistic anthropologists such as Kathryn Woolard and Greg Downey, mainly because his data support the Sapir-Whorf hypothesis. Monaghan writes that the ongoing discrepancy between popular notions about Whorf and his legacy as seen from within linguistic anthropology is something that members of the field are continually trying to correct.

type of diversity may have very serious consequences for other types of diversities in the affected ecosystem and for the overall biocultural diversity. This is an important issue because of the rate at which languages are currently being displaced. Harmon and Loh's (2010: 110) index of linguistic diversity based on data from Ethnologue shows that from 1970 until 2005 20 % of the languages in the world have declined. In 1992 Krauss (1992: 4-7) estimated that in the 21st century 90 percent of the approximately 6000 languages that exist in the world would disappear. According to Crystal (2000: 14, 19) an estimated loss of 50 percent of the languages in the 21st century would be a middle point between all the different estimations. An important point to note is that just 4 percent of the world's languages are spoken by 96 percent of the population.

Brenzinger (1992: 3-4) writes that here are two interacting levels involved in language endangerment. 1. the environment, formed by political, economic, historical, and linguistic realities. 2. the community of speakers, with their modes of use of the language, attitudes, and strategies. Himmelmann (2010: 45-46) defines language endangerment as the possible outcome of an endangerment scenario: a specific and complex constellation of varied factors, some of which may be conducive to language shift, others to language maintenance. It is useful to make a distinction between clearly perceivable symptoms (indications) of language endangerment and their often not so clearly discernible causes. One essential symptom for the vitality of a language is the number and the quality of the domains in which it is used. Quality refers to the importance of a given domain within the overall language ecology in a speech community, based on the breadth and variety of linguistic behavior found in that domain. Fishman (2001: 1) considers language illnesses and death as examples of varying degrees of severity of hitherto uncontrolled (largely because misunderstood) changes in the number and kinds of social functions for which languages are utilised at particular historical junctures. These definitions complement each other and demonstrate the complexity of language shift.

It is important to note that language displacement is rarely a voluntary choice made by the speaker community, often it is a consequence of social and political discrimination against the language or/and its speakers (Maffi, Skutnabb-Kangas and Andrianarivo 1999; Harrison 2007; Reyes-Gómez 2008). In many cases marginalized groups that are forced or choose assimilation in the linguistic and cultural majority do not overcome their marginalization and are encountered among the dispossessed in mainstream society (Maffi, Skutnabb-Kangas and Andrianarivo 1999: 37). Rhywen (1998 cited in Crystal, 2000: 25) writes that loss of language is not the loss of a concept, an abstraction, but rather it is what happens when people change their behavior and stop transmitting their language inter-generationally. It is intimately connected with people and it cannot be treated simply as an intellectual puzzle to be solved. Crystal (2000: 25) adds that it is this interconnection that has led so much of the contemporary emphasis to be ecological in character, focusing on the relationships between people, their environment and their thoughts and feelings. The ecology of language shift can be defined as follows:

> 'the study of interrelated sequences of causes and effects producing changes in the traditional language behavior of one group under influence of another, resulting in a switch in the language of one of the groups. The traditional cultural behavior of one group therefore changes to conform to the cultural behavior of another group' (Mackey, 2001 (1980): 68).

Perhaps it is an oversimplification to state that the cultural behavior of the group whose language is displaced changes to conform to the cultural behavior of another group, yet it is exactly the link between language, thought, behavior and culture which makes language displacement such a worrying phenomenon. Brenzinger (1992: 3-4) writes that when a language disappears, often the cultural traditions and the socio-cultural or even ethnic identity of the speakers disappears as well. While Fishman (2001: 3) writes that such a huge part of every ethnoculture is linguistically expressed that it is not wrong to say that most ethnocultural behaviors would be impossible without their expression via the particular language with which these behaviors have been traditionally associated. Crystal (2000: 39) asks which aspects of culture, exactly, are dependent on language for their preservation and which are not? Ellen and Fischer (2013) write that in the

case of environmental knowledge, especially the practical aspects, much knowledge is substantive, which means it is not ordinarily committed to language, although it may emerge through performance. In Puri's (2013) conceptualization of practical knowledge however there is no strict distinction between knowledge as text and practice. I will examine this topic more in-depth in Chapter five, where I will look into the forms of knowledge that the different TEK domains, that constitute the TEK conglomeration of medicinal plant knowledge in Tilantongo, can take and how it affects their transmission and dependency on language.

Human language is an extremely complicated phenomenon. As far as we know there is no other species on the earth with a system of communication comparable to ours when it comes to the creativity and the complexity of expression and communication. This capacity develops early in children who acquire adult linguistic capacity in a very short time. Language is a fundamental part of the human being: it reflects our identity and is essential for social interaction within a society (Tserdanelis and Wong, 2004: 3). Hale (1992: 36) writes that it might not make sense to think of language as a single entity as it constitutes a multitude of human competences and capacities. This corresponds to what Halliday (2001 (1990): 180) writes, that language is simultaneously a part of reality, a shaper of reality and a metaphor for reality. Heller and Duchêne (2008: 3) however write that in order that the discourse on language endangerment makes sense the concept of language has to be understood as something that can be counted; in this context languages are presented as delimited spaces (although internally variable), independent in some way of other forms of social practice. This brings us back to the question that is at stake: what happens to people's social and cultural practices and their perception of the world and their environment when their language is displaced? In how far is a language independent from other forms of social practice and how far are other forms of social practice independent of language? Language is not an ideologically neutral tool (Halliday, 2001 (1990): 191), it shapes our worlds.

There are three theoretical perspectives from which the issue of language endangerment can be approached. The first represents language as an entity that maintains an organic link with an environment and culture, and like them can be disturbed and invaded. The second perspective represents each language as a specific manifestation of human capacities. The loss of one language is represented as a threat for the cumulative diversity of the total, using rhetoric from biodiversity endangerment. The third perspective represents language as the possession of its speakers as well as a natural phenomenon. Language is connected to the collective identity of its speakers while at the same time it is a right to be recognized by sources of political authority (Errington, 2003: 723-732). The first two perspectives both perceive language loss as the loss of experience. Both seem to relate to language ecology and biocultural diversity. Although Errington writes that the rhetoric of the second perspective tends to separate languages from their interactional contexts, natural environments and communities; the perspective itself has a clear ecosystem approach, stressing the interrelatedness of processes that take place on earth. The second perspective has a clear link with linguistic relativity. While the third approach is connected to the ethical question of human rights. These perspectives are not mutually exclusive and tend to overlap in most writings on language endangerment.

How can we investigate the link between language, thought, behavior, culture and environment and the extent to which language, worldview, culture and environment interact? Looking at the relationship between traditional environmental knowledge and language in communities that are experiencing language shift may provide us with answers that will help to advance this much debated and still little understood aspect of biocultural diversity.

1.6. Traditional environmental knowledge as a link between language and environment

Traditional environmental knowledge (TEK) is part of the broader spectrum of Indigenous and local knowledge (ILK) (Berkes, 1999). These notions are inherently dynamic and divergent due to the nature of the subject, human intellectual diversity. New studies bring new insights and contribute to the ongoing process of revision and redefinition of these concepts (Zent, 2008: 11-

12). In the context of TEK the term traditional has been redefined and signifies continuity from past to present. This continuity however is recognized as a cumulative result of the dynamic, collective intellectual response of a people to the challenges of a constantly evolving natural and social environment. It is deeply embedded in the local culture and lifestyle and cannot be separated from all the other cultural elements that are particular to a specific people and place and make up their (dynamic) worldview. Environmental knowledge refers to the knowledge that deals with the natural environment and people's relationship to it. This encompasses knowledge of biological entities (species, biotopes), abiotic components (soils, geology, astronomy, climate), how they function, interrelate and what affects them. TEK emerges from the deeply rooted communal relationship of people with their environment and is therefore both Indigenous and local. It is often related to the practical engagement of the environment and bound together with resource appropriation, management, and utilization behaviors. At the same time, it is part of a particular peoples' worldview and may be linked to concepts of health, spiritual beliefs, symbolic expressions etc (Zent, 2008: 14-15; Hunn, 2008: 7). Some communities have recognized that family activities involving the learning of traditional environmental knowledge skills serve as the most important vehicles for teaching Indigenous language, traditional stories and community values that reinforce a distinctive sense of place (Ohmagari and Berkes 1997 in Nabhan 1998: 30). Traditional environmental knowledge recognizes the link between biodiversity and cultural diversity (Zent, 2008: 4).

There are many synonyms in the literature which have roughly the same meaning and significance as TEK. Some examples are: Traditional ecological knowledge (TEK) (Gómez-Baggethun *et al.* 2010), Ethnobotanical knowledge (EBK) (López-Zent & Zent 2004a), Indigenous environmental knowledge (IK) (Ellen and Harris 2000), Indigenous knowledge (IK), Local knowledge (LK), Traditional knowledge (TK), Indigenous Knowledge systems (IKS), Indigenous resource management systems (IRMSs), Local community systems (LCs) and more (Posey, 1999: 9). Ellen and Harris (2000: 2) write the words we use matter, as they are indicative of our approach of the subject we discuss and the assumptions we make about it. At the same time there must be enough overlap in the meaning of our words to recognize the existence of a shared understanding to allow that these words refer to the same focal semantic space. This does not mean that the terminology isn't problematic. Many authors emphasize the dynamic nature of TEK because the term traditional has been associated with a static state of being in opposition of modernity. As Posey (1999: 4) writes it is important to not allow the term 'traditional' to be used to restrict local innovation and cultural change.

As written above TEK is considered to be a subset of Indigenous and local knowledge. Who defines Indigenous? A fundamental principle established by ILO 169 is:

> 'self-identification as Indigenous or tribal shall be regarded as a fundamental criterion for determining the groups to which the provisions of this convention apply' (Article 1 ILO 169, 1989).

The right to self-determination is repeated in the U.N. Declaration on the Rights of Indigenous Peoples adopted on 13 September 2007:

> 'Indigenous peoples have the right to self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development' (Article 3 U.N. Declaration on the Rights of Indigenous Peoples).

The U.N. has the following working definition of Indigenous Peoples:

> 'Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system' (Martinez Cobo U.N. Definition of Indigenous People 2004).

Indigenous cannot be used in a morally neutral or apolitical way (Ellen and Harris, 2000: 3). The –s distinction in peoples is especially important because it symbolizes not just the basic human rights to which all individuals are entitled, but also land, territorial and collective rights, subsumed under the right to self-determination. In contrast the use of terms like 'people', 'populations' and 'minorities' implicitly denies territorial rights (Posey, 1999: 4). This distinction is of particular importance for biocultural diversity conservation, which cannot effectively take place if the rights of Indigenous peoples are not recognized (Maffi, Skutnabb-Kangas and Andrianarivo 1999).

1.7. Previous research into traditional environmental knowledge and its relation to language

An issue that becomes immediately apparent when reading the literature relating to traditional environmental knowledge and language is the disparity in methods used, definition of concepts and approach of the theme by different scholars. Even so it is possible to recognize certain overlapping themes from which several hypotheses can be developed.

Hill and Zepeda (1995 in Nabhan 1998: 31) showed that younger people in the community recalled only a fraction of the Indigenous names for plants and animals that the elder people knew. They made a scrapbook with photos and pictures of more than 80 local animal and plant life forms and asked native speakers to name or describe the organisms while they tape-recorded the responses. They compared the names given by different age-groups of women to come up with a measure of lexemic loss, while they also analyzed the extent of dialect distinctions and loanword use. Nabhan and St. Antoine (1993) tested whether biophilia, the human affinity with other life-forms, is influenced by environmental factors through comparison of traditional environmental knowledge between O'odham and Yaqui elders and activities and attitudes of O'odham, Yaqui, Anglo and Hispanic children of the Sonora desert. They interviewed a cross-section of 52 children of rural and urban desert communities using non-randomized sampling. They observed that TV and classroom learning had taken over from direct experience and oral traditions learned from elders. Twelve O'odham and Yaqui children were shown 17 pictures of familiar plants and animals, on average they could only name 4.6 in the Indigenous language while their grandparents averaged 15.1 names.

Atran and Medin's (2008: 128-140) findings from studying four groups of children from different populations suggest that induction patterns may be influenced by relative familiarity with animals and by the culturally specific character of the functional and ecological relationships between humans and other natural categories of elements. Similar comparative studies reveal components of biological cognition that vary systematically as a function of cultural milieu and input conditions (intimacy of contact with nature). Their findings also suggest that because of different knowledge frameworks, knowledge acquired outside of the classroom will not necessarily make its way into it. Science (instruction) is not culturally neutral. Bang *et al*. (2005 in Atran and Medin, 2008: 140) suggest that there is a better match between majority-culture parents' views of nature and science instruction than between Menominee parents' views and instruction. For example, both the texts and the majority-culture parents tend to imply that nature is an externality to be exploited, cared for, learned about etc. Menominee parents tend to emphasize that we are part of nature and that nature is not an externality.

Zarger and Stepp (2004) restudied (Indigenous) ethnobotanical naming ability among Tzeltal Mayan children in Chiapas 30 years after the original study by Stross (1973). They used a more compact, yet representative version of the plant trail used by Stross, interviewing 29 children while Stross interviewed 25 children. They found similar patterns of knowledge distribution correlated with the children's age, as well as a higher percentage of correctly identified plants in the two most salient categories. Despite several decades of socioeconomic and ecological changes in the community, the daily activities of the children had remained similar to the daily activities 30 years ago. Another important point to note is that 80 percent of the community were monolingual Tzeltal speakers.

These studies show that exposure to the traditional environment (social and natural) is necessary for children to acquire ethnobotanical naming abilities in the Indigenous language and to develop their biological cognition and their subsequent relationships with nature. By traditional environment I mean a healthy dynamic community embedded in a continuity of cultural practices related to the direct environment (social and natural) of this community. These studies also suggest that classroom learning still promotes the worldview of Man as master and possessor of nature, meaning this worldview is still dominant. This worldview appears to clash with healthier, more inclusive worldviews, such as that of the Menominee parents or others that resonate with biocultural diversity views. Because it is the dominant worldview when it comes to our relationships with nature though, it could have displacing effects on traditional environmental knowledge, especially amongst children. This could be one of the reasons why formal education has been found to negatively correlate with traditional environmental knowledge (Voeks and Leony 2004; Zent, 2001; Zent 1999a). It is important to note this could be changing though, most likely depending on the school system, for example, Reyes-García *et al.* (2005a) found that among the Tsimane parental schooling was negatively correlated with cultural competence in knowledge of plant uses, while schooling was positively correlated.

According to Berlin (1992) the ability to classify and name the surrounding environment is the foundation of ethnobotanical knowledge. He also writes that lexical variation found in medicinal plant vocabulary appears to be governed by factors relating to the cultural significance of the species involved (Berlin, 1999: 13). As described in section 1.6 traditional environmental knowledge encompasses much more than just naming ability. While Levi-Strauss (1966: 2) wrote that the naming of plants seems to be inextricably linked to the knowledge of their properties and uses, Rosenberg's (1998) study of knowledge of names for animals among Seri children has shown that knowledge of Indigenous names does not necessarily correspond with traditional environmental knowledge related to those species. Seri youth know and talk about local fauna in the Seri language, but do not know certain culturally based beliefs and songs related to the fauna. Rosenberg used 40 photographs of local animals for identification exercises and to answer specific questions about the depicted species. Each question was asked both in Seri and Spanish. 29 interviews of which eight were focus group interviews involving two or more individuals, were conducted (a total of 41 individuals were surveyed). All interviewees spoke Seri as their first language. The degree of bilingualism was estimated in casual conversation and each individual was given a score. There was no correlation between amount of schooling and age and degree of bilingualism. It is unclear however whether the lack of knowledge of certain cultural based beliefs about the local fauna is due to a normal age related learning curve (older people have had time to assimilate more knowledge (Voeks and Leony 2004)) or whether it is an indication of change in traditional environmental knowledge. Rosenberg (1998) does suggest that this information is not necessarily passed down to younger generations and she writes about certain programs among the Seri that promote retention of natural history lore embedded in Seri oral traditions.

During a pilot study, Zent (2001; 1999a) researched the impact of the social variables of age, formal education, and bilingual speaking ability on knowledge of forest tree names and uses among Piaroa men in Venezuela. He used a plot-survey marking 50 tree and liana species combined with structured interviews into plant uses and the social background of the informants. He interviewed 44 men between the age of 10 and 68, making up about 40 percent of the male population. He analyzed the results using linear regression and Romney's consensus analysis to determine the right response. Three sets of linear regression were performed: 1. impact of the social variables of age, education, and bilingual ability on plant naming competence scores. 2. impact of plant naming competence on plant use-value scores. 3. impact of social variables on plant-use value scores. He found that there was a sharp divide between the plant naming knowledge distribution of men below and above the age of 30. Naming ability was correlated with knowledge of uses. Plant knowledge was slightly increasing with age among the older cohort, while there was a steep increase of competence among the younger cohort (plant knowledge showed a steep decline with younger age). Multiple regression tests revealed that none of the

social variables were significant predictors of plant naming competence among the older cohort, while age (positive) and bilingualism (negative) were shown to be significant predictors among the younger cohort. Education was found to be a strong positive predictor of bilingualism. Thus, the knowledge difference is not due to age alone. This patterning of knowledge can be explained by the change in the Piaroa settlement pattern 30 years ago which is associated with greater acculturation pressure.

Ross (2002) studied the changes that occurred from one generation to the next among the Lacandón Maya in Chiapas. Ross conducted all the interviews in Lacandon Maya. He interviewed the entire male population of Mensäbäk (consisting out of 34 adults) apart from one deaf person. The work included forest walks, work in the milpa and informal interviews. After freelisting exercises, sorting of cards with plants and animals was used to elicit plant-animal relations. Romney's cultural consensus was used to determine agreement. Principal-component analysis was used to test whether a single underlying model holds for all informants. He found one underlying cultural model within which two sub-models were distinguished representing the two generations. These sub-models relate only to the forest, as further exploration of the data showed a strong consensus without group differences for the cultivated plant species. Social network elicitation showed that the elder generation males were perceived as experts on the forest. Experts reported a higher rate of plant-animal interactions than the younger generation, yet plant ranking correlated significantly between the two groups (r=0.88). Correspondence analysis was performed to investigate the structure of this knowledge. For both groups separate matrices (animal by plant) were calculated, indicating relations. The data showed that the knowledge of the younger generation was less specific and involved less species than the knowledge of the experts. It is unlikely they will acquire the knowledge of the experts due to lack of opportunity (some species are no longer observable in the area) and interest. When it came to the effect of animals on plants, there was a negative correlation between the number of relations reported and the age of an informant. This means younger informants were more likely to recognize the damaging effects of animals on the forest, the experts saw the same relations but did not perceive them as harmful. The ethno-ecological model of the experts was not only more detailed but also had an ideological structure that was completely missing in the model of the younger generation. The differences in knowledge seem to reflect a rupture in the acquisition of cultural knowledge among this community which forms a part of a wider cultural change.

In their intergenerational study of the Lacandón Maya among the men of two adult generations living in the community of Mensäbäk, Atran and Medin (2008: 206-207) found one underlying model for all informants, that suggested two submodels for the members of the two generations. They refer to the study above (Ross 2002) to describe how members of the first generation reported significantly more interactions than members of the second generation. The first generation's consensual model exhibited a clear structure that separates animals and plants along lines of taxonomy and habitat. Second generation adults clearly regarded first generation adults as experts; however, Atran and Medin could not find evidence for a relation between proximity to an expert and ecological knowledge. The changes appear to reflect a dramatic change in settlement patterns that distanced the younger generation from forest life.

These studies show that plant naming ability is correlated with knowledge of plant uses. They also show that wider cultural changes have consequences for exposure to the traditional environment (social and natural) that is necessary to acquire ethnobotanical knowledge. Philips and Gentry (1993a) collected plant use data from non-Indigenous people in southeast tropical Peru. Most of the ethnobotanical data collection was done in a series of one hectare tree plots at the Zona Reservada Tambopata with approximately 570 tagged, identified trees and lianas in a total of 6.1 ha, representing seven different forest types. 29 people were interviewed individually. They recorded use data in 1885 independent events. An "event" is defined as the process of asking one informant on one day about the uses they know for one species. There was a recognized male bias in choice of informants. Over 116 uses were reported for the large woody

plant species in the sample plots. They introduce a technique to calculate the overall use value for each species. The formula is:

$UV_s = \frac{\sum_i UV_{is}}{n_s}$ where n_s equals the number of informants interviewed for each species, UV_{is} is the use value for a species for a given informant. This technique is built around several events per species per informant and therefore takes into account intra-informant variation, as well as inter-informant variation and gives a much more reliable account of the use value of a species as the sample size increases. In the follow-up paper, Philips and Gentry (1993b) analyze the relation between a species use value and eight ecological factors. They also introduce the formula to calculate relative use value for each informant (RUVi) to compare knowledge between informants. They use regression lines to plot informant's relative knowledge (RUVi x 100) against informant's age. The results show that knowledge of medicinal uses and overall uses is related to informant's age (elderly people have more knowledge). Age explains over 50% of variance in relative knowledge of medicinal uses. They suggest that simply establishing the existence of a uniquely steep increase in medicinal plant knowledge with age proves that ethnomedical knowledge is uniquely vulnerable to acculturation, regardless of whether acculturation is taking place now.

In the Afro-Brazilian community of Lençóis in Eastern Brazil Voeks and Leony (2004) employed two local medicinal plant experts to formulate a sample plant pharmacopoeia on a selected disturbed ground plant trail. The sample included 45 plant taxa. 67 non-randomly selected informants (out of a population of 8000) were administered a socio-economic questionnaire and then taken along the plant trail where they were asked the name, any use and then medicinal use(s) of each of the 45 plants. They analyzed normative data (yes-no, male-female) using several one-way ANOVA tests. Women were significantly better informed about the names and uses of the sample flora than men and literacy was negatively associated with both name and use competency. They analyzed the nominal data using linear regression. Age and numbers of years residing in the locale were both correlated significantly with name and use competency. Kendall's non-parametric tau showed that there was negative correlation between formal education and name competency: as the level of formal education of the informant increased their name competency decreased. To test whether the difference in knowledge is due to the age learning curve the participants data was divided in age cohorts. This showed a sharp rise in medicinal knowledge between the 61-70 and 71-80 groups, from a mean of 34 percent to 69 percent, which indicates that the difference in knowledge is not due to the age learning curve.

These studies suggest that medicinal plant knowledge is largely confined to older people and that this might be the case because it is especially vulnerable to acculturation. Other studies have suggested that knowledge related to plants in general is especially susceptible to cultural erosion that is written to often accompany language shift (Balick 1996: 23; Leonti 2002: 11; Maffi, Skutnabb-Kangas and Andrianarivo 1999; Zent 2001). Although there are examples of exceptions such as the Yaku language of Ethiopia, which is reported to only survive in its plant names (Brenzinger, 1995 Newsletter FEL p. 5 cited in Crystal, 2000: 22). This is similar to Roy Ellen's experience in Eastern Indonesia where plant names in local languages are often the last words to disappear. Especially when species are endemic to a certain locality, have no name other than in the local language, and in situations where people mainly depend on the local pharmacopeia for their healthcare (Roy Ellen, personal communication, 2020). Another factor that appears to contribute to the retention of local plant names in island Southeast Asia is the extent to which people rely on plant species that do not overlap with plant species used elsewhere (Ellen and Puri, 2016: 356-357). Komaromi's (2009: 41, 52, 61) data gathered among the Mambila community of Somié of Nothern Cameroon suggested a high level of lexical knowledge sharing regarding plant names in Mambila. At the same time, she observed that fulbeization (cultural and language shift to Fulbe, the dominant culture in the region) led to increased knowledge sharing of Fulbe plant names and uses amongst young Mambila men and women to varying degrees. She also reported positive correlation between age and ethnobotanical knowledge. Older Mambila men and women

held a higher lexical knowledge, especially in the domains of medicine and ritual, than younger Mambila.

Benz *et al*. (2000) tested the hypothesis that communities with fewer modern services (they hypothesized that communities of Indigenous language speakers are more marginalized) have higher ethnobotanical importance values. They conducted systematic interviews with residents of eight communities in the Sierra de Manantlan biosphere reserve. Only a handful of Nahua speakers are left, so Spanish speaking Indigenous people were interviewed and their knowledge compared with Alcorn's monograph (1984) on Huastec ethnobotany which reports species that are used as well as number of informants that report them as useful. Informants participated on a volunteer basis, and showed a lack of shared knowledge. A total of 173 informants were administered periodic interviews using fresh fertile plant specimens collected within two hours walking distance of the community. Fourteen categories of use were established based on informal freelisting. Seven ethnobotanical indices were calculated: 1. total number of useful species in each community. 2. average number of times a species was recorded as useful by all informants. 3. average number of uses provided by all informants. 4. the average number of informants acknowledging utility. 5. diversity of useful species Simpson's. 6. diversity of useful species Shannon-Wiener. 7. aggregate use value of all useful species in each community. These indices were averaged for all useful species reported by all informants from each community.

Except the diversity indices, all were log-transformed prior to analysis. One-way analysis of variance was performed and Scheffe's test for post-hoc comparison. INEGI data was used to obtain information on socio-economic marginality. Likert scaling was used to summarize the seven indices of marginality and Property fitting was used to predict ethnobotanical importance value from socio-economic marginality indices. Parametric correlation analysis was used to determine the strength of relationship between ethnobotanical importance value and socio-economic marginality indices. The Manantlan communities are compared amongst each other with regard to socio-economic marginality indices and ethnobotanical importance value. The Manantlan communities were compared as one population with the Huastec data to test for diversity of knowledge, comparing the number of useful species and their relative importance among informants. Diversity statistics were used and showed that ethnobotanical knowledge was more diverse and more evenly spread among the Huastec than the Manantlan people. The combined indicator of marginality does not correlate with indices of ethnobotanical importance, yet the authors do suggest that TEK erodes with modernization that follows language loss. They suggest that TEK has eroded in Manantlan together with the Indigenous language but provide no proof for this. Another critique that can be raised is the approach to modernization. There are different forms of modernization and continuation of the Indigenous language and modernization are not mutually exclusive.

Reyes-García *et al.* (2005a) looked at the correlation between participation in a market economy and folk knowledge of plant uses. Methods included a cross-sectional survey of 497 households in 59 Tsimane villages with a randomly selected female or male household head for the interview. As well as a repeated measures study in two villages, comprising of all the adults (n=108) on three occasions (n=312) in a panel survey. Romney's consensus analysis was used to determine responses to multiple-choice questions on plant use. The weaknesses of this study include that it does not capture specialized knowledge, it only works if plant nomenclature does not differ between villages and that it does not allow analysis of factual use of plants. Freelisting was used from 50 subjects on the panel, from the 92 plants that were mentioned by at least one informant in each village, three multiple choice questionnaires were developed. Three were employed in the panel survey, one in the cross-sectional survey. Surveys were conducted in Tsimane with the help of translators. Cultural consensus was calculated at the village level and the total level. Data from the cross-sectional study show that individuals in more isolated villages share more knowledge than individuals in villages closer to town. The three proxies for acculturation were: father's schooling, schooling, and fluency in spoken Spanish. They used random-effect regression with semi robust standard errors and ordinary least squares regression

(just means that the model that best fits the data is chosen) with robust standard errors. They found that fluency in spoken Spanish and parental schooling was negatively correlated with cultural competence in knowledge of plant uses, while schooling was positively correlated.

While the Benz study seems to be suffering from some serious methodological flaws that put the conclusions to doubt, the Reyes-García study supports the hypothesis of exposure, suggesting that traditional environmental knowledge depends on an active process of transmission, in which schooling can play an important role. None of the above studies assessed the individual respondents' fluency in the Indigenous language. Instead bilingualism (the ability in the dominant language was assessed) was taken as a proxy for acculturation or an entire community speaking an Indigenous language was compared with a Spanish speaking Indigenous community. Because many studies have shown that the distribution of knowledge within human communities is not homogeneous (Romney, Weller and Batchelder, 1986: 314, 325; Hays, 1974: 491-495; Berlin, Breedlove and Raven, 1974: 53-56, 58-59; Boster 1986; Berlin 1992: 223-231; Philips and Gentry 1993b, Lizarralde 2004; Zent and López-Zent 2004), we miss a vital dimension by not measuring the Indigenous language capacities of the individual respondents. This is especially important in situations of language shift, where the transition of one language to another is usually gradual, some language domains are lost before others and there are many different levels of language capacity in the affected community- from non-speaker, semi-speaker to fluent speaker (Crystal, 2000: 21-22).

The main limitation of the literature is that there are very few studies that look at the link between traditional environmental knowledge and language shift. The exception is Margaret Florey's work. Florey (1993: 297-304) tested the language proficiency in the Indigenous language of 33 speakers in the Alune village of Lohiatala, Seram island, Indonesia. Four groups of speakers were identified based on the test results: near-passive bilinguals, imperfect speakers, younger fluent speakers and older fluent speakers. Florey found rapid language shift to Ambonese Malay along generational lines. Use of Alune was markedly greater with older speakers and decreased noticeably with younger people. Malay is associated with the Christian church, biomedical medicine, education and the pan-Indonesian system of government, while Alune is increasingly linked with traditional knowledge and Indigenous religion. The younger fluent speakers overreported their use of either Alune or Malay. It appears this arose from the speakers' desire to be affiliated with the cultural and social values currently associated with each language. The same group of younger fluent speakers has been reinterpreting two types of secular narratives as sacred knowledge and therefore secret knowledge. In the case of incantations, the power resides in precise use of language and misuse of language may have disastrous consequences. With regard to sacred knowledge, Malay is used to diffuse the danger of incorrect language use in Alune and it is used in transmission of sacred knowledge to protect and maintain the status of this knowledge. The younger fluent speakers are affecting the pace of language shift by limiting the transmission of the reinterpreted sacred knowledge and using Malay to impart it, as well as encouraging the use of Malay in their role as mediators in the community. In Lohiatala it is the domain of Indigenous religion which due to restrictions on transmission and the reinterpretation of previously secular knowledge into this category is hastening the demise of Alune.

Florey (1998: 205-226) writes that historically the use of incantations was embedded in all aspects of life of the Alune. Alune cosmology focused on placating ancestral and local nature spirits through incantations to ensure health and vitality, and the productivity of the environment. During the last 50 years of the twentieth century the Alune experienced rapid sociopolitical and ecological change. Conversion to Protestantism has resulted in the suppression of non-Christian religious practices. In Lohiatala the process of language shift to Ambonese Malay is well advanced and there are clear generational differences in knowledge and use of the Alune language and Alune ritual practices. The performance of incantations is affected by the loss of many of the appropriate contexts of use for ritual and sociocultural knowledge and interrupted transmission of the Alune language and ritual practices. Young people are also spending an important part of their formative years away from the community and are therefore not gaining the detailed

knowledge of Alune ecology and social practices which they need to attain skills as ritual practitioners. At the same time, it appears that in Lohiatala a syncretic form of Christianity is being created which enables some people to incorporate some features of pre-Christian practices. The modern incantations used differ in form and function from the incantations used before, they are shorter, and they appear to lack the poetic features of their precursors. Younger Lohiatala people are reluctant to recite the original incantations because of their lack of fluency in Alune. Also, the traditional sources for incantations are closed to young people as older people from the community have ceased transmission of their pre-Christian knowledge. Young people now obtain their incantations from a variety of sources, both Alune and non-Alune, often purchased and in written form. The comparisons between modern and traditional incantations in their context of use shows both continuity and discontinuity of practice.

Research conducted by Florey and Wolff (1998: 41-56) in two Alune villages revealed that some pre-Christian healing practices (both herbal medicines and incantations) retain a role. Although the distribution and patterns of use of this knowledge have changed. In Lohiasapalewa information concerning herbal medicines is largely restricted to a small number of older villagers and has only been acquired by a very few younger villagers. It is considered specialist knowledge. Language shift and the suppression of pre-Christian practices by the church are clearly implicated in the loss of traditional healing methods, including use of herbal medicines and incantations. Another factor is reduced time for horticultural practices and less time in the forest learning about TEK. Nowadays in Lohiatala and Lohiasapalewa illness and injury are treated first by prayer and then by biomedical medicine. When ailments remain resistant to these treatments, some people will call upon elderly villagers to prepare an appropriate herbal medicine. If this fails people may ask an expert to use incantations. Due to the suppression of these practices by the church, this needs to be concealed. Herbal medicines are now rarely used and knowledge of them is in decline. In Lohiatala and Lohiasapalewa older people remember and may covertly use curative incantations. People born following the conversion to Christianity were unwilling to discuss pre-Christian practices of any kind. In Lohiasapalewa younger people appear to have no knowledge of curative incantations. In Lohiatala young people have sought other sources than parental knowledge for curative incantations, changing their form and function.

These studies show that traditional medicinal (plant) knowledge and language are endangered by the same processes of socio-cultural change. Sousa Araújo *et al.* (2012) propose a quantitative measure to study the distribution, variation and sharing of TEK at an intracultural and intrafamily level. A home is defined as a family unit. In each house they interviewed at least two people (usually members of a couple). Three surveys took place: freelisting was used to assess the knowledge and/or uses of plants for medicinal, food, and/or fuel purposes; a semi-structured interview was conducted to record socio-economic data; a guided tour was used to add to the list of cited plants and to collect specimens. They constructed a binary matrix that contained the record of citation for each species (Si) known to each informant (Ii) for each category of use (medicinal, food, or fuel). Based on these data, the knowledge richness and uniqueness index (KRI) and the knowledge sharing index (KSI) were calculated for each informant. KRI measures the knowledge richness and uniqueness of a specific set of plants by a certain individual. The index tends to assume smaller values with a larger richness and a higher number of exclusive plants cited by a determined informant. KRI values are inversely proportional:

$$1 = \text{KRI} \sum J_i^2 \qquad [7]$$

where: J_i= Ri/Rfi
Ri - Record of species (Si) cited by informant (Ii);
Rfi - Total record of species (Si) cited by the family or community (fi).

[7] There is a typing mistake in the formula in the article: "1 /= KRI$\sum J_i^2$" (Sousa Araújo *et al.*, 2012: 4), I have corrected this in my review of the text.

KSI aims to evaluate the homogeneity of the knowledge. It is a measure of distance, and the value may range from 0 to 1, with 1 being the value that expresses the lowest degree of sharing among a determined informant (KRIi) and the other components of the family unit or community (KRIMax)

KSI = KRIi/KRIMax.

They found that knowledge of plant species is heterogeneous and less than half of it was shared among individuals of the same residential unit. Of the categories fuel, food and medicine, the knowledge of medicinal plants is much richer on average. Medicinal plant knowledge was also more widely shared within the community than knowledge pertaining to the other categories. More knowledge is shared within the community than within family groups, especially regarding the medical category. Principal component analysis was used to establish groups in the different categories and then the Kruskal-Wallis test was used on these groups to test for difference in KRI and KSI between these groups. The Kruskal-Wallis test shows that there is a very significant difference (p: 0,0001) between the KRI and KSI scores of these groups.

Hopkins and Stepp (2012) conducted research among the Yucatec Maya of Tabi in Mexico into the distribution of medicinal plant knowledge. They used freelisting of herbal remedies (plant and illness together), which informed the cultural consensus analysis (Romney) questionnaire. They calculated the frequency of all items (separating remedy in illness and plant). They collected specimens for each plant that was named a minimum of three times by different informants. 40 people were interviewed; they mentioned a total of 650 remedies in the freelisting exercise. The frequency ranged from 1 to 20. The average number of remedies reported was 23 (range 2-88). The remedies were comprised of 107 illnesses and 276 plant names. In general, a few plant names were mentioned by many people and numerous plant names were reported by few people. The assumptions of the CCA were met, so there is one common culture of herbal remedy knowledge in Tabi. The mean competence score was 0.64 with a standard deviation of 0.20.

These studies show that there is a lot of variation in medicinal plant knowledge. Medicinal plant knowledge was more widely shared within the community than knowledge pertaining to other plant use categories. More knowledge was shared within the community than within family groups. There are several hypotheses that can be extracted from the literature on TEK and its relation to language. The main hypothesis that was extracted from the literature review is that language shift is often accompanied by cultural erosion. Further hypotheses that can be extracted from the literature are that plant naming ability is correlated with knowledge of plant uses and that TEK depends on exposure or an active process of transmission, in which schooling can play an important role. Other important findings described in the literature are that wider cultural changes have consequences for exposure to the traditional environment (social and natural) that is necessary to acquire ethnobotanical knowledge; and that traditional medicinal (plant) knowledge and language are endangered by the same processes of socio-cultural change; and that there is a lot of variation in medicinal plant knowledge and that it is often largely confined to older people.

1.8. Main aim of this thesis and chapter overview

The primary aim of this thesis is to examine the relationship between traditional environmental knowledge (TEK) and language shift in the Mixtec community of Tilantongo in Oaxaca Mexico and to answer the research question ‘What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community?’ TEK recognizes the link between biological and cultural diversity, while in the discourses of endangerment, language has been put forward as the organic link between culture and environment. Studying what happens to TEK when a community experiences language shift will

enhance our understanding of how the diversities (biological, cultural and linguistic) that make up life interact, potentially advancing the biocultural diversity theory. A better understanding of the mechanics of the biocultural diversity theory could help to develop this theory in an overarching theoretical framework within the discipline of ethnobiology and to help popularize it with the larger public.

This thesis focuses on medicinal plant knowledge as a conglomeration of several TEK domains. Medicinal plant knowledge is intrinsically linked to other domains of TEK related to cosmovision, illness etiology, religion and the hot cold system. The hot cold classification system is an integral part of how people think about their environment and the interactions it has with the human body, including medicinal plants and their use. I suggest that the hot cold classification system also constitutes a TEK system which has been misrepresented and misunderstood by some of its main scholars, and that the key to understanding it is to situate it within the framework of TEK and to study it in relation to medicinal plant use, cosmovision, illness etiology and religion. I argue that both the hot cold system and medicinal plant knowledge cannot be studied and understood without studying the conglomeration of TEK domains that they are part of.

Chapter one gives an overview of the theories that have informed this thesis. The discipline of ethnobiology does not have a unifying theoretical framework, although it is informed by many theories and methodologies. The biocultural diversity theory has however been developing as one of the guiding principles of the discipline (Ellen, 2006: 16). Biocultural diversity can be defined as the interlinked (and likely co-evolved) complex whole of the diversities-biological, cultural and linguistic - that constitute life (Maffi and Woodley, 2010: 5-6; Pretty *et al*., 2009: 101). The biocultural diversity theory builds upon the linguistic relativity hypothesis and ecolinguistics. The linguistic relativity hypothesis postulates that habits of speech affect habits of mind and that this influences how people interact with their social and physical environment. Ecolinguistics studies language use in its interaction with an environment trying to elucidate the interactive process of exchange that takes place. The biocultural diversity theory suggests that because the biological, cultural and linguistic diversities are interlinked, changes in one diversity will have profound effects on the other diversities in an affected ecosystem. One approach that can be taken is that Indigenous people who have lived in a certain environment for a long time have co-evolved with their environment and that their languages specialize in co-habiting with the myriad of life that surrounds them. This could mean that in a situation of language shift, the dominant language that people shift to, does not have the same relationship with their original environment. It is important to remember that often language shifts as part of a bigger paradigm of cultural and environmental shifts. This means that incorporation of all the elements from the original language into the language the community is shifting to, is unlikely.

Traditional environmental knowledge (TEK) connects environment, culture and language. TEK comes from the relationship between a particular peoples and the place they live. It is part of a peoples' worldview. It forms a complex web of interconnected cultural domains that all relate to the human being in relationship with their environment. The study of TEK in a community which is experiencing language shift can broaden our understanding of how the different diversities that make up life connect and therefore advance the biocultural diversity theory. A review of the relevant literature shows that there have been many different methodologies to study changes of TEK. The main hypothesis that was extracted from the literature review is that language shift is often accompanied by cultural erosion. Further hypotheses that can be extracted from the literature are that plant naming ability is correlated with knowledge of plant uses and that TEK depends on exposure or an active process of transmission, in which schooling can play an important role. The main limitation of the literature is that there are very few studies that look at the link between traditional environmental knowledge and language shift. There are studies that have assessed the degree of bilingualism (fluency in the dominant language) and taken that as a proxy for acculturation, or a community speaking an Indigenous language was compared to a community speaking Spanish. Apart from Margaret Florey's work, there are no other studies that measured the Indigenous language capacities of the individual respondents. This is especially

important in situations of language shift, where the transition of one language to another is usually gradual, some language domains are lost before others and there are many different levels of language capacity in the affected community (Crystal, 2000: 21-22).

Chapter two gives a short geographical background of the Mixteca and Mexico, situating Tilantongo in the Mixteca Alta. It also gives an archaeological and historic background of the Mixteca. This is followed by a description of Tilantongo, which shows its historical and archaeological importance. Language shift signifies the displacement of one language by another. It is not a neutral term; language shift often happens in a post-colonial setting when the dominant language displaces the Indigenous language. It is often a consequence of social and political discrimination that becomes internalized to the extent that people stop speaking their language. We cannot study language shift without acknowledging the history of the peoples that are undergoing it. The description of the Mixteca and Tilantongo is followed by a short overview of previous ethnobotanical work that has been done in the Mixteca and a description of the Mixtec language. This is followed with an overview of the methods that were used during the fieldwork and subsequent analysis of the data for this thesis.

Mixtec is a tonal language; Chapter three presents a preliminary tonal analysis of the Mixtec of Tilantongo. It starts with the general methodology and the orthography. This is followed by a description of how surface contrasts are established when studying a tonal language and a Praat[8] picture example, explaining its features. I then present seven bisyllabic word groups, followed by seven monosyllabic word groups. These word groups are representative of the pitch patterns that are distinguishable on words in citation form. I go on to explain the relationship between tone, the couplet, the syllable, and the mora[9] with examples from Tilantongo Mixtec. This is followed by a section on discovering tonal alternations, in which previous tonal work on Tilantongo-Diuxi Mixtec is introduced and compared to Tilantongo data. I propose a preliminary rule system to explain the observed tonal alternations and present related examples. A full understanding of the tonal system is necessary for a more in-depth study of language shift in Tilantongo.

Chapter four explains how the Linguistic Vitality Test (LVT) developed by Margaret Florey calculates language proficiency and how I adapted the LVT for Tilantongo Mixtec together with Sr Marcial Cruz Cenobio. On first glance the results from the LVT appear binary; there is one group that speaks Mixtec fluently and scores mostly 100 on all components of the LVT and there is a second group that understands Mixtec to varying degrees but cannot speak it, their scores drastically drop for the second component and they are unable to do the third component of the LVT. Overall, 65 percent of respondents are fluent Mixtec speakers. The preliminary speech and tonal analysis of the LVT data however, suggests that the group of fluent Mixtec speakers is divided into two subgroups based on sound and tonal differences in speech. The first subgroup consists of mostly elderly speakers, while the second consists of young people who have taken active measures to learn to speak the Mixtec language.

Chapter five addresses the main research question: what happens to knowledge of medicinal plants when language shift takes place in an Indigenous community? It contains the analysis of the data and presents the results from the related statistical tests. It shows that when language shift happens, medicinal plant knowledge shifts as well. As will be further discussed in Chapters six and seven, when language shifts, not everything the original language contains shifts into the dominant language. This chapter shows that when medicinal plant knowledge shifts, there is a change in focus and therefore in knowledge. Medicinal plant knowledge in the language the community is shifting to is more extensive and held by more people than medicinal plant knowledge in the original language. There appears to be a core of medicinal plant knowledge that partly shifts into the dominant language, but while doing so, the focus changes. So while less

[8] Praat is a free and open source software package for speech analysis in phonetics (Boersma and Weenink 2010)

[9] The mora is a phonological unit determining syllable weight

salient species do not appear to shift into the dominant language, there is also a change in focus wherein ritual Mixtec plants are the most salient plants mentioned in Mixtec, but not in Spanish, where the most salient plants are introduced species. While the medicinal plant knowledge in Spanish constitutes TEK, it is a shifted form of the Mixtec TEK; its focus, and therefore parts of its content, has changed.

Chapter six describes the ethnobotanical database, which contains an alphabetical list with the names and uses of the medicinal plants mentioned in this thesis, as well as voucher specimen numbers when applicable. This is followed by a description of Mixtec plant classification, a subject that requires much more research. Then I show how people talk about illnesses, treatments, and medicinal plants in Mixtec and in Spanish. This is important because it shows which concepts that exist in Mixtec shift into Spanish and which do not. This chapter also contains descriptions of certain illnesses, treatments, and an introduction to the *temazcal* or 'traditional steam bath' by medicinal plant experts, contributing to our understanding of Mixtec illness etiology and cosmovision. This theme continues more in-depth in Chapter seven, which introduces the Mixtec medicinal framework. The Mixtec medicinal framework consists of nature, the sacred and spiritual world and their interactions with the human body and spirit. It is contained in the conglomeration of TEK domains that constitutes medicinal plant knowledge. Previous researchers of the hot cold system have suggested that it is the disturbance of the hot cold equilibrium that lies at the center of Mesoamerican illness etiology. I propose that this is expanded to disturbance of equilibrium in general, contextualized in the Mixtec medicinal framework, contained in the conglomeration of TEK domains which constitutes medicinal plant knowledge. I present evidence that supports the reinterpretation of the hot cold system as an Indigenous TEK system, part of the medicinal plant knowledge TEK conglomeration, a system that is not random but governed by rules, that forms a dynamic yet coherent classification system.

Chapter eight contains the conclusion of this thesis, it shows that when language shift happens, medicinal plant knowledge shifts as well. It means that knowledge of medicinal plants in Spanish is more prevalent than knowledge of medicinal plants in Mixtec in Tilantongo. Shift does entail change though. Not all elements from the conglomeration of TEK domains shift into Spanish. Ritual and religious elements do not all shift and suggest a change in focus in the shifted medicinal plant knowledge. The hot cold classification system appears to be a more resilient TEK system that has shifted into Spanish (probably a long time ago, considering the interest in humoral pathology and consequently the hot cold classification of plants of the Spanish invaders). However, the understanding of the hot cold system comes from understanding the classification context for each classification event. The principle of opposites provides classification context, yet implementation of the principle of opposites requires in-depth knowledge of medicinal plants and illness etiology and their classifications. This is where differences between expert and non-expert knowledge appear and where it is demonstrated again how these TEK systems intertwine and likely co-evolved forming an inseparable TEK system conglomeration. This also means that changes in one TEK domain have consequences for the other domains. How this will affect the continued resilience of the hot cold system will become apparent in the future.

The shift in medicinal plant knowledge seems to indicate a change in the way people perceive their environment. The shift in medicinal plant knowledge is linked to the language shift that is taking place. As language shift entails the endangerment of the original language, medicinal plant knowledge shift entails the endangerment of the original knowledge framework. Some elements are transferred into the new language and the new medicinal plant knowledge framework, while others are not. This is related to the focus of the discourses that differ between the original and the new language, reflecting changes in the social and physical environment. These findings support the biocultural diversity theory as they support the theories behind it and show that changes in one diversity type have consequences for the other diversities, emphasizing its integrated and interconnected character. Considering that the way we perceive our environment has consequences for how we interact with it (Atran and Medin, 2008) and that ethnobiology is the study of the interactions between humans and their environment, it makes

sense to develop the biocultural diversity theory as an overarching theoretical framework within our discipline. This could contribute to further development and popularization of biocultural diversity, which has an important role to play in creating a sustainable future.

2. Methodology and background

2.1. Introduction

This thesis addresses the following research question: What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community? In order to answer this question two related Indigenous communities in Oaxaca, Mexico were chosen as study-sites. The Mixtec *municipios* of Santiago Tilantongo and San Juan Diuxi.[10] While developing the research design I travelled to the Mixteca to obtain permission from the municipal authorities to conduct my research there from the 9th of November 2012 for a duration of two years. It was granted and I could proceed with the research design. I received support from the *Centro Académico y Cultural San Pablo* and the Ethnobotanical garden of Oaxaca to obtain a research visa from the Mexican government for the duration of the fieldwork. Upon commencing fieldwork however, it proved difficult to work in San Juan Diuxi. The local authorities were willing to let me speak in a town assembly to try to find people on an individual basis to work with, but would not grant access to recent Census data or assist in any other way. Considering the ambitious scope and community dependent nature of the design I decided to focus solely on Tilantongo, where I finished fieldwork on the 18th of December 2013. The fieldwork took place over a period of thirteen months. The methodology was developed to look at the distribution and relationship between traditional environmental knowledge and language shift in a community or population. It is therefore appropriate to be used to study language shift and TEK in one community or population. Not being able to conduct the research in two Mixtec communities with different levels of language shift means that I could not compare the results and test for significant differences between two populations. The results described and analyzed in this thesis come therefore from one population. However, the population they come from, is the population with a higher level of language shift, which seems appropriate given the research premises. It would be interesting though, to see this research duplicated in another community and compare those results with the results presented here.

2.2. Geographical background

Mexico has a territory of two million km^2, more or less equally divided above and below the Northern Tropic. 3/4 of the country's circumference borders the sea. It is among the most mountainous places on earth. These circumstances influence the diversity of the climate and vegetation, which is among the most diverse on our planet (Rzedowski, 1994: 9, 21, 23, 33). Two major floristic kingdoms, the Holarctic and Neotropical, intersect in Mexico (Frei, 1997: 37) and it is estimated to contain 10 to 12 percent of the biodiversity on earth (García-Mendoza, 2012: 21). Mexico can be divided into 17 floristic provinces, which can be grouped into four regions which pertain to the Holarctic and/or Neotropical (Rzedowski, 1994: 97-99).

The state of Oaxaca has a territory of 95364 km^2 and its southern side borders the Pacific (García-Mendoza *et al.*, 2004: 22). The northern half of Oaxaca as well as adjacent areas in Puebla and Veracruz form a mountainous system. It is a very rugged terrain with few plains or soft slopes, most of it with an altitude above 1000 meters. Part of this terrain could be considered an extension of the Sierra Madre Oriental. Between Cuicatlán and Xalapa de Díaz runs a rupture caused by the Papaloapan River (Rzedowski, 1994: 25-27). Oaxaca is known for its biological, geological, and cultural diversity. It is the state with the highest biodiversity in Mexico

[10] San Juan Diuxi used to belong to the *municipio* of Tilantongo but got separated in the XVIII century. San Juan Diuxi is located at latitude north 17°16'50'' and longitude west 97°22'25'' and has a territory which encompasses 9696 ha. (INAFED) In their archaeological survey of the Mixteca Alta Kowalewski *et al*. (2011: 64) describe the Valley of Tilantongo; San Juan Diuxi is located in the head of the well-watered, lowest and southernmost ravine, while Tilantongo spreads over the ridge downstream from Diuxi.

(representing 40% of the flora), it contains almost all types of vegetation present in the country (70 %) (García-Mendoza *et al.*, 2004: 13, 21, 24; Centeno-García, 2004: 29). Based on its physiography and geomorphology Oaxaca can be divided into twelve physiographic subprovinces; Depresión del Balsas, Montañas y Valles del Occidente de Oaxaca, Fosa de Tehuacán, Sierra Madre de Oaxaca, Planicie Costera del Golfo, Valles Centrales de Oaxaca, Montañas y Valles del Centro, Depresión Ístmica de Tehuantepec, Sierra Madre del Sur de Oaxaca y Chiapas, Sierra Madre del Sur, Planicie Costera del Pacifico, Planicie Costera de Tehuantepec (Ortiz Pérez *et al*., 2004: 43-45). Figure 2.1 presents a map of Mexico, with the state of Oaxaca and the location of the Mixteca.

In 2011 following earlier attempts by Martínez-Gracida (1891) and Conzatti who collected around 6000 specimens between 1895 and 1940 (García-Mendoza, 2012: 14), García Mendoza together with 127 botanical experts (2012: 16) completed the compilation and taxonomical revision of a plant inventory for Oaxaca state. They list 321 plant families, 2160 genera, 9363 species and 227 intraspecific taxa. 308 of the listed plants are introduced species, while 685 species (constituting 728 taxa) are estimated to be endemic to Oaxaca. 2383 species are endemic to Mexico. Frei (1997: 37) wrote that Mexico has been estimated to be home to 30.000 flora species, while De Ávila (2010: 20) wrote that it is home to 22.325 flora species.

Figure 2.1: Map of Mexico showing Oaxaca and the location of the Mixteca region (shaded)

The Mixteca is a cultural and geographical area that constitutes one third of the state of Oaxaca to the west, contiguous portions of the south of Puebla and a strip of the east of Guerrero. Figure 2.2 presents a map of the Mixteca. The Mixteca is divided in the Mixteca Baja in the north and north-west, the Mixteca de la Costa in the south and south-west and the Mixteca Alta in the central area and the east (Spores, 2007: 4-8). The Mixteca is approximately situated between N 16° and 18° 16' and 97° and 98° 30'. It occupies a territory of around 40.000 km^2 (Dahlgren de

Jordan, 1954: 15). Geologically the Mixteca is made up of sedimentary continental rocks (from the Pleistocene and earlier Cenozoic period), volcanic rocks, granite, granodiorites (early Cenozoic), limestone, mudstone and sandstones of continental and oceanic origin (Mesozoic), mudstone schist, igneous rocks of oceanic origin (Paleozoic) (Centeno-García, 2004: 30-31). The main river systems draining the Mixteca are the upper Río Balsas and the Rió Verde which flow into the Pacific and the Río Papaloapan which flows into the Gulf of Mexico (Josserand, 1983: 106).

The second physiographic subprovince of Oaxaca; Mountains and Valleys of Western Oaxaca (encompassing a territory of 21.362,73 km^2), corresponds to the floristic subprovince of the Mixteca Alta. In the north it adjoins the state of Puebla, in the northeast the foothills of the Tehuacán trench, in the southeast the Central Valleys, in the south the meridional group of the Sierra Madre del Sur and in the east the state of Guerrero. It consists of mountainous systems that converge in the south. The highest parts are formed by the Sierra de Tlaxiaco (3200-3400 m) and the Sierra de Nochixtlán (2800 m). The northern part is drained by the Río Mixteco, a tributary of the Río Balsas, while the southern part is drained by the Río Verde (Ortiz Pérez *et al*., 2004: 46-47). The Mixteca Alta forms the western edge of the Mesa del Sur or Southern Plateau of Mexico. Its eastern boundary is the Valley of Oaxaca, in the west it adjoins the Mixteca Baja, in the south it is delimited by the Río de la Culebra and affluents of the Río Grande. In the northeast it is delimited by the Cañada, a long north-south trench which connects the Tehuacán-Papaloapan-Gulf corridor to the Etla Valley, one of the main arms of the Central Valleys of Oaxaca (Josserand, 1983: 108).

The climate in the Mixteca Alta is very diverse, as is the precipitation and the temperature due to its mountainous nature. Cook and Borah (1968: 8 in Josserand, 1983: 112) note that overall the climate in the Mixteca Alta follows a north to south gradient: in the north the Central Valleys are higher, dryer and colder while in the south the valleys are milder and wetter, particularly at the southern edge of the Mixteca where the slopes face the pacific and catch moist tropical air. There is a marked difference between the dry and wet season, which determines how much water is available and which plants thrive and where. Rzedowski (1994: 32) writes that the difference between the dry and wet season that can be observed in river flows is augmented by retention of water and its use for irrigation as well as destruction of vegetation and active erosion of the soil.

During the wet season, the trade winds bring humidity. Overall, not much humidity is brought to the region due to the mountains that isolate it. Much humidity remains in the Sierra Madre Oriental. The region that corresponds to the Mixteca Alta, Las Montañas del Occidente y Centro de Oaxaca, has a mostly semi-warm (average annual temperature between 18 and 22°) and subhumid climate. In the Mixteca Alta, temperatures as low as -5° have been registered during the coldest part of the year (December-January). The difference between minimum and maximum temperature during the year can be very high (Trejo, 2004: 71-75). Temperatures during the day also vary noticeably, starting and ending cold with a hot peak in the middle. De Ávila (2010: 6) further specifies that a temperate semi-arid climate is present in the Northern Mixteca at mid altitude, while it is the zones with an altitude over 2000 meters that tend to have a temperate subhumid climate and those at the highest altitudes that have a semi-cold subhumid climate. Temperate and semi-warm are not the same, temperate being cooler.

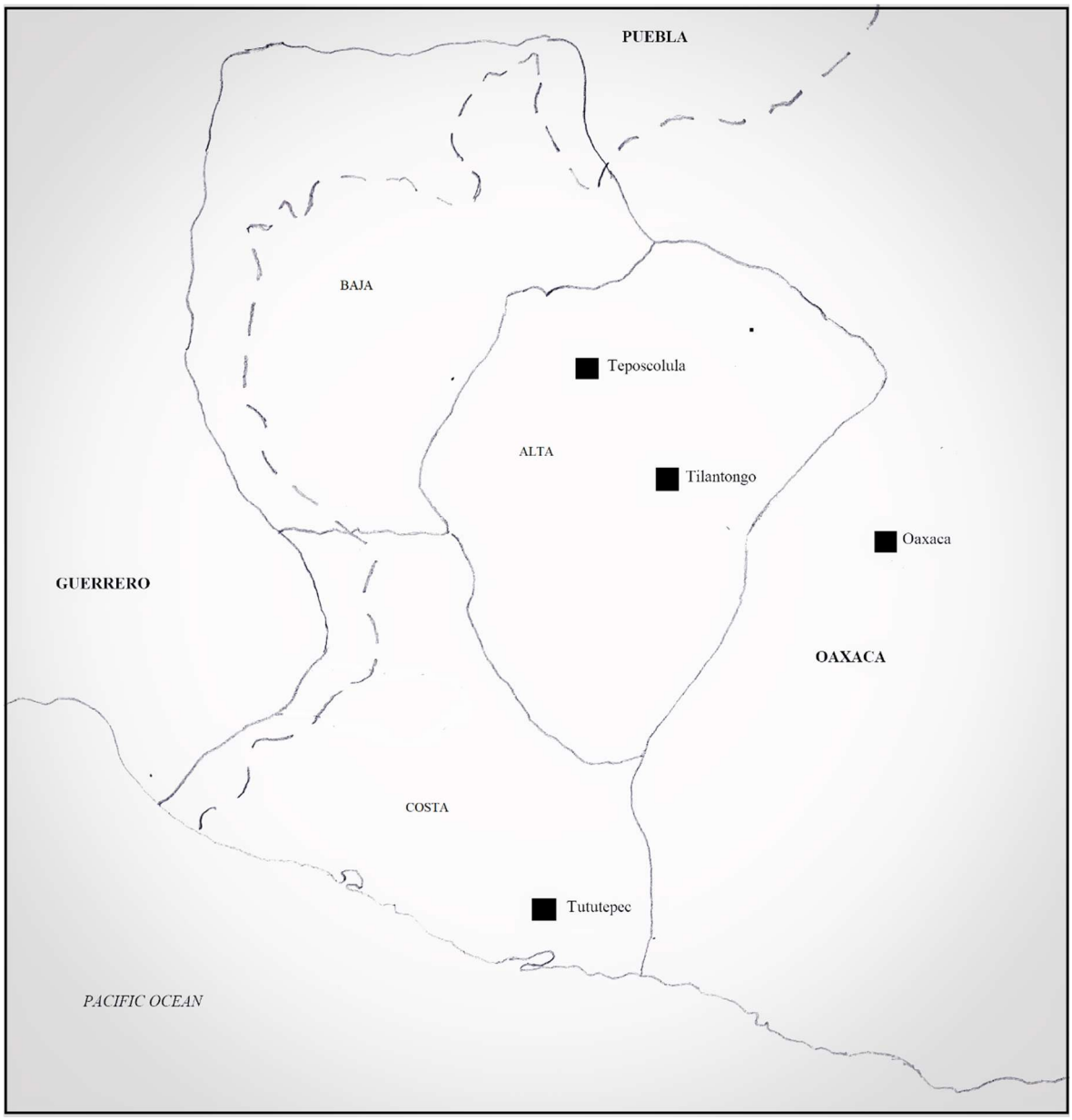

Figure 2.2: Map of the Mixteca (drawn by Kamil Piestrzynski)

2.3. Historic background of the Mixteca

In a work that synthesizes previous archaeological, philological and ethnohistorical research with current findings, Spores and Balkansky (2013) trace the development of the Mixteca as a cultural area and demonstrate its importance as one of the heartlands of Mesoamerica. Overthrowing earlier notions of the Mixtecs as late arrivals in Oaxaca, secondary to the Zapotec or primarily a postclassic phenomenon.

At present, archaeological sites linked to the archaic period (8000 to 2000 B.C.E.) in the Mixteca, associated with hunter-gatherers, have not yielded conclusive results. There are traces of human occupation, but not on a level comparable to the Valley of Oaxaca. We have to await future investigations (Spores and Balkansky, 2013: 39-41). During the Formative (2000 to 300 B.C.E), associated with agriculture and village life, the inhabitants of the Mixteca can be accurately described as Mixtec speakers. The beginning of this period is related to social stratification and the rise of chiefdoms. The settlement patterns of the Middle Formative are almost identical to those at the time of the Spanish conquest, but on a smaller demographic scale. The population of

the Middle Formative Mixteca Alta is comparable to the levels of the most populous areas of Puebla and the Valley of Mexico, placing it among the demographic core regions of Mesoamerica. To this period the first relatively unambiguous evidence of the *coo-yuu* terrace systems[11] can be traced. These innovative features allowed for agricultural intensification that helps explain the regions demographic estimates. From this period stem the first monumental platforms typical of Mixtec architecture. The Mixteca was geographically and in terms of actual exchange in the middle of Gulf coastal, Central Mexican and Pacific coastal exchange spheres (Spores and Balkansky, 2013: 41-51).

At the end of the Middle Formative (300 B.C.E to 300 C.E.) urban societies began to appear, many grew into urban states during the Late Formative. This was an interactive, macro-regional pan-Mesoamerican phenomenon. Mixtecan urbanization is perceived by the authors as fundamentally autochthonous: Mixtec cities originated where they are found and there is great variation due to the experimental phase of development, yet there are elements that are recognizable as protohistoric Mixtec (Spores and Balkansky, 2013: 52-53). This is also the period when settlements moved to more defensible mountain tops. At the end of this period most urban settlements had collapsed, apart from Huemelulpan and Yucuita. After their decline, the classic period (300 C.E to 600 C.E.) saw a rise of new urban areas, which were larger and more complex and featured many examples of monumental architecture, more extensive use of *coo-yuu* terracing, sometimes wall and ditch fortifications as well, and which continued to be built on top of the defensive mountain tops. These were compact densely populated interrelated small states or *yuhuitayu*. Again, recent surveys have shown that the population of the Central Mixteca Alta and Nochixtlán was greater than the entire Valley of Oaxaca at this time and that it continued to be a demographic core in Mesoamerica. After 600 C.E. there is another collapse of urban sites across Mesoamerica, of which scholars still dispute the causes (Spores and Balkansky, 2013: 73-77).

Nearly all *cabeceras* of post classic or early colonial *yuhuitayu* are located directly under or adjacent to the classic period capitals (Spores and Balkansky, 2013: 79). The post classic (900-1520) is a period of cultural and artistic revolution in the Mixteca from which stem the codices, polychrome pottery, delicately carved bone and the most impressive lapidary art and jewellery of Mesoamerica. During this time, the vast majority of the mountain top urban centers were relocated down to lower slopes where valley lands meet the hillsides. These newly formed communities had generally less monumental architecture than in previous periods. Every region yet surveyed reached its population peak during this period. Often occupation was so dense that post classic occupations were nearly continuous, bringing into question the correspondence of what is defined as an archaeological site with the Indigenous view of the landscape. To meet the sustenance needs of such a large population, as well as tribute for local rulers and the Culhua-Mexica, *coo-yuu* terracing underwent significant expansion. Because of the codices that deal with genealogies and histories of the places where they were produced, we know a lot about the political alliances and rivalries between the royal lineages of different *yuhuitayu* and their territorial expansions due to marriage, warfare or annexation (Spores and Balkansky, 2013: 89-93).

The first contact between the Mixtecs and the Spaniards was likely during the expedition of Gonzalo de Umbría on his way to the districts of Sosola and Tamazulapan in 1519. In a letter to

[11] *Coo-yuu*, whether its purpose was defensive, response to population pressure or the challenging settlement locations (probably all three), is a variant of terrace hillside farming that increases production. *Coo-yuu* or *lama-bordo* system of soil and water management overcame the limited carrying capacity of the narrow valleys of the Mixteca. Arable land was created by adapting normal channels of runoff to retain soils eroded from upper slopes as well as catching and retaining moisture. These terraces are similar to what geographers call cross-channel or gully terraces but built over time to enormous proportions with retaining walls of one to three meters high, descending for hundreds of meters. They constitute some of the most productive lands of the Mixteca (Spores and Balkansky, 2013: 78-79).

the Spanish emperor Charles V, dated October 30th 1520, Cortés mentions that emissaries from eight towns under the province of Coixtlahuaca offered allegiance to the Spanish crown and indicated that four other towns of the same area would soon do likewise. During the final siege of Tenochtitlan by the Spaniards there was unrest in the northern part of Oaxaca which continued several months after the final defeat of the Culhua Mexica on August the 13, 1521. In 1522 Pedro de Alvarado fought an entrenched force of Mixtecs in Itzcuintepec and later in Tututepec. At the end of 1522 or beginning of 1523 the Spanish had established control over the Mixteca (Spores and Balkansky, 2013: 142-144).

The Mixteca is often described as one of the poorest regions of Mexico, Spores and Balkansky (2013: 16) point out how incorrect this description is, considering the history of the area and its potential (Spores, 2007: 4-8). In the colonial period the Mixteca was considered one of the richest and most important areas of New Spain. After the epidemic of 1545-1548 another period of splendour began, evidenced by the monumental churches and convents (mainly Dominican) that were constructed through the effort of the population. Between 1570 and 1580 many of the communities had completed their churches and employed the most famous European artists to construct the altarpieces (De los Ángeles Romero Frizzi, 2008: 70-73). Some of the richest *encomiendas* (grants of tribute and labor service based on *pueblo* units to *encomenderos* (conquistadores and first Spanish settlers)) in New Spain were in the Mixteca (Spores and Balkansky, 2013: 144).

Spanish administrative entities known as *corregimientos* and *alcaldías mayores* were installed in populous and strategic places in the Mixteca. In 1549 the *encomienda* became a system of tribute, a royal decree eliminating the labor obligation. Tribute was assessed based on population size. While agriculture remained an important industry in the Mixteca, silk, cochineal and sheep became the principle sources of income. The Mixteca Alta was the most important silk producing area in New Spain from about 1530 to 1580. The great plague of 1575-1585, competition from China and excessive demands from clergy and civil officials contributed to the demise of the industry at the end of the 16th century. In 1600 silver was the leading export from New Spain followed by cochineal. It is estimated that there were over 200.000 sheep in the Mixteca Alta alone at the end of the 16th century, which greatly contributed to the economy of the region while causing severe erosion of the land (Spores and Balkansky, 2013: 144-149).

The native population declined precipitously between 1540 and late colonial times, but settlement patterns and social organization remained unchanged into republican times. Social differences were clearly marked by wealth and access to productive resources. Although the status of *caciques* declined after 1600, their access to goods, lands, services and privileges was exceeded by no one, not even affluent Spaniards. The multilevel system of government reinforced the identity and autonomy of communities while linking them into an ascending system of colonial government. Granting of legal titles, territorial delineation and subsequent adjudication by Spanish courts validated their identities. When faced with mistreatment by Spaniards, legal institutions were used in search for justice. There was a high level of direct interaction between Mixtec and Spanish administrators, religious leaders, merchants, traders, miners, *encomenderos*, travelers and residents. Social status corresponded with economic function. While traditional patterns of social interaction among native populations were not altered, the social confrontation with a politically dominant group of foreigners did bring change. However, the bi-ethnic hierarchical structure characterizing Spanish-native relationships that existed elsewhere in Spanish America did not develop in the Mixteca (Spores and Balkansky, 2013: 153-160).

During late colonial times and throughout the 19th century there were many land disputes and suits, sometimes even open warfare between *caciques* and *pueblos* and/or between *pueblos*. After independence, the basic form of government remained the same in the Mixteca while the official role and influence of the *cacique* declined (Spores and Balkansky, 2013: 196, 200,201). In the 19th century the Mixteca produced at least 90 percent of its subsistence goods. While In the 1820s the Mexican National economy was in tatters following the struggle for independence, the Mixteca experienced demographic and economic growth from the 1820s to

the 1890s while its levels of migration were the same as those for Oaxaca as a whole. The Mixteca had a trade market system, a controlled but open forum for exchange, connected to great regional markets which played a vital role in interregional commerce. Each community was virtually independent with respect to basic daily needs, while there were significant differences in resources, manufactured goods and specialized services. Each occupied a specialized niche in a multiregional economic network, following an ecological complementarity-adaptive strategy (Spores and Balkansky, 2013: 203-216).

At the beginning of the 20th century the dramatic upheavals of the Mexican revolution, influences of migration, extension of national highways and motor transport into the area, intrusion of foreign markets and products and created needs, poorly conceived national economic policies all contributed to the end of autonomy for the Mixteca. With twentieth century modernization were brought mutually reinforcing changes that worked in the same direction to change more or less self-sufficient village economies and societies into interchanging sectors of the national economy, culture and polity. Economic studies from after the 1950s all point to economic deterioration in the region, but they are all too preliminary or do not take into account the recent trends in the communities toward visible improvements in the standards of living. The market system changed from an integrated and independent system to a system organically dependent on the national-international marketing system, the *tianguis* (plaza market) remained intact though. There are indications that local production of certain items continues strongly, there are reinvestments of funds from migrant labor and there is increased building activity (Spores and Balkansky, 2013: 224-227).

The Mixtecs have always been mobile. During pre-Hispanic times they were present in the Valley of Oaxaca, the Isthmus of Tehuantepec, Central Puebla and the Valley of Mexico. Mixtec influence and authorship of Culhua-Mexica art marks their presence in Tenochtitlan. During the colonial period Mixtec trading expeditions took place to Tehuantepec, Guatemala, Guerrero, Puebla, Veracruz, Mexico and Guadalajara. Seasonal migration took place to Veracruz, Puebla, the Cuicatec Cañada, the coasts of Oaxaca and Guerrero from this period until the 19th century. In the early twentieth century Mixtecs began to migrate to the north and by the 1960s the rate of migration had augmented significantly. The primary cause of migration was economic necessity. The Mexican Revolution had a devastating effect on the Mixteca, anarchy and hunger prevailing from around 1915 until the late 1920s. Under the U.S.-Mexico *Bracero* (hired hand) program from the early 1940s until 1964 migration increased, reaching massive proportions in the 1970s and persisting to the present. The Mixtecs have greatly contributed to U.S. commerce, industry and services. Their successes are reflected in the Mixteca itself, through financial reinvestment and technological applications. Migration serves as an adaptive strategy contributing to long term Mixtec cultural survival (Spores and Balkansky, 2013: 228-235). Josserand (1983: 104-105) writes that migration in the form of expansion through agricultural colonization has been part of the Mixtec way of life for a long time. Mixtec settlements can for example be found in the Isthmus of Tehuantepec and outside of the zones traditionally associated with the Mixteca.

2.4. Tilantongo (ñuu Tnuu)

Tilantongo is situated in the district of Nochixtlán in the Mixteca Alta. It has the following coordinates: latitude north 17º 16 and longitude west 97º 20 (Spores, 1965: 978). Its territory encompasses 22.424 ha or 224 km^2 (INEGI Medioambiente 2008), 260 km^2 according to Butterworth ((1969) 1990: 17). It is located in the Eastern Mixteca Alta (Josserand, 1983: 111). The Tilantongo Valley consists of Yanhuitlán sandstones and conglomerates, it slopes downward to the east and south, the upper valley is over 2400 meter in elevation in the northwest and 2200 meter in the southeast. To the west, south and east are higher limestone ridges rimming the valley. The western and southern mountains are Tilantongo's watershed and source of wood and lime. There are four main and many small ravines that cut through the landscape. They are

typically 150 meters from the bottom of the *arroyo*[12] to the top of the adjacent ridge. The main *arroyos* carry water all year round and there are numerous springs (Kowalewski *et al*., 2011: 63). The reddish soils of the Yanhuitlán beds-deposits are extensive, easily worked, and both fertile and highly erodible. The erosion[13] in the Mixteca Alta today (clearly visible even in satellite photos), is linked to the Yanhuitlán beds, their extensive modification and use during pre-Hispanic times and their abandonment subsequent to the Spanish conquest (Abandoned terrace systems eventually fall apart, pulling whole sites down into the growing *arroyos* with them (Spores and Balkansky, 2013: 93).

In their survey of the Valley of Tilantongo Kowalewski *et al*. (2011: 64-66) found lithic assemblages of which it is unclear whether they represent archaic or later lithic use. They found five sites from the period 1400 to 700 B.C.E. (Early Formative). At the end of this period a cluster of a larger village and outlying hamlets had been established. The occupied area is over 60 ha. or 0.6 km^2 which would mean a population of 1000 people at standard densities of residential occupation. The largest site is at Diuxi. There could have been more that is no longer visible, considering the solid ceramic evidence, later occupation and the amount of erosion. One of the sites is near the possible Archaic lithic areas. During 700 to 300 B.C.E. (Middle Formative) large villages and centers with mounded architecture were established on the Tilantongo ridge and on the slopes above the Río Grande Yucatán. For the most part these sites were not on the highest ridges, nor were they on the toe slopes next to the main rivers. They were on side ridges and slopes above *barrancas*[14], which put them near *coo-yuu* terraces, springs and permanent water courses. Nine of the sixteen sites are on the lower slopes of the south rim of the basin, the best watershed. Nowadays the whole area has *coo-yuu* terracing and there are many scars of washed out *coo-yuu* terraces. The population estimate for that time is between 2000 and 4000 people. The largest site was in La Providencia (Kowalewski *et al*., 2011: 67).

From 300 to 100 B.C.E. every previous site was abandoned and a population of about 3500-4000 or according to other estimates 2,100 to 5,212 resettled at Monte Negro onto the defensible hilltop, most likely as a response to an expansionist Monte Albán. Monte Negro covers the top of the limestone mesa two km south of the center of Tilantongo. The elevation at the summit is 2,680 m and the occupation extended down to the north to an elevation of 2,560. It is 500 meter above the main stream on the valley floor and looks out over the Tilantongo Valley. Monte Negro is one of the best studied archaeological sites of the late formative period. Monte Negro was terraced (*coo-yuu*), most of them now in poor condition, and covered nearly 80 hectares or 0.8 km^2. The architecture includes columnar supports, patio groups, temples as well as buildings unique to the site, which form a whole that is like no other place (Kowalewski *et al*., 2011: 68-72; Spores and Balkansky, 2013: 57-58).

In the Early Classic (AD 350-550) Tilantongo was resettled with settlements spread across the whole valley, most on soils of the Yanhuitlán beds. They are associated with *coo-yuu* terracing. The population has been estimated to have been between 6,600 and 15,500 people. Housing density in settlements ranged from relatively compact to dispersed. The site of the 16th century Dominican church in the center of Tilantongo was where the major center of this period, with a large platform and a mound, was located. The valley was ringed with seven villages which had one or a few small mounds (Kowalewski *et al*., 2011: 73-74). During the Post Classic period 900-1520 AD Tilantongo occupied an area of 900 ha or 9 km^2 and had a population of which the midpoint

[12] An *arroyo* is a water-carved gully or channel.

[13] Other factors affecting rates of erosion that Michael Kirby (1972 in Spores and Balkansky, 2013: 93) considers amongst the highest in the world are the recent centuries of sheep and goat grazing dating from the conquest, and the fact that modern farmers typically dismantle terrace walls to create more planting surface. This is a short term and eventually self-defeating approach to the loss of fertile land. *Coo-yuu* terracing is still in operation in dozens of Mixteca Alta and Mixteca Baja communities. It once fed hundreds of thousands of residents in the Alta alone and it might do so again (Spores and Balkansky, 2013: 93).

[14] A *barranca* is a deep gully or *arroyo* with steep sides.

estimate is 18,000 people. The largest settlement, accounting for two-thirds of the population, was where nowadays the center of Tilantongo is located. It was larger than it is nowadays and spread up the ridge north and northwest of town and along the La Providencia ridge. There were sixteen large and small villages and two dozen hamlets. All these sites are associated with extensive *coo-yuu* terracing. All these sites and their immediate surroundings are severely eroded (Kowalewski *et al*., 2011: 75-76).

It is during the post classic that the most famous ruler of the Mixteca lived in Tilantongo. Lord 8 Deer 'jaguar claw'[15] conquered and united the Mixteca. His history has been recorded in four surviving pictorial codices: Colombino, Becker, Nuttall and Bodley. It has been calculated that he gained control over approximately 100 places during his lifetime. The empire which he constructed remained in place and powerful from the XII until the XVI century (Spores, 2007: 141-145). Joyce *et al*. (2004: 287) write that despite numerous claims that Lord 8 Deer created a kingdom uniting the Mixteca Alta and the coast, this is never explicitly shown in the codices. While Jansen and Pérez Jímenez (2007: 186) detailed analysis and reading of the above-mentioned codices support the notion that at least the Mixteca Alta became united under centralistic rule, a vassal to the Toltec empire. According to the accounts in the previously mentioned codices Lord 8 Deer had been born in Tilantongo on the day 8 Deer in the Year 12 Reed (C.E. 1063) to Lady 11 Water 'Blue Parrot' and Lord 5 Alligator 'Rain-Sun'. Joyce *et al*. (2004: 283) write that neither of Lord 8 Deer's parents had genealogical ties to the ruling families of Tilantongo nor Tututepec, while Spores (2007: 142-143) writes that Lord 5 Alligator (1021-1082 C.E.) was governor of Tilantongo and had two wives. Lady 11 Water was the second wife, while Lady 9 Eagle was the first. Lord 12 Movement, son of the first wife inherited governance of Tilantongo. Alfonso Caso suggested that Lord 8 Deer inherited governance of Tututepec from his mother, Lady 11 Water.

In order to understand the difference in accounts we need to look at a more in-depth reading and analysis of the codices. Jansen and Pérez Jímenez (2007: 122-136) give the following account of the history of Lord 8 Deer and Tilantongo. The father of Lord 8 Deer, the previously mentioned Lord 5 Alligator was a son of parents who had founded a noble house at River of the Drum and the Red Band. This place has not been identified with certainty, but it is likely to have been a lesser settlement under the influence of Tilantongo and Chiyo Yuhu.[16] The *Relación Geográfica* of Tilantongo mentions a Council of four that assisted the ruler. Jansen and Pérez Jímenez think that Lord 5 Alligator was asked to become a Death Priest (responsible for contact with the ancestors) and later joined this council. As mentioned above he married twice and his marriage alliances and those of his children are linked to the Death cult, Monte Albán and the Zapotec region. To understand how he came to govern Tilantongo we have to look into politics and the relationship between Tilantongo and Chiyo Yuhu. Lord 5 Alligator was uncle to Lord 5 Movement 'Smoke of Heaven' heir to the throne of Tilantongo. The aforementioned codices show that there was political strife surrounding the ruler of Chiyo Yuhu, Lord 8 Wind 'Twenty Eagles', and his different dynastic lines. Tilantongo's dynastic line did not remain untouched by this. Lord 5 Movement's first wife was a princess of Añute who died shortly after the marriage. Her brothers are shown to have been captured and ritually sacrificed around the same time. Lord 5 Movement's second marriage was to Lady 2 Grass who belonged to a subject town of Chiyo Yuhu

[15] The Mixtecs used two calendars. A 365-day calendar and a ritual 260-day calendar, 260-days being the time elapsing between conception and birth of the human being. That means that the date for being conceived and being born should be the same. The 260-day calendar consists of twenty day signs in combination with 13 numerals. Each 13-day period or *trecena* is linked to specific deities and attributes, as are the day signs. The reading of the 260-day calendar allowed divination of the characteristics and destiny of an individual.

[16] Chiyo Yuhu means hidden altar in this context and the glyph refers to the Altar of White Flowers which is a very important place in the early history of Añute or Jaltepec and may represent Cerro Jazmín, the location of a huge late classic archaeological site. Today the location of Santa María Suchixtlan (Jansen and Pérez Jímenez, 2007: 114).

and they resettled to rule another subject town of Chiyo Yuhu. Their firstborn son was Lord 2 Rain '20 jaguars' who remained in custody of Lord 8 Wind, while it was Lord 5 Alligator upon whom governance of Tilantongo fell following the death of Lord 5 Movement in 1079. It is during this time that a sixteen-year-old Lord 8 Deer, who was trained as a warrior, starts on his path of conquest.

According to Joyce *et al*. (2004: 275-283) Lord 8 Deer's coastal campaigns began when at age 18 he and his followers set out for the Oaxacan coast where he founded the city of Tututepec in C.E. 1083[17]. They write that this foundation date is supported by the archaeological record which shows an almost complete absence of early post classic settlement followed by a population expansion for Tututepec in the late post classic. After conquering many places Lord 8 Deer was visited by the Toltecs. The alliance that followed has been interpreted as instrumental in Lord 8 Deer's foundation of the second dynasty of Tilantongo. In C.E. 1097 a ritual took place where Lord 8 Deer's nose was pierced and adorned with a turquoise jewel, which invested Lord 8 Deer with the title of *tecuhtli*, designating membership in the Tolteca-Chichimeca royal house. This was one year after the death of the heirless Lord 2 Rain. Lord 8 Deer ruled Tilantongo until he was captured and sacrificed in C.E. 1115. After his death, marriages between his descendants and the rulers of Juquila into the ruling line at Tulancingo maintained the highland-lowland ties for several generations (Joyce *et al*., 2004: 283-287).

For a more complete account see Jansen and Pérez Jímenez 2007; in their reading of the codices Lord 8 Deer is a figure with a complex fate, a great warrior responsible for the deaths of those closest to him, unable to find happiness. Amongst whom his half-brother Lord 12 Movement who accompanied him on his campaigns and who sat next to him when homage was received by many nobles and princes who recognized the new dynasty of Tilantongo, who is killed in the *temazcal*[18] and Lady 6 Monkey whose life and death intertwine with Lord 8 Deer's (Jansen and Pérez Jímenez, 2007: 122-196). It was the son of Lady 6 Monkey, Lord 4 Wind who is responsible for ending Lord 8 Deer's life and ends up marrying the firstborn daughter of Lord 8 Deer's first wife, his own half-sister, becoming ruler of Place of Flints (Pohl and Byland, 1990: 118; Jansen and Pérez Jímenez, 2007: 188-199). Lady 6 Monkey was a granddaughter of Lord 8 Wind 'twenty eagles' and only surviving heir to the throne of Añute. Her mother was a daughter of Lord 8 wind, while her father was a prince of Tilantongo (Jansen and Pérez Jímenez, 2007: 130, 136).

There is a legend that relates to the foundation of Tilantongo which centers around the *flechador del sol* or the archer of the sun, written down by Burgoa (1534). One of the four warrior groups born from the trees of Apoala[19] reached Tilantongo where they encountered no one, tired from the journey and exasperated by the heat of the sun, they shot arrows at the sun. The sun went down immediately, and the warriors decided to settle there (Butterworth, 1990: 37). Pohl and Byland (1990: 126) write that the foundation date of Tilantongo is given in Vindobonensis 42 as day 7 Flint. In the 260-day calendar this date is associated with the North. De los Reyes (1890 (1593): 7) wrote that the lords of Tilantongo were celebrated and held in high esteem, while Burgoa (1534) wrote that the *cacique* royal lineage of Tilantongo was described as the most important in the Mixteca (Pohl and Byland, 1990: 126). The Tilantongo place sign was recognized by Alfonso Caso on the map of Teozacoalco with the name Tlilanton. The *Relación Geográfica* of Tilantongo lists the name Notoo-huaiadehui (*Nuu tnoo huahi andehui*) meaning 'black town temple of heaven' (Pohl and Byland, 1990: 114). See Smith (1973: 234-235) for an overview of different pictorial representations of the place sign for Tilantongo.[20]

[17] No date is mentioned by Jansen and Pérez (2007: 143).

[18] The traditional Mesoamerican steambath.

[19] The Mixtec origin story where the first people were born from a tree in Apoala can be seen in several codices. De los Reyes (1890 (1593): 1) writes that the Mixtec lords who came from Apoala called the Mixteca Alta *ñudzavuiñuhu*, which means 'divine' or 'estimated'.

[20] Regarding place signs and Tilantongo, there is some discussion regarding page 19a and 19b of codex Nuttall. As can be seen above in the story concerning Lord 8 Deer, there are many connections with the

Pohl and Byland (1990: 122) write that Alvarado lists *yucu naa* as equivalent to north, meaning dark hill. *Tnoo* also means dark and to shine. The mountain of Monte Negro might readily be portrayed as a hill with a black and white pattern. Alvarado lists *yucu naa* as meaning 'North' and 'very dense forest'. *Tnoo* is found throughout the dictionary meaning 'shining', 'dark' and 'fertile' depending on the context (Jansen and Pérez Jímenez, 2009). Ñuutnoo is listed as the Mixtec name of Tilantongo by De los Reyes (1890 (1593): 89). Tilantongo derives from *Tlillantonco* which means 'small black place' in Nahuatl (Jímenez Moreno, 1962: 97). Ñuu Tnuu can mean several things depending on the tones on *tnuu*. Nowadays many inhabitants of Tilantongo say it is not meant to mean black place but *lugar donde alumbró*, 'place that got enlightened'.

The territory that makes up Tilantongo contains 22 *agencias*[21]: Centro, Buena Vista, Las Flores, El Carmen, El Progreso, Socorro, Galeana, Guadalupe Hidalgo, La Paz, Las Palmas, Monte Negro, Providencia, Tres Lagunas, Zaragoza, Mendoza, San Antonio, San Isidro, Vista hermosa, La Laguna grande, San Vicente guerrero, El Capulín, Corral de piedras.

According to the 2010 census Tilantongo has a population of 3210 people (INEGI Conteo de Población 2010). This is less than in previous years as the 2005 census gives a population value of 3348 (INEGI Conteo de Población 2005 II). Butterworth's monograph (1990: 23) on Tilantongo mentions erosion and growing population as the main causes for migration. Over the last decades there has been extensive reforestation to combat erosion in Tilantongo. When travelling through the community many young pine forests that were planted since 1983 can be observed, such as around Buena Vista, in Providencia, El Carmen, El Progreso and San Antonio. Tilantongo is one of the model communities for restoration of eroded soils by the Comisión Nacional Forestal. In 2009 2000 ha or 20 km^2 had been planted with over 2 million native tree species and hundreds of kilometers of ditches to retain water had been constructed, as well as terraces to contain soil. Traditional techniques to enrich soil (TEK) have also been applied (Comisión Nacional Forestal, 2009: 52-53). In 2011 the Comisión Nacional Forestal approved a new program to reforest 100 hectares of Tilantongo (Resultados de la convocatoria del Programa ProÁrbol de la Comisión Nacional Forestal 2011).

Tilantongo has a large and very diverse territory with altitudes ranging from around 2100 (Zaragoza) to around 2700 (Monte negro), where you can find palm forests (in the aptly named Las Palmas), Quercus and pine forests (in higher areas such as Monte Negro), scattered acacia trees in the valley, large cypresses next to the water streams, as well as many varieties of *chamizo, somaque, modroño*. Most people plant corn, beans and a variety of vegetables. Among the medicinal plants that people tend to cultivate there is *epazote* (also used for cooking), *hierba buena, manzanilla, santa maría, siempreviva* and *maguey* varieties. Many people consider themselves *campesinos* or farmers. Some people tend to small herds of sheep or goats. There are six shops in the center of Tilantongo and two establishments that serve food, as well as one food stall only open in the evenings. There is also a stall a bit outside the center that serves alcohol. A wide range of professionals live in Tilantongo; there is a young doctor who has her private practice in Tilantongo (in addition to the healthcare provided by the *centro de salud*), there is a mechanic, there are construction workers, taxi drivers, entrepreneurs, nurses, teachers and herbalists and *curanderos*. People also serve the community through the different *cargos* or positions (governmental and religious) that rotate and are considered a great and heavy responsibility. *Tequio* or communal labor is another way through which people contribute to their

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Zapotec region and Monte Albán. Jansen and Pérez Jímenez identify the very large ceremonial place glyph encompassing page 19a and 19b of codex Nuttall as Monte Albán. Lejarazu (2009: 51) presents arguments that back up Byland and Pohl's identification of the insect that appears in the place glyph here and also in codex Bodley and Vindobonensis as Yucu yoco or Cerro de avispas, located in San Isidro, Tilantongo. Jansen and Pérez Jímenez identify the hill of the insect and the hill of the reeds as Sayultepec and Acatepec, two places in the Monte Albán region according to the 17th century map of Xoxocotlán.

[21] The *agencias* or *ranchos* are the dependencies of the community.

community. Many people leave the community to pursue their studies and careers but return for their retirement. Most people who migrate away send money back to the community, they also safe up money to construct their houses for when they return.

2.5. Previous ethnobotanical research conducted in the area

In an overview of the ethnobotanical work done in Oaxaca, Caballero *et al.* (2004: 541-564) write that despite the great biocultural wealth of the state, the plant uses and the different forms of interaction between people and plants have not been well documented. Although there exist works of ethnobotanical interest for almost every one of the 16 recognized Indigenous peoples and for some mestizo communities, there are very few studies which present a clear inventory of the useful plants and their utilization.

Not enough ethnobiological research has been conducted in the Mixteca of Oaxaca. De Ávila´s doctoral dissertation (2010) `Mixtec plant nomenclature and classification´ gives a comprehensive overview of all the different works that mention Mixtec plant names and compares the data to Berlin´s (1992) 'Principles of plant classification'. Another important work is by Esther Katz (1990) 'Des racines dans la Terre de la Pluie, Identité, écologie et alimentation dans le haut pays mixtèque'. After De Ávila´s doctoral dissertation and Kuiper's work in San Juan Diuxi, the source with the richest lexical ethnobiological information remains Francisco de Alvarado's dictionary from 1593, which has 184 plant species recorded in Teposcolula. Albertha Kuiper (2003) published an ethnobotanical work containing 240 names of plants collected in San Juan Diuxi. The four dictionaries published by the Summer Institute of linguistics concord with Kuiper's terminology and include some plants, mushrooms and animals. Two of the dictionaries have been compiled in the Mixteca Alta: Dyk and Stoudt (1973) San Miguel el grande and Beaty *et al.* (2002) Yosondua. The two others have been compiled in the Mixteca de la Costa: Pensinger (1974) Chayuco and Campbell *et al*. (1986) San Juan Colorado (De Ávila, 2004: 487). There exists an inedited manuscript by Alejandro De Ávila (1994) entitled 'Tundakua vs. yuva xiyo: Mixtec plant nomenclature and classification.' There have also been published some ethnobotanical works related to the Mixteca of Guerrero; Viveros and Casas (1985) 'Etnobotánica Mixteca: las plantas alimenticias en Alzocauca, Guerrero' and Casas *et al*. (1994) 'Etnobotánica Mixteca: sociedad, cultura y recursos naturales en La Montaña de Guerrero'. Aguilar-Santelises and del Castillo (2015) 'Demographic and socio-economic determinants of traditional plant knowledge among the Mixtecs of Oaxaca, Southern Mexico' examines the uses of 106 plant species that grow in native oak forests.

2.6. The Mixtec language

The Mixtec of Tilantongo has been grouped together with that of its neighboring town Diuxi and called Tilantongo-Diuxi Mixtec. Tilantongo-Diuxi Mixtec is a language that belongs to the Mixtecan branch from the Otomanguean language family. There are eight coordinate branches that belong to the Otomanguean language family: Otopamean, Popolocan, Amuzgo, Chiapanec-mangue, Chinantecan, Zapotecan, Tlapanecan and of course the aforementioned Mixtecan. The distribution of Otomanguean very nearly coincides with the northern and southern borders of Mesoamerica (Josserand, 1983: 95). The Otomanguean language family can be traced 4400 years back (De los Ángeles Romero Frizzi, 2003: 11). According to Josserand (1983: 97) Mixtecan and Zapotecan follow Otopamean when it comes to internal diversification and size. Mixtecan and Zapotecan occupy the largest portion of Oaxaca state. The Summer Institute of Linguistics[22] also describes the Mixtecan branch as one of the largest and most diverse of the Otomanguean stock

[22] The Summer Institute of Linguistics (SIL) is one of the largest linguistic organizations in the world. Their goal is to translate the bible into all languages of the world, and they have collected very extensive linguistic data to achieve their purpose.

(www-01.sil.org/mexico/mixteca/00i-mixteca.htm). According to Ethnologue (published by SIL) Mixtec is on the third place when it comes to the most diversified groups of languages in the world. Zapotec is on the first place, followed by Quechua in second place, while Roman languages occupy the fourth place (Lewis, 2009: 483).

Scholars have always been divided about the exact number of Mixtec languages. The problem is that it is difficult to define a language versus a dialect; how much comprehensibility between variants defines them as languages versus dialects. Ethnologue lists 57 languages that belong to the Mixtecan language family of which 52 are Mixtec, 3 are Trique and 2 are Cuicatec languages (Lewis, 2009), while the Instituto Nacional de Lenguas Indígenas (INALI) lists 84 Mixtec languages (INALI 2005). Mixtec languages share certain phonological, morphological and syntactic traits: voicing of obstruents after nasals; tonal contrasts; contrastive voiced fricatives; the appearance of the central vowel /ɨ/; a vigesimal numeral system; VSO (verb-subject-object) word order; kinship terms and body parts are intimately possessed; locatives derived from body parts; absence of plural markers on nouns; noun incorporation; body-part incorporation; verbal aspect more important than tense; inclusive vs. exclusive pronominal forms; relational nouns; absence of switch-reference; 'zero' copula; pronominal copular constructions with affixes; presence of the stress rule (Campbell; Kaufman; Smith-Stark, 1986: 537-557). All Mixtec phonologies have contrastive tone, and most have complex systems of tone sandhi[23] associated with morpheme classes. Until very recently most phonological studies of Mixtec have been straight forward descriptive presentations dealing with surface forms of tones rather than underlying structures (Josserand, 1983: 157, 177). The tonal variation in Mixtec languages and its complexity is one of the most characteristic traits of Mixtec languages and often the first thing that distinguishes one community from another (Josserand 1983: 158, Dürr, 1987: 20).

Mixtec has a long-written history and is famous for its pictographic manuscripts, written on laminated deer skin. Jansen and Jiménez (2009: 14-15) write that the roots of Mesoamerican writing systems can be traced to Olmec times, around 1000 B.C.E. and that they flourished during the classic period, 250-900 C.E. Mesoamerican pictographic writing achieves literary elegance through the use of parallelisms (two phrases with similar word order that tend to have similar meanings), metaphors, archaic expressions and *difrasismos* (the combination of generally two concrete elements that together signify an abstract concept). During colonial times Mixtec writing continued, first in pictographic form (the *lienzos*, large cotton cloth pieces covered in writing, that are known today are late post-classic and colonial (Jansen and Jiménez, 2009: 22)) and then through use of the roman alphabet. The many Mixtec writings in archives show that it was normal to read and write in Mixtec during colonial times. After independence the most well-known piece of Mixtec writing (and literature) is the costumbrist novel 'Ita Andehui' by Mariano López Ruiz. Nowadays a new generation of Mixtec writers, and of course the Academy of the Mixtec Language, Ve'e tu'un savi, continue writing Mixtec (Jansen and Jiménez, 2008: 16-17).

Terraciano (2001: 68-69) writes that the Dominicans were the first Europeans who started to record the Mixtec language and compile instruction materials such as a grammar (de los Reyes 1593) and a vocabulary (Alvarado 1593) and several *doctrinas.* There are two catechisms published in Mixtec: that of Hernández (1567); and the translation of Ripalda's catechism by González (Ripalda, 1755) (McKendry, 2013: 9). Alvarado's vocabulary made use of recompilation by many frairs from the beginning of their work in the Mixteca (Terraciano, 2001: 69). De los Reyes (1890 (1593): 3-8) divided the Mixteca in 5 language areas: Yanhuitlán, Teposcolula, Tlaxiaco and Achiutla, la Mixteca Baja and Cuilapan. Terraciano (2001: 73-74) looked at archival documentation from colonial times by Mixtec speakers and writes that it shows five language areas with consistent variation: Mixteca Baja around Huajuapan, Oaxaca Valley around Cuilapan, Mixteca Alta around the Valley of Nochixtlán (including Yanhuitlán and Coixtlahuaca), the Alta around the Teposcolula Valley and Tamasulapa and the Alta around the Valley of Achiutla,

[23] Tone sandhi entails change of tone on a word or morpheme triggered by the phonological environment of that word or morpheme.

Tlaxiaco and Chalcatongo. The Mixteca Alta areas correspond with a division of the Alta into Northeastern, Eastern and Western sections and support the division made by de los Reyes.

Following a contemporary survey of the Mixteca, Josserand (1983: 174-175) divides it into two slightly different sets of five initial geographic language groupings: Northeast Alta, Central Alta, Northern (Northwestern) Baja, Southern Baja, Costa. Compared to de los Reyes, Josserand divides the Baja and associates Cuilapan with the Northeastern Alta (Terraciano, 2001: 74). De los Reyes (1890 (1593): 3, 7) described the Mixtec language of Tilantongo as the same as that of Teposcolula with some differences, while he wrote that the language of Teposcolula is the most universal in the Mixteca. Smith-Stark (1995) places Tilantongo-Diuxi Mixtec in the Teposcolula Mixtec area. The Teposcolula Mixtec area also consists of San pedro Yucunama, San pedro y San Pablo Teposcolula, San Juan Diuxi, Santo Domingo Tonaltepec, San Francisco Jaltepetongo, San Juan Teposcolula, Santa María Nduayaco and Santiago Nejapilla. They are grouped together as the language variant Mixtec of Central Nochixtlán, which belongs to the Eastern Alta Mixtec area.

Josserand (1983: 176-178) writes that all Mixtec phonologies conform to a well-defined overall structure. They all share a core of structural phonological units and the maximum variation is clearly delimitable, the same goes for morphophonemic processes. She gives the following range of phonological units encountered in Mixtec:

Bradley's core consonant and vowel inventory (1977 in Josserand 1983: 176-177) (but note that no contemporary systems are limited to these core structures):

> Alveolars: /t s ⁿd n l/. Velars: /k/. Labialized /kʷ/. Palatal semivowel /y/. Labial semivowel /w/. Bradley reanalyzes the glottalstop, previously considered a consonantal feature, as part of the vocalic nucleus, creating a contrast between plain and checked vowels. Plain oral /i e a o u/. Plain nasal /i e a o u nasalized/. Plain checked /i' a' u'/. Checked nasal /i' a' u' nasalized/. All documented Mixtec languages have more extensive phonologies. Usually with around two dozen consonants and six basic vowel contrasts. Many languages have added the voiceless stop /p/. One or more palatized units /tʸ ȼ č kʸ/. The prenasalized oclusives /ᵐb ⁿg ⁿdʸ ⁿǰ ⁿgʷ/ by order of frequency. The fricatives show most variability and can be both voiced and voiceless, up to three or four voiceless /s θ š ş x xʷ/ and introduced /f/ or /~~þ~~/, voiced /~~ƀ~~ ~~ɗ~~ ž/. Almost all languages have been analyzed with three nasals /m n ñ/ and most show /r/. Vowel systems are either the basic core of five vowels /i e a o u/ or six vowel systems with /~~ɨ~~/ added. All systems have glottalized and nasalized vowels and all appear to have contrastive tone associated with vowel nuclei.

Josserand (1983: 178-181) writes that the most prominent structural (phonemic) syllable types are CV and V. This is based on the reinterpretation of the data with the glottalstop as a prosodic feature of the vowel nuclei. Phonetically long vowels are reanalyzed as a sequence of two geminate vowels on the phonemic level, meaning they have two moras. All Mixtec vowels carry a single tone, except for long vowels which sometimes carry two tone levels (on reanalysis each mora carries a single tone). Even after resegmentation of nasal, glottal and palatal segmental features many languages still have CCV syllables. Some languages, principally in the Peñoles-Tilantongo area have CVC syllables. The vocalic nuclei of Mixtec syllables carry a set of prosodic features including nasalization, glottalization, tone and stress. The basic unit of any utterance is the couplet, consisting of two syllables, of which the first is stressed. The first syllable of the couplet is the syllable of the grammatical stem which shows consonantal variations associated with meaning alternations (derivational processes, aspect changes in the verb, singular and plural markings). it is often marked by additional phonetic features and is the most likely to engage in tone perturbations. The couplet is a nucleus to which other syllables are added without disturbing the stress placement. It is the basis of all word and phrase building. It is primary a phonological concept, in terms of which morphological structures are manifest in their surface realizations. There is not always a one to one relationship between morpheme (root or stem) and couplet.

2.7. Research Methods

Many studies have shown that the distribution of knowledge within human communities is not homogeneous (Romney, Weller and Batchelder, 1986: 314, 325; Hays, 1974: 491-495; Berlin, Breedlove and Raven, 1974: 53-56, 58-59; Boster 1986; Berlin 1992: 223-231; Philips and Gentry 1993b, Lizarralde 2004; Zent and López-Zent 2004). To explain why there is variation in cultural knowledge distribution, cognitive anthropologists conceptualized culture as a partially shared and socially patterned information pool, where social patterning is assumed to be a result of knowledge acquisition and transmission processes (Boster, 1986: 429; Puri, 2013: 271). It has been hypothesized that cultural transmission takes place through at least three distinct, but not mutually exclusive pathways: vertical transmission, from parent to child; horizontal transmission, between two individuals of the same generation; and oblique transmission, from non-parental individuals of the parental generation to members of the filial generation (Cavalli-Sforza and Feldman, 1981). As written above the pattern of social distribution of knowledge within a community closely reflects the pattern of knowledge transmission (Boster 1987b). When a diachronic study is impossible a synchronic study of the patterning of knowledge correlated with other social variables that are indicators of change can give a good indication of change in traditional environmental knowledge (Zent 2001). Puri (2013: 262) writes that identification tasks have been shown to be an important means of comparing an individual's knowledge of a domain, where the ability to identify an object is taken as a proxy for general knowledge of the domain. When combined with questions about use (theoretical and substantive) and other methods for studying the instantiation of knowledge in everyday tasks, these tests can help to identify changes in knowledge over time, which may result from changes to the processes of cultural transmission.

2.7.1. Research question, main hypotheses and objectives

This research will address the following question: what happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community? The Mixtec community of Santiago Tilantongo in Oaxaca, Mexico was chosen as a study site. The Mixtec of Tilantongo speak the Mixtec language of Tilantongo-Diuxi, which they share with the neighboring town of San Juan Diuxi. The status of the language however differs very strongly in the two communities; in Tilantongo the language is spoken by 1471 out of 3348 people (INEGI Conteo de Población 2005 II), with a few exceptions all 50 or older, while in San Juan Diuxi 1086 out of 1469 (INEGI Conteo de Población 2005 II) inhabitants speak the language, including children. Children are perceived as the key to language continuation (Krauss 1992; Watahomigie and Yamamoto 1992; Wurm 2003; Harisson 2007). While both communities are located in a very similar environment, the level of language shift that they are experiencing is very different. Because Tilantongo is experiencing a much higher level of language shift, it is a very appropriate study site to investigate the relationship between language shift and TEK.

The main hypothesis that was extracted from the literature review is that language shift is often accompanied by cultural erosion, thus I will test whether there is no difference between the traditional environmental knowledge expressed in Mixtec and Spanish. If the main hypothesis is correct, there should be a difference between the traditional environmental knowledge expressed in Mixtec and Spanish. The question is, how will this difference be expressed if it is present, and is it measurable? Another hypothesis that was extracted from the literature is that plant naming ability is correlated with knowledge of plant uses. I will test whether plant naming ability is a predictor of plant uses knowledge. A further hypothesis that was extracted from the literature review is that exposure to the traditional environment (social and natural) is necessary for children to acquire ethnobotanical naming abilities in the Indigenous language, to develop their biological cognition, the related traditional environmental knowledge and their subsequent relationships with nature. I chose to represent exposure by the variables age, time living in the

community, Mixtec language skills and self-reported experience with medicinal plants. These variables will be tested as predictors of traditional environmental knowledge. Formal education has been recognized as an important tool in strengthening certain cultural beliefs and it has been mostly described in the literature as being negatively correlated with traditional environmental knowledge. Formal education will be tested as a predictor of TEK, as well as of Mixtec language ability as formal education has an important role in contributing or remedying language shift. Age and time living in the community will also be tested as predictors of Mixtec language ability as variables that represent exposure.

The objectives of this research are: the formation of an ethnobotanical database linked to the relevant botanical specimens that were collected; the formation of a linguistic database; testing of the hypotheses above and answering the main research question: what happens to medicinal plant knowledge (and related ethnomedical concepts) when language shift takes place in an Indigenous community?; contribution to our understanding of the hot cold classification system and to 1. provide evidence for its Mesoamerican origins and 2. show that it is not random but governed by rules forming a dynamic yet coherent classification system; contribution to the advancement of the biocultural diversity theory and providing arguments why it should be developed as an overarching theoretical framework within the discipline of Ethnobiology.

A random sample of participants was obtained by constructing a sample frame and using a random number generator (more on this in the following section). Using a random process for the collection of data is needed to make use of the theory of probability regarding tests of statistical hypotheses, so that the hypothesis will reflect the sampling distributions of experience. A test of significance may be described as a method of analysis of statistical data that helps to discriminate between alternative theories or hypotheses. The null hypothesis or H_0 is a specific hypothesis the researcher sets out to test, taking into account the alternative hypotheses to it, which the researcher believes to be important to be on the look out for. The test has to have maximum discriminating power within this group of hypotheses. First the experimental probability set (the set of results that could follow on repeated application of random sampling) is specified. Second the probability set is divided so that we reach a class of results, which will make the researcher more and more inclined, on the information available, to reject the hypothesis tested in favor of alternatives which differ from it by increasing amounts. Thirdly, if possible, the researcher associates with each division of the probability set the chance that if the null hypothesis is true, a result will occur in random sampling lying beyond that level (Pearson, 1947: 142-143). Zar (2010: 74-75) writes that the null hypothesis expresses the concept of 'no difference' regarding a concise statement about the population mean. If statistical analysis concludes that it is likely that a null hypothesis is false, then an alternative hypothesis (H_a or H_1) is assumed to be true (at least tentatively). The researcher states a null hypothesis and an alternative hypothesis for each statistical test performed.

2.7.2. Data collection

2.7.2.1. Obtaining participants from a random sample, research ethics and anonymization

I used the most recent census data obtained from the municipal authorities to construct a sampling frame, which consisted of all adults in the community of Tilantongo, including all the *agencias* or *ranchos*. Butterworth (1990: 18-19, 33) pointed out that studies of just *cabeceras*[24] are not representative of a whole community. When he conducted his research in Tilantongo in the 1960s, 90 percent of the population resided in *ranchos*. Spores and Balkansky (2013: 165) write that the high degree of interaction between the *cabecera* and the *ranchos* seems not to have diminished in the least as a result of the Spanish conquest and that the 16th century

[24] The *cabecera* is the primary settlement and *agencias* or *ranchos* are its dependencies. Together, they form the *municipio,* or community.

community in slightly altered form exists today in the modern Mixtec *municipio*. The *cabecera* is called *centro* nowadays in Tilantongo. The cases were numbered sequentially and a random number generator was used to pick 65 cases to be included in the sample (Newing, 2011: 67-69). Because not all people will be willing to participate and because of complications that might arise after people have consented, 50 is considered a safe number to get the minimum of 30 (prof. Michael Fischer personal communication 2012). I picked 65 just to be on the safe side.[25] Prior informed consent to work in the community had been obtained before commencing fieldwork in November 2012 from the municipal authorities. The 65 people from the sample pertained to 14 *agencias*: Centro, Buena Vista, Las Flores, El Carmen, El Progreso, Socorro, Galeana, Guadalupe Hidalgo, La Paz, Las Palmas, Monte Negro, Providencia, Tres Lagunas, Zaragoza.

The *regidora de turismo*, Eva Cenobio and/or Eliseo Reyes Miguel, the *regidor de salud* travelled with me to each of these *agencias*. Several days prior to our arrival the *agentes* of each selected *agencia* were asked to call an assembly and to ask the people from the random sample to attend. Together with Sra Eva and Sr Eliseo we would explain the project, its aims and what was required of the participants, assuring them that their data would be presented in an anonymous way. People had the chance to ask questions and to think about the project. We asked each person if they would be willing to participate and if so dates for the interviews were agreed upon or at a later stage the municipal authorities would contact an *agente* who would communicate with the participant to set an interview date. I had printed many prior informed consent forms, which were signed by the first participants, but I found that people did not really understand the forms, so I decided not to use them. Prior informed consent was obtained by asking people directly after the assembly whether they wanted to participate and the project was discussed before commencing the first interview again.

Out of the 65 people selected through random sampling, 15 could not participate, three had recently died, four were too ill to participate and eight were not currently residing in Tilantongo. Out of the 50 people remaining 45 people consented to participate. However complications arose: one of the people who consented died during the research period; several elderly people got ill and moved to Oaxaca; some people changed their mind; and I ran out of time to do all the interviews with the remainder. In the end all three elements (freelisting and follow-up uses and preparation interview in Mixtec; freelisting and follow-up uses and preparation interview in Spanish; and the Linguistic Vitality Test) of this investigation were completed with 34 people. This means that the minimum of 30 was achieved (prof. Michael Fischer personal communication 2012). A sample size of 30 is the minimum required to be able to use both parametric and non-parametric statistical techniques (Eagle, 2011: 288-289). The sample size depends on the effect size[26] that you want to test for. To detect a large effect size (*r* is 0.5), 28 participants are required at the standard α-level (the probability level at which we will accept an effect as being statistically significant) of 0.05 and at a recommended power of 0.8 (an 80% chance of detecting an effect if one genuinely exists) (Field, 2011: 58). Therefore, a sample size of 34 should be sufficient for the purposes of this thesis.

2.7.2.2. Obtaining experts to participate

[25] Newing (2011: 69) suggests that if for any reason one of the cases that has been picked with a random number generator cannot be included, the researcher should not move to the next case on the list, but use a random number generator to pick a replacement case. This however wasn't feasible considering the time involved in contacting each person selected to obtain prior informed consent considering that the community consists of 244 km^2 and it takes 2,5 hours by car to travel to further outlying *agencias* such as Las Palmas from the center of Tilantongo and residences are spread out, so usually some walking time is added as well.

[26] Field (2011: 785) gives the following definition of effect size: an objective and (usually) standardized measure of the magnitude of an observed effect. Measures include Cohen's *d*, Glass' *g*, and Pearson's correlations coefficient, *r*.

Two types of experts were needed to participate in this research; language experts and medicinal plant experts. Because I had worked with medicinal plant experts from Tilantongo before during my MPhil I started by contacting them and asking if they would like to participate. I worked with my dear friend and daughter of Sr Aron Montesinos Santiago, the principal *curandero* of Tilantongo, Abigail Montesinos Pedro, who lives in Zaragoza. I would not have been able to do my Mphil research without Aron Montesinos Santiago and my PhD research without Abigail Montesinos Pedro. Abigail's knowledge on medicinal plants and uses is impressive. Abigail participated in numerous plant collection trips and she was one of the experts who verified medicinal plant uses and identification of voucher specimens. She also accompanied me many times as a friend to conduct interviews with the people from the random sample in the more outlying *agencias.* I also continued working with Sra Seferina García Santiago (age 63 and living in Buena Vista) and one of her daughters, Isabela Cruz García. Sra Seferina García was one of the experts who verified medicinal plant uses and identification of voucher specimens, she also participated in some language recordings and one of the plant related focus groups. Isabela Cruz García (age 28, living in Buena Vista) is one of the young people of Tilantongo who learned to speak Mixtec in her twenties and we had several language recording sessions. Other people who had participated were no longer available due to changed circumstances such as no longer living in the community.

I found the other experts I worked with through asking the people I knew (including the municipal authorities) (snowball sampling (Newing, 2011: 74)) who is knowledgeable when it comes to the Mixtec language or medicinal plants. I prepared the Linguistic Vitality Test (LVT) with Sr Marcial Cruz Cenobio (age 60, living in the center) who is a retired school teacher, and who is very passionate about the Mixtec language and the culture of Tilantongo. Sr Marcial would come by most evenings and we would work on my Mixtec. He also participated in all the focus groups. Sr Noe Anon Cruz Santiago (age 69, living in El progreso) and Sra Adelina Agustina Miguel Vicente (age 63, living in El Progreso) participated in plant collection trips, all the focus groups and we also had many individual language recording sessions. Sra Floralia Altamirano Cruz (age 50, living in Monte Negro) was another expert who verified medicinal plant uses and identification of voucher specimens, she participated in language recording sessions, we went on plant collecting trips together and she participated in the plant related focus groups. Sra Fidela Panfila Santiago Palacios (age 83, living in the center) was the eldest expert on medicinal plant uses and identification of voucher specimens and she participated in all the plant related focus groups.

Preceding the three main elements of the random sample interviews, I adminstered a short questionnaire (see table 2.1) aimed to collect general data about the person participating in the research. This short questionnaire relates to basic socio-economic questions (age, place of birth, current place of residence, amount of years in the place of residence, schooling level, occupation) and experience with medicinal plants, how the participants learnt about medicinal plants and what it means to them. I used a system to rank the participants' experience with medicinal plants: no experience (1); picked up some knowledge by observing others (2); picked up a fair amount of knowledge by observing others (3); put in effort to learn as much as possible about medicinal plants from a variety of sources (4). Participants were asked to self-assess their experience with medicinal plants based on this ranking system prior to the plant knowledge and Mixtec knowledge interviews.

Table 2.1: General questionnaire

Nombre de la entrevistadora:
Lugar y fecha de la entrevista:
1. Nombre del(a) experta/informante entrevistado/a'
2. Edad:
3. Lugar de nacimiento:
4. Lugar de permanencia:
5. Cuántos años ha vivido en la comunidad?

6. Educación:
7. Profesión:
8. Experiencia con las plantas medicinales:
    1. ninguna experiencia/conocimiento
    2. un poco experiencia/conocimiento aprendido observando otros
    3. bastante experiencia/conocimiento aprendido observando otros
    4. trató de aprender todo lo que podría sobre las plantas medicinales de varias fuentes
9. Cómo aprendió el conocimiento de las plantas medicinales?
10. Qué significa el conocimiento de las plantas medicinales para usted?

2.7.2.3. Mixtec language related data collection

With the help of the above-mentioned Mixtec language experts, recordings were made of the Swadesh Wordlist for Mesoamerican Oto-Manguean languages (this list consists of 240 words to be elicited), one or more contrastive sentences related to each word in the wordlist, sentences related to medicinal plant use and all words and sentences from the Pike and Oram (1976) article 'Stress and tone in the phonology of Diuxi Mixtec'. A TASCAM DR-100 MKII linear pcm recorder with a high-quality stage microphone was used to make all the audio recordings. Words in isolation were repeated two to three times by each expert, while sentences were said once. The Linguistic Vitality Test was prepared with Sr Marcial and we tested it with several people before administering to the random sample participants.

2.7.2.4. Linguistic Vitality Test (LVT)

All random sample participants were administered the Linguistic Vitality Test. The LVT was developed by Margaret Florey and has three components: lexical recognition, translation sentences and discourse. The lexical recognition test component is designed to test receptive ability in the target language and no productive language skills are necessary. The second component, translation sentences, tests the productive ability in the target language, requiring translation from the dominant language (Spanish) to the target language (Mixtec). The last component, the discourse test, is designed to test the creative ability in the target language by asking the participant to talk for about a minute in Mixtec. The first element should take 30-45 minutes, the second up to 25 minutes, the third approximately 15 minutes. The LVT is designed specifically to test language ability in a situation of language shift. In Tilantongo there are still some people who are monolingual Mixtec speakers. The second test can only be administered to people who are bilingual since knowledge of Spanish is necessary for the translation task. There was only one elderly mostly monolingual Mixtec speaker among the random sample. This participant skipped the first two tests and I only recorded the third test.

First test (lexical recognition task): Five photo sets were developed consisting of a total of 53 test items[27]. The first three sets test recognition of common nouns, while the fourth and fifth set test recognition of simple sentences. Mixtec descriptions of the 53 lexical recognition items were recorded with a fluent speaker. The first photo set was displayed in front of the participant, while the content of each photograph was explained in Spanish. After this the lexical item description recording was played twice, the participant selected a photo that matched the recording, and the researcher noted the response. This procedure continued through all the photo sets. Based on their test experience Margaret Florey assessed that respondents who identified more than 35 items can take the second test.

[27] Plant names are not included in these 53 test items, except for the class term *ita* for flowering plants which can also refer to the word 'flower', as it does in this context.

Second test (translation sentences): There are 75 translation sentences in total. The translation task was explained first, then the first test sentence in Spanish was read out, the participant translated to Mixtec. If reasonably confident with the first translation set the researcher moved to the second and third. All translation tasks with each random sample participant, who could do the task, were recorded.

Third test: Participants who completed all three translation sets moved to the discourse task. Margaret Florey used six photos from the lexical recognition task to trigger discourse or asked them to make up a story in the target language. I asked people to tell a story in Mixtec, whatever they felt like sharing, they could talk about their life or any activities that they had done or were planning to undertake that day. All discourse tasks with each random sample participant, who could do the task, were recorded (Florey, 2007: building tools for assessing linguistic vitality).

2.7.2.5. Plant specimen collection

By courtesy of Alejandro de Ávila Blomberg, director of the Ethnobotanical Garden of Oaxaca a card was prepared that granted permission to collect plant specimens in Oaxaca state on behalf of the Ethnobotanical garden as part of my PhD research. The ethnobotanical garden of Oaxaca has the authorization of the Mexican environmental secretary to collect plant specimens in the state of Oaxaca. All plant specimens that were collected were originally deposited in the Ethnobotanical garden of Oaxaca, where preliminary identifications took place before the specimens were sent to the herbaria of the Society for the Study of Biological Resources of Oaxaca (SERBO) and the National Herbarium of Mexico (MEXU) for further identification and storage. The best specimens were mounted (before identification) on my request by Ana Ruiz Velasco and Rosenda associated with the Ethnobotanical garden of Oaxaca and SERBO. These mounted specimens are in the community museum of Tilantongo, where they have their own display case.

The plant specimens were collected with the experts mentioned above. Of each collected plant specimen, the names were written down, a botanical description was made, and a photo was taken. The plant specimens were dried in a plant press inside a plant dryer made by the ethnobotanical garden of Oaxaca. A total of 309 plant specimens were collected, each with two or more duplicates when possible. The plant specimens were collected in the following *agencias*: Buena Vista, El Carmen, El Centro, Guadalupe Hidalgo, Monte Negro, El Progreso, Tres lagunas and Zaragoza. There were several collection instances of the same plant if I thought specimens were not good enough or had dried badly. The plant specimens were identified by César, Rosenda and Oscar of the Ethnobotanical garden of Oaxaca, Silvia Salas of SERBO and Rosalinda Medina Lemos of the National Autonomous University of Mexico (UNAM). All collected plants were discussed using the voucher specimens in combination with photos with a focus group of experts in order to check all the names and to see if plants had multiple names, both in Mixtec and Spanish.

2.7.2.6. Collecting ethnobotanical data

One of the research goals has been documenting medicinal plant knowledge and related ethnomedical concepts as a subset of TEK in the community of Tilantongo. In order to reach a better understanding of this knowledge system and to compare the distribution of its elements amongst different groups of people I started by conducting Cultural Domain Analysis. Cultural Domain Analysis aims to uncover how people define their world and the categories that make up their worldview. Different people in different societies will define and delimit their categories in distinct ways. The way people define and delimit a specific category and organize the elements that make up the category can give insight into the importance of that category, the way people think about that category and the characteristics of the culture that is being studied. A specific category that is important to a specific society is known as a cultural domain. Freelisting can be

used to identify the components of a cultural domain (Puri, 2011: 146-149). During fieldwork for my Mphil it became clear that *yuku tatna* in Mixtec and *plantas medicinales* in Spanish are important cultural domains in Tilantongo.

I conducted freelisting exercises with the people from the random sample, collecting freelists of the domains *yuku tatna* and *plantas medicinales.* According to Borgatti (1998) the number of informants needed to collect freelists with depends on the amount of cultural consensus in the population of interest, but as a rule of thumb a minimum of 30 freelists should give adequate information. The Mixtec and Spanish freelists were collected on separate occasions, preferably several weeks apart to ensure that they were independent events. They were administered in random order. Because of language shift in the community not all participants were able to list items in both languages, although one person listed a Mixtec descriptor of a plant in their Spanish freelist, even though they said they could not name any Mixtec plants. As it was a Mixtec descriptor rather than a Mixtec plant name, the plant could not be identified by the experts. In the Mixtec freelisting exercise people mentioned introduced species which are known by their Spanish name, that has been adopted into Mixtec. After conducting the freelisting exercise in both Spanish and Mixtec, a follow-up interview took place, one in Spanish and one in Mixtec, in which the participant was asked to name all the medicinal uses of each plant she/he mentioned. Table 2.2 lists the freelisting questions and the questions asked in the follow-up interview in Spanish. Table 2.3 contains equivalent questions in Mixtec. Table 2.4 contains the English translation of these questions. For each plant use mentioned by the participant, they were asked to describe how the plant is used (see table 2.4 for specifics) and whether they had used the plant/ had seen the plant used/ had heard how the plant should be used and from whom this use was learned. Also, for each plant, the participant was asked whether it was hot or cold.

Table 2.2: Freelisting and follow-up plant uses interview Spanish

1. Nombra todas las plantas medicinales que conoce.
2. Nombra todos los usos medicinales de las plantas que mencionó.
3. Cómo se usa la planta?
4. Qué parte(s) de la planta se usa?
5. Cuándo se recoge la planta?
6. Cómo se prepara la planta (fresca, seca, molida, hervida, etc.) y cómo se aplica? (¿se toma o se unta o se barre, etc.?)
7. Cuánto tiempo se usa?
8. Se combina la planta con otra cosa? (limpia, otra planta, oración, alcohol, etc.)
9. Cómo aprendió este uso?
10. Ha usado la planta en esta manera? / Ha visto a alguien usando la planta así o ha escuchado sobre este uso?
11. Está fría o caliente esta planta?

Table 2.3: Freelisting and follow-up plant uses interview Mixtec[28]

1. Kada xamani ka'un nanda nani yuku kida tatna texiniun?
2. Kada xamani ka'un nanda jwetniuro yuku kida tatna texiniun?
3. Nanda jwetniuro yuku ya'a?
4. Jwetniuro nda'a yuku? / Jwetniuro yo'o yukude? / kwa'a xa jwetniuro yutnude?
5. Nde yoo nake'ero yuku ya'a?
6. Nanda kadava'ar yuku ya'a? (kwi, yichi, ndiko, dakwido, etc.)
7. Nada kɨu ku tatnar?
8. Iyo ka ɨnka yuku kunetna'a? Iyo ka xa jwetniuro?
9. Yundu dane'e ña'a?

[28] See Chapter six for a translation and analysis of the Mixtec questions in Table 2.3.

10. Xe tniun yuku ya'a? / Koxiniun ñayiw xe tniun yuku ya'a? / Tekun nanda kada tatnaro?
11. Vixi o i'ni yuku ya'a?

Table 2.4: English translation of the freelisting and follow-up plant uses interview

1. List all the medicinal plants that you know.
2. List all the medicinal uses of the plants that you mentioned.
3. How do you use this plant?
4. which part(s) of the plant are used?
5. when do you gather the plant?
6. How do you prepare the plant (fresh, dried, ground, boiled, etc.) and how is it applied? (is it drunk, is it rubbed or is it swept, etc.?)
7. How long is it used for?
8. Is the plant combined with anything else? (cleansing, other plants, prayer, alcohol, etc.)
9. How did you learn this use?
10. Have you used this plant in this way? Have you seen someone using this plant in this way or have you heard about this use?
11. Is this plant hot or cold?

2.7.2.7. Plant focus groups

I organized a focus group of the experts mentioned above to identify all the items on the freelists, cross-checking the Spanish and Mixtec names and the uses that were given. For as many items as possible voucher specimens were acquired in the field with the help of an expert. The voucher specimens were also cross-checked with the names by the focus-group. The municipal authorities granted us the use of the municipal museum and helped organizing chairs and a table for the focus group. Four sessions took place over a span of four days. Two sessions to discuss and identify the voucher specimens and the myriad names and two sessions to discuss all the plant names mentioned in the freelisting exercises and all the uses of the plants mentioned during the freelisting follow up interviews. This allowed comparison of the data between participants and it also provided an answer key for the plant uses and preparations that were mentioned.

2.7.3. Data analysis

2.7.3.1. Preliminary tonal analysis

The Mixtec language-related recordings mentioned in section 2.7.2.3. were listened to extensively and repeatedly and data were compared between recordings of each of the language experts. I started by establishing tonal exemplars. All recorded words were compared to these exemplars and then placed in surface tone word groups, each group consisting of words with the same tonal pattern. Once surface tonal patterns were established on bimoraic[29] words, I moved on to tonal frames to elicit underlying tones and analyze tonal sandhi. A comparison was made with previous work on tone in San Juan Diuxi. Auto-segmental phonology was used to analyze the tonal frames, supported by recent work on tones, most notably McKendry's (2013) thesis on Mixtec tones. This preliminary work on tones allows for a more in-depth analysis of the Linguistic Vitality Test.

2.7.3.2. Linguistic Vitality Test

[29] The couplet is a binary constituent central to tonal analysis of Mixtec (Daly and Hyman, 2007: 167). I follow McKendry's (2013: 22, 68, 71) analysis that the couplet consists of two moras and that a word must be at least bimoraic.

A Mixtec language focus group consisting of three experts, Sra Adelina, Sr Noe and Sr Marcial, was formed to help with the analysis of the Linguistic Vitality Test. The second component, the translation test, was listened to and discussed and we tried to record all possible variations of the translation sets in Mixtec. All recorded texts from the third component, the discourse task, were listened to and analyzed by the focus group over a course of several weeks in which we gathered for sessions that lasted from half a day up to three days. This allowed us to assign Mixtec language ability scores based on the test results, and discuss tonal variations. Linear regression was used to test predictors of Mixtec language ability (age, time living in the community, and education). The work done on the tonal system of Tilantongo Mixtec, described in section 2.7.3.1. allowed a preliminary speech and tonal analysis of the LVT data, yielding some interesting results.

2.7.3.3. Testing what happens to traditional environmental knowledge when language shift takes place

The two freelists, one in Mixtec and one in Spanish, that were collected with each of the 34 randomly selected participants, for a total of 68 freelists, were compared and analyzed. The null hypothesis 'there is no difference between the plant knowledge expressed in Mixtec and Spanish' was tested. I used a dependent t-test to compare Smith's S, which reflects the salience of the plant, in the Mixtec and Spanish interviews to compare the plants that were mentioned both in Mixtec and in Spanish. I also used a dependent t-test to compare the number of Mixtec plant names with the number of Spanish plant names freelisted per participant. Disproving the null hypothesis would allow us to tentatively accept the alternative hypothesis: there is a difference between the plant knowledge expressed in Mixtec and Spanish and vice versa. I analyzed the plants that were freelisted in Mixtec but not in Spanish. I also analyzed the level of instantiation of the preparations mentioned by the participants, and the categories that the traditional environmental knowledge conglomeration that constitutes medicinal plant knowledge belongs to, and how that affects its transmission. Related to this, I analyzed how the participants learned about medicinal plant knowledge by looking into transmission patterns.

2.7.3.4. Testing whether plant naming ability predicts plant use and preparation knowledge

Using the expert answer key, plant use and preparation knowledge scores were calculated for the random sample participants. Plant naming scores were also calculated (a general plant naming score, taking into account each plant a participant mentioned, regardless of language; a Mixtec plant naming score; and a Spanish plant naming score). Linear regression was used to test whether plant naming ability predicts plant use and preparation knowledge.

2.7.3.5. Testing for predictors of traditional environmental knowledge

Age, education, Mixtec language ability and self-reported experience with medicinal plants were tested as predictors of traditional environmental knowledge using linear regression.

2.7.3.6. Plant classification, uses and illnesses

Using the ethnobotanical database in Appendix 1, a comparison was made with previous work on Mixtec plant classification. Text analysis of the Mixtec questions related to plant use (see figure 6.2), used to make the questionnaire for the Freelisting and follow-up plant uses interview in Mixtec (see table 2.3), took place. As well as text analysis of the Mixtec sentences related to illness and treatment (see Appendix 7) obtained during the plant use and preparation interviews with the random sample participants. I analyzed how people talk about illnesses, treatments and medicinal plants in Mixtec and in Spanish to investigate which concepts that exist in Mixtec shift into Spanish and which do not.

2.7.3.7. Hot cold analysis

I analyzed previous work on the hot cold classification system and compared it to the Tilantongo data on the subject, proposing that understanding of the hot cold system comes from re-interpreting the hot cold system as an Indigenous TEK system that is part of the medicinal plant knowledge TEK conglomeration. I tested whether the hot cold classification system is governed by rules (forming a dynamic yet coherent classification system), or whether it is random. I speculated that understanding of this system comes from understanding the classification context for each classification event. I tested whether the principle of opposites provides classification context. I analyzed 1193 hot cold identification events for 264 plants mentioned by the 34 random sample participants. Probability calculations were used to calculate the chances of occurrence for the patterns of agreement. Useful probabilities could be calculated for 789 classification events representing 89 plants. A one sample t-test was used to test the random probability mean of those 789 classification events representing 89 plants. Using expert hot-cold classification of the uses that were mentioned by the participants for each plant, the application of the principle of opposites was tested. I also tested whether the principle of opposites applies more consistently with higher agreement on hot cold classification of the plant itself.

2.8. Summary

This chapter introduced the geographical and historic background of the Mixteca, and presented previous ethnobotanical work conducted in the Mixteca. It gave an overview of the research methods starting with data collection: how the random sample participants were obtained, research ethics and anonymization, how experts were obtained, Mixtec language data collection, the Linguistic Vitality Test, plant specimen collection, ethnobotanical data collection, and plant focus groups. Then a short overview of how the data were analyzed was presented, starting with the preliminary tonal analysis, followed by the Linguistic Vitality Test, testing what happens to traditional environmental knowledge when language shift takes place, testing whether plant naming ability predicts plant use and preparation knowledge, testing for predictors of traditional environmental knowledge, plant classification, uses and illnesses, and hot cold analysis.

3. The Mixtec language of Tilantongo: a preliminary tonal analysis

3.1. Introduction

The Mixtec of Tilantongo speak a tonal language. This means that pitch is used to produce tones that, together with other phonological features, determine the meaning of words and morphemes. Hyman (2007: 485) indicates that

"a language with tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes".

Pike (1964: 3) defined tone language as a language that has lexically significant, contrastive but relative pitch on each syllable. All languages possess intonation; the use of pitch in a contrastive manner to express discoursal meaning and mark phrases (Gussenhoven, 2005: 22), and over 50 percent of the world's languages are estimated to be tonal (Yip, 2002: 1; Hyman, 2007: 483; Gussenhoven, 2005: 28), where tone is a phonemically contrastive feature. In order to understand how people speak as opposed to whether they speak Mixtec and to further analyze the data collected during the administration of the Linguistic Vitality Test (LVT), it is necessary to fully understand the tonal system of Tilantongo. Without a full understanding of the tonal system it is impossible to assess the nuances of language shift in the case of any tonal language.

One of the difficulties when analyzing a tonal language is the translation of the phonetic data (pitch) to phonological data (tone). Obviously, there is large variation between speakers when it comes to the pitch height they produce to convey a certain tone, but also within a speaker's range of production there often is pitch variation to denote the same tone. The speaker converts phonological input to phonetic output and the researcher tries to do the reverse. Yip (2002: 78) writes that phonetically every syllable is pronounced on some pitch, with a frequency that depends on a vast array of factors such as the sex of the speaker, their state of mind, whether they have laryngitis, whether the syllable is at the beginning or end of an utterance and the phonological tone features associated with that syllable. Within a person's pitch range, between the highest and lowest pitch that she/he can produce is a pitch spectrum which has to be translated to discrete morphophonemic units of meaning denoted by tone. Pike (1953: 101-102) points out how, for example, the disparity in the interval between phonemic pitch levels can confuse the researcher in distinguishing the structurally relevant contrasts.

3.2. Methodology

Although the tonal analysis is an integral part of this research it was not the only focus while in the field. Extensive linguistic work undertaken by the Summer Institute of Linguistics (SIL) has taken place in the neighboring town of San Juan Diuxi, which proved very helpful for my research. As part of the tonal analysis I recorded the same tonal frames as Pike and Oram did in 1976, as well as all the words and phrases that feature in their article to illustrate their tonal analysis. I also recorded the Swadesh Otomanguean languages list and contrastive sentences centered around the items on this list. For this part of the research I worked with six experts: Sra Adelina Agustina Miguel Vicente (age 63), Sr Marcial Cruz Cenobio (age 60), Sr Noe Anon Cruz Santiago (age 69), Sra Floralia Altamirano Cruz (age 50), Sra Seferina García Santiago (age 63) and Isabel Cruz García (age 28). Together they represent the *agencias* of Monte Negro, Centro, El Progreso and Buena Vista. Recordings from other parts of the research such as the LVT test, the plant questionnaire and sentences related to use of medicinal plants served as additional material to check the tonal data.

The program Praat (Boersma and Weenink 2010), free and open source software for speech analysis in phonetics, was used to listen to and analyze the recordings and observe pitch patterns. I also used it to create the images of the recordings following in the text.

The work Cornelia Mak (1953) and Pike (1953) did on the Mixtec tonal systems in San Miguel el Grande and San Esteban illustrates that *municipios* or townships which are in the same

major central dialect area, with frequent travel and trade between them, geographically very close together and with Mixtec variants that are easily mutually intelligible, can have two completely different tonal systems. This in combination with the lack of agreement regarding tonal analysis and transcription in previous works focused on the Mixtec of Diuxi made me decide to analyze my data without any assumptions and only compare it to Diuxi and earlier writings once I had a fair idea of what was happening with the tones in Tilantongo.

I use the orthography developed by Ve'e tu'un savi (Academia de la lengua Mixteca) (Peña 2007; De los Ángeles Romero Frizzi 2003) as much as possible. Ve'e tu'un savi 'house of the word of rain' was created at the beginning of the 1990s as an institution to strengthen Mixtec identity and develop a writing system for Mixtec to fight language loss, break structures of internal and internalized colonialism and participate in the Mexican nation as citizens who enrich the diversity of its languages and cultures through the development of every single one of them (Caballero, 2008: 239-249; Caballero, 2003: 73-85). The tables 3.1a and 3.1b give an overview of the segmental phonological units in Tilantongo-Diuxi Mixtec and the correspondence to Kuiper and Oram's (1991) inventory for Diuxi and the inventory of Ve'e tu'un savi (Caballero, 2008: 245-246; Peña, 2007: 39-42). Due to the variation and linguistic richness of the Mixtec language family not all phonemes /dj ts ty ö ü/ in the Ve'e tu'un savi orthography are present in Tilantongo. The exception being the voiced dental fricative [ð] which has no exact academy counterpart, but most closely resembles the voiceless dental fricative [θ] written by the academy as dj. The consonants /n/ and /r/ become syllabic in final position and carry tone (Kuiper and Oram 1991).

Table 3.1a: Vowels

Phonetic symbols with the manner of articulation	Phoneme	Orthography	Tilantongo Mixtec has six oral vowels that can be nasalized and glottalized. When nasalized[30] a superscript n: ^{n} is added to vowels that do not follow a nasal consonant. When glottalized ' is added. Ve'e tu'un savi lists the vowels /ü/ and /ö/ additionally to the six vowels in Tilantongo Mixtec
[i] front, close	/i/	I	
[ɛ] front, open-mid	/ɛ/	E	
[a] front, open	/a/	A	
[ɨ] central, close	/ɨ/	ɨ	
[u] back, close	/u/	U	
[ɔ] back, open-mid	/ɔ/	O	

Table 3.1b: Consonants

Phonetic symbols with the manner of articulation	**Tilantongo Mixtec**		**Ve'e tu'un savi**	**Kuiper and Oram**
[b] bilabial, plosive, voiced [β] bilabial, fricative, voiced	/β/ /b/	v	v represents /b/	v represents /β/ b represents /b/ only in Spanish loanwords
[m] bilabial, nasal, voiced	/m/	M	/m/	/m/
[p] bilabial, plosive, voiceless Only in Spanish loanwords	/p/	P	/p/	/p/ only in Spanish loanwords
[ʊ] labiodental, approximant, voiced	/ʊ/	W	/w/	-
[k^{w}]Labialized, velar, plosive, voiceless	/k^{w}/	kw	-	Kw
[t] alveolar, plosive, voiceless	/t/	T	/t/	/T/

[30] McKendry (2013: 4, 17) presents nasalization in Mixtec as a feature of the morpheme, not the vowel.

Phonetic symbols with the manner of articulation	**Tilantongo Mixtec**		**Ve'e tu'un savi**	**Kuiper and Oram**
[tⁿ] alveolar, plosive, voiceless, nasal release	/tn/	tn	-	-
	-	-	Ts represents /t͡ɕ/	-
[ð] dental, fricative, voiced (not after [n])	/ð/	d	D represents /d/	~~Đ~~ same as /ð/
	-	-	Dj /θ/	-
[ⁿdʸ] prenasalized, alveolar, plosive, voiced, palatalized	/ⁿdʸ/	ndy	Most similar to ty (alveolar, palatal, voiceless stop)	-
[n] alveolar, nasal, voiced	/n/	N	/n/	/n/
[ⁿd] prenasalized, alveolar, plosive, voiced	/ⁿd/	nd	-	Nd
[l] alveolar, lateral approximant, voiced	/l/	L	/l/	/l/
[r] alveolar, trill, voiced	/r/	R	R trill	r liquid[31]
[s] alveolar, fricative, voiceless	/s/	S	/s/	/s/
[ʃ] postalveolar, fricative, voiceless	/ʃ/	X	X	sh
[tʃ] postalveolar, Affricative, voiceless	/tʃ/	Ch	ch	Ch
[ʒ] postalveolar, fricative, voiced[32] [j] palatal, approximant, voiced	/ʒ/	Y	Y	Y
[ɲ] palatal, nasal, voiced	/ɲ/	Ñ	Ñ	Ñ
[k] velar, plosive, voiceless	/k/	K	K	K
[g] velar, plosive, voiced	/g/	G	G	-
[gʷ]labialized, velar, plosive, voiced	/gʷ/	gw	-	Gw
[ŋ] velar, nasal, voiced	/ŋ/	Ng	Ŋ	ng
[x] velar, fricative, voiceless [χ] uvular, fricative, voiceless [ħ] pharyngeal, fricative, voiceless	/x/	J	j represents /h/ but velar, fricative, voiceless	X
[xʷ] labialized, velar, fricative, voiceless	/xʷ/	jw	-	xw
			-	f bilabial fricative

[31] Flap r in Pike and Oram (1976).

[32] McKendry (2013: 15) writes that the proto-phoneme which Mak and Longacre reconstruct as *ʒ and which Josserand reconstructs as the semi-vowel *j is realized as [j] in some varieties and as [ʒ] in others. McKendry writes that in Southeastern Nochixtlán Mixtec it is usually realized as [ʒ] in stressed syllables and as [j] elsewhere.

Phonetic symbols with the manner of articulation	Tilantongo Mixtec		Ve'e tu'un savi	Kuiper and Oram
[ʔ] glottal, plosive, voiceless	Glottalized vowels	-	Glottalized vowels	H

3.3. Establishing the surface contrasts (stage I of how to study a tone language) (Hyman 2014)

Hyman (2014: 527-532) suggests that we should start by looking at words in isolation, by recording wordlists and then grouping words which sound as though they have similar tones together and listening to them again to check for inconsistencies, starting with noun citation forms. This is similar to Pike's (1964: 48; Yu, 2014: 740) methods, who suggests starting by classifying words in word classes of uniform morphological and phonological structure. Cruz and Woodbury (2014) use exemplars of each word class to compare new words they record to and assign them accordingly. This is in accordance with Pike (1953: 102) who suggests that the researcher, once helpful contrastive pitch data are found, refers to them often. Exemplars are first sorted prosodically and then by pitch (Cruz and Woodbury, 2014: 501-502). Because of the earlier mentioned difficulties with "translating pitch to tone" many scholars find it more useful to group words with the same pitch together without assigning tone until a later stage or assigning preliminary tones for the pitch groups. In contrast with the standard for Mesoamerica, I use 1 to denote the lowest pitch and 5 the highest pitch of a speaker. I chose to do this because it is the standard in general works on tone (Yip, 2002; Gussenhoven, 2005). Following in the text I present word groups, which I sorted prosodically and by pitch. When prosodically different words have the same pitch pattern I have grouped them together in the same word group. Preliminary tones have been assigned to the word groups. The pitch pattern of each word group is illustrated through one or more Praat pictures (see supplemental document for linked sound files).

Daly and Hyman (2007: 167) write that it is the minimal phonological word or couplet, a binary constituent, which is central to tonal analysis of Mixtec. There is some indeterminacy on whether the couplet consists of two syllables or two moras. In Peñoles Mixtec the couplet normally consists of a CVCV, CVV, VCV, VV root. There are no couplets with the shape CVVCV or CVCCV. The couplet may be preceded (proclitics) or followed by monosyllabic morphemes (enclitics) dependent on the root. In PM each V is an independent TBU (tone bearing unit). The glottal stop does not take up a skeletal slot. Macaulay and Salmons (1995: 38) write that the phonological status of glottalization is problematic among the languages of the Americas. In a more descriptively oriented approach where the glottal stop would be posited as the phoneme /ʔ/ in the consonant inventory the word *va'a* would be assigned a CVCV structure. In the prosodic approach the vowels are analyzed as being glottalized and the word *va'a* would be assigned a CVV structure. Macaulay and Salmons think both representations are flawed. As could be seen in the orthography, I have chosen to analyze the Mixtec of Tilantongo using glottalized vowels. However I would feel more comfortable doing this after analyzing couplets that contain a glottal stop in a context of tonal alternations and comparing their behavior to prosodically similar couplets with the glottal stop both as a consonantal and as a vocalic feature and observing how it fits (whether these couplets with a glottal stop behave as though it does not occupy a skeletal slot or whether they behave as though it is a consonantal feature). However, this is outside of the scope of this thesis[33].

[33] To illustrate the difficulty in analyzing the phonological status of the glottal stop, for San Miguel el Grande Mixtec McKendry (2013: 20-21, 69) considers the glottal stop a feature of the vowel, making CV'V monosyllabic, while Tranel (2012) considers CV'V as bisyllabic, unlike CVV words which he considers monosyllabic but bimoraic. McKendry (2013: 75) goes on to write that Goldsmith (1990) accounts for the difference in tonal association patterns of words which are CV'V and CVCV in San Miguel el Grande Mixtec by positing that the glottal stop occupies a position on the tonal tier, however the glottal stop does not participate in tone association phenomena in all varieties of Mixtec, as in Southeastern Nochixtlán Mixtec.

Returning to the issue as to whether the couplet consists of two syllables or two moras, McKendry (2013: 22) writes that both CVCV and CVV words have two vowel positions in all Mixtec varieties, and that in the case of the CVV form, the underlying vowel is linked to both positions. This is in accordance with Josserand (1983 in Dürr, 1987: 22), who wrote that VV is phonetically V, but that it should be treated as consisting of 2 mora. McKendry (2013: 68, 71) follows Hyman (2003) and Hayes (1995) and analyzes CVV words as one heavy syllable. She writes that this would change K. Pike's analysis that a word must have at least two vowels and be bisyllabic to a word that must be at least bimoraic. When CVV is considered a heavy syllable, it is the mora that is argued to be the TBU. Heavy syllables have two moras and can therefore have two tones associated, one per mora, whereas a light syllable has only one mora and thus one tone associated. McKendry (2013:74) writes that when vowels are not identical in CVV words, these words are bisyllabic in San Miguel el Grande Mixtec.

McKendry (2013: 69-71) writes that CVV words become CV when they occur as the first element of a compound word and that they also become unstressed[34]. She accounts for this by positing that heavy syllables are stressed, thus by reducing the syllable it becomes light. She postulates this as part of the clash avoidance rule which means stress on adjacent syllables is not permitted in San Miguel el Grande and Southeastern Nochixtlán Mixtec. She goes on to write that the foot structure in San Miguel el Grande Mixtec is built from right to left and does not span morpheme boundaries. Following Alexander (1980) this approach accounts for the fact that in words of more than two syllables it is the penultimate syllable that is stressed.

In section 3.4 of this chapter I will present data on CVV words in order to further illustrate how tone links to the TBU in Tilantongo Mixtec. I find McKendry's (2013) argument of the mora being the TBU in Mixtec convincing and I hope to present further evidence to support this. In both the bisyllabic and monosyllabic word groups following the Praat picture example, I have added citation examples that are compounds. Compounding is indicated by a -. Tilantongo Mixtec also has words that are CVCVS, S stands for sonorant consonant. In a non-compounded word this is usually an approximant[35] that carries tone. In compounded words CVCV-S it would usually be the personal affix -n or -r. As already mentioned, Kuiper and Oram (1991) wrote that the consonants /n/ and /r/ become syllabic in final position and carry tone, I wonder whether they do not form a syllable of their own, but instead become the sonorant coda of the syllable they attach to, changing that syllable to bimoraic as in the case of noncompounded CVCVS words, where the second syllable appears to be bimoraic, with two sonorants that carry tone. More research into this is needed. Other bimoraic second syllable forms existent in Tilantongo Mixtec are CVCVV and CVCSV. This means that in Tilantongo Mixtec the couplet consists of a CVCV, CVV, VCV, VV, CVCVV, CVCSV or CVCVS[36] root.

3.3.1. Praat picture example explanation

[34] Pike and Oram (1976: 322-323) wrote that in Diuxi Mixtec each non-compounded word has a first syllable that is stressed and marked by a long vowel. When a compound word is made up of two stems, the first stem loses the length from its long syllable. If the first stem has a CVV or CV'V pattern the second syllable is also lost. This means the first stem loses its stress. This description coincides with McKendry's (2013).

[35] An approximant is a type of consonant of which the articulation falls between fricatives and vowels.

[36] Following McKendry (2013), if words of this type were transcribed with a /u/ rather than with a /ʊ/, the second syllable would be analyzed as two syllables, because it would contain two different vowels. Considering that the basic word in Mixtec is the couplet it seems more likely that words of this type end in an approximant when they are not compound words.

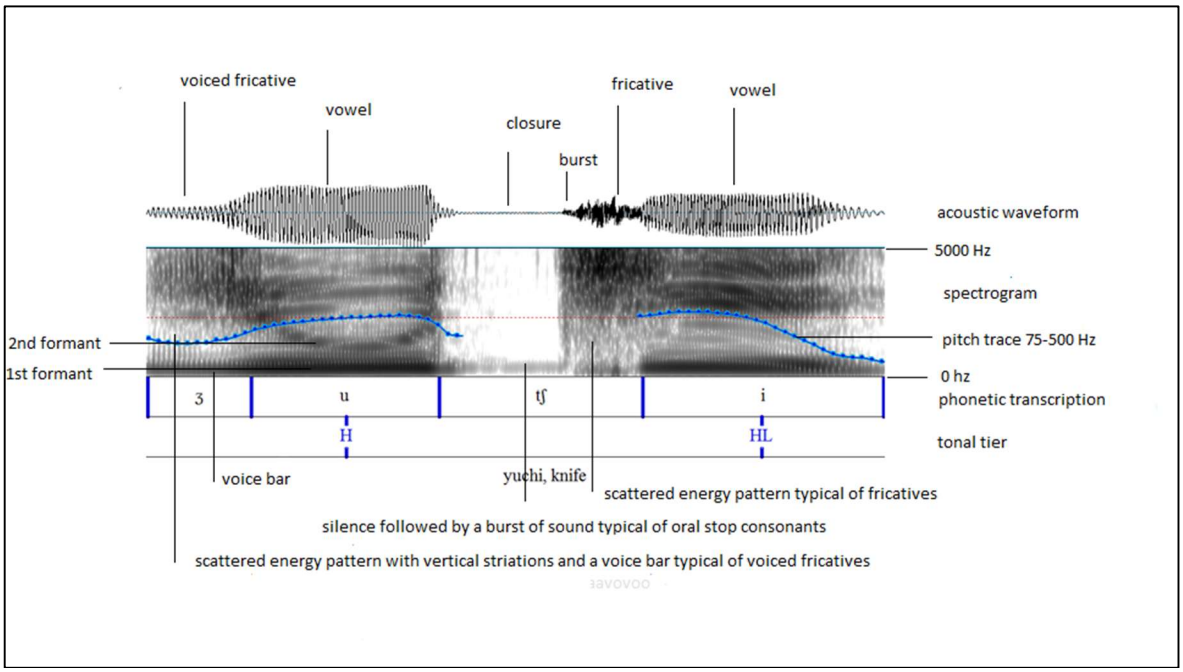


Figure 3.1: Praat picture example

Figure 3.1 is an example of a Praat picture. The acoustic waveform is a graph of a sound wave. The vertical axis represents air pressure (relative to the normal surrounding air pressure) and the horizontal axis represents time. Voiced sounds have comparatively large regular pulses of air pressure and voiceless sounds have a smaller amplitude and irregular variations of air pressure (Ladefoged and Johnson, 2006: 7). In a spectrogram complex sound waves are split into their component frequencies (overtone pitches), the amplitude (intensity) of each frequency being shown by darkness. The horizontal axis represents time and the frequency of the components is shown on the vertical scale (Ladefoged, 2005: 38; Ladefoged and Johnson, 2006: 194), which in the spectrograms in this thesis ranges from 0 Hz to 5000 Hz. Resonances of the vocal tract are called formants. Vowels can be distinguished by differences in their formant frequencies which relate to their manner of articulation and vary due to individual and accentual differences between speakers. There are other acoustic correlates of articulatory features that can be observed in spectrograms and are used for their interpretation, some of which are illustrated in figure 3.1. Individual variation and phonetic context change the articulatory manner and influence the acoustic structure of phonetic features complicating the interpretation of spectrograms (Ladefoged and Johnson, 2006: 193-212; Ladefoged, 2005: 34-62). The pitch of a sound depends on the rate of repetition of a sound wave. 100 Hz or when the frequency of repetition is 100 times a second, represents a fairly low pitch in a male voice (Ladefoged, 2005: 7). My settings for pitch tracking in Praat range from 75 Hz to 500 Hz, meaning that when the blue pitch trace line touches the bottom of the spectrogram it registers a pitch of 75 Hz or less, while the top of the spectrogram would represent 500 Hz. The vertical striations that represent voicing or vocal fold vibrations in a spectrogram also indicate pitch height: the closer they are together, the higher the pitch (Ladefoged and Johnson, 2006: 195).

3.3.2. Surface tone word groups

In tables 3.2 to 3.15, an overview is presented of groups of words with the same surface tonal patterns in citation form. In Tilantongo Mixtec the following seven tonal patterns exist on CVCV words in isolation or in citation form: H H, H HL, L HL, L H, HL L, H L and HL LH. Pike and Oram (1976: 327) wrote that in Diuxi Mixtec there are five stress-tone patterns on two syllable words in isolation; H H, H H-stressed (H HL), H L, L H and L H-stressed (L HL). For Tilantongo all these

patterns are attested for with the addition of the HL L and HL LH patterns. Pike and Oram (1976: 324-327) transcribe *tvea* (squash flower) and *tkwiti* (potato) as H L, while in Tilantongo these words have an HL LH pattern. They also transcribe *chuku* (louse) and *chaka* (fish) as H L while in Tilantongo these words have an HL L pattern. The presence of floating tones (see Section 3.5) means that there are more underlying patterns that can be distinguished. In order to further illustrate contrast between these tonal patterns, they must be observed in the setting of tonal frames (see Section 3.5). On monosyllabic CVV words the same seven tonal patterns exist in citation forms as on the bisyllabic CVCV words.

3.3.2.1. Bisyllabic word groups

In table 3.2, words with an H H surface tonal pattern are presented together. Figures 3.2a to 3.2e present Praat picture examples of the H H tonal pattern on words of different prosodic types, showing the pitch patterns.

Table 3.2: Bisyllabic citation forms of words by prosodic type and pitch group (H H)

Prosodic type	Pitch	Tone
CVCV/VCV/CVCV-S/CVV[37]	23 32/34 43/45 54/44	H H
CVCV: Yuku (forest), yuku (mountain)[38], viko (party), yutnu (wood), kɨtɨ (animal), yɨkɨ (bone), yɨkɨ (needle)[39], ndɨkɨ (horn), kaja (thigh), ndute (water), doko (water well), taxa (thunderbolt), ndeyu (food), ngutu (bull), ko^{n}jo^{n} (thick), luchi (small), chitu (full), datni (right (side)), yatni (near), xika (far), xija (that), dawa (some), diña (that), kaka (will walk/run), ki'ni (will squeeze), nduku (will search), da^{n}'ma (clothes), ka'nu (large). VCV: idi (hair), ichi (road), ija (there), iñu (thorn), i'ni (hot). CVCV-S: ñe'e-r (I will scratch), kata-r (I will sing), ka'u-r (I will count/read), kwe'nu-r (I will grow). CVV: te'a (will be dirty).		

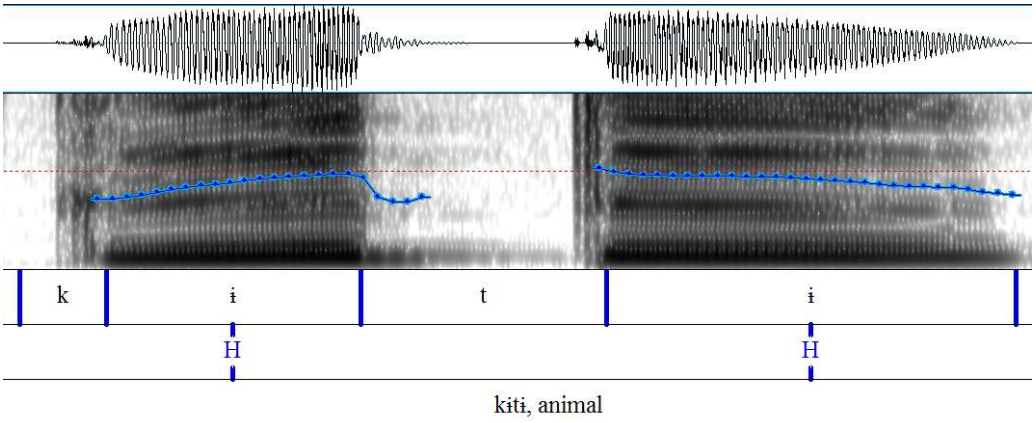


Figure 3.2a: *kɨtɨ*, Sra Adelina, 0.67 sec

[37] I am following McKendry (2013) who considers CVV syllables with two different vowels to be bisyllabic.
[38] *Yuku*, 'mountain' and 'forest' need to be analyzed in tonal frames to see if there is a difference between the two, whether floating tones play a role.
[39] *Yɨkɨ*, 'bone' and 'needle' also need to be analyzed in tonal frames to see if there is a difference between the two.

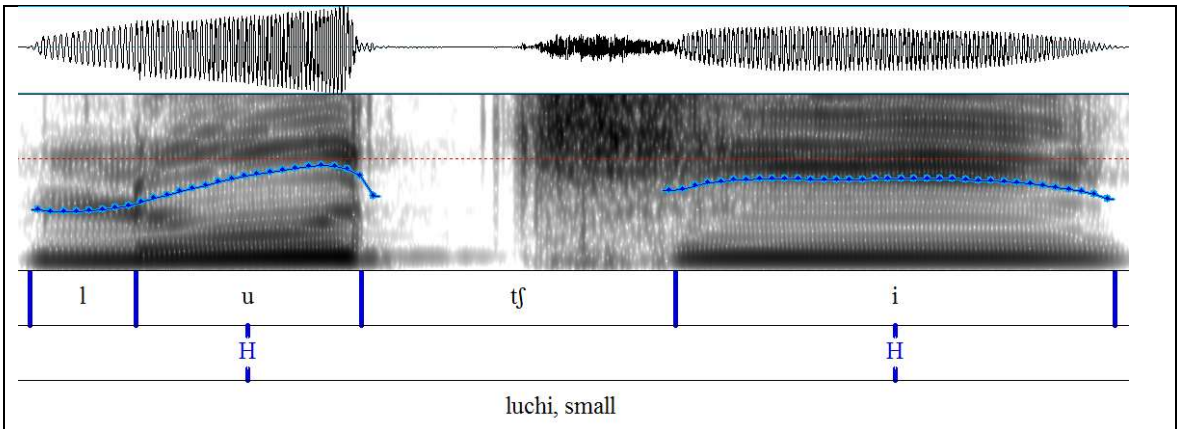


Figure 3.2b: *luchi*, Sra Adelina, 0.84 sec

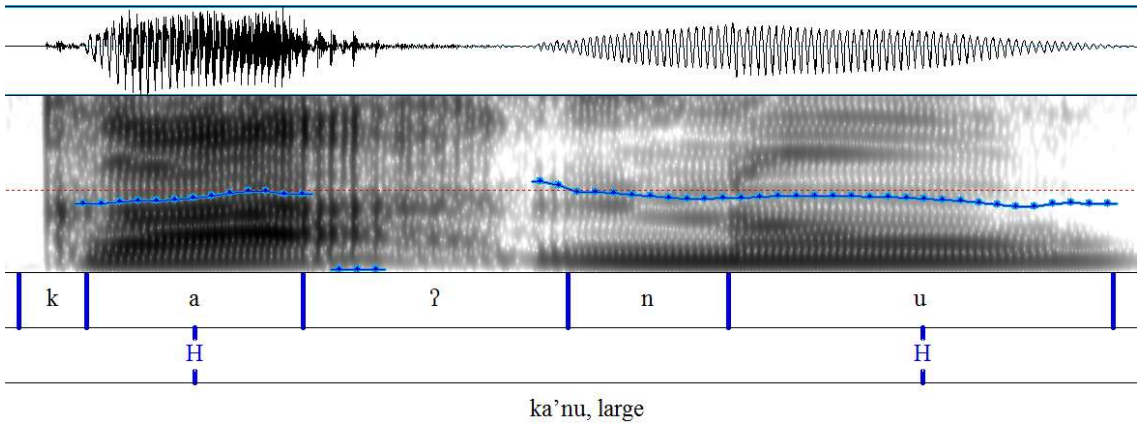


Figure 3.2c: *ka'nu*, Sra Adelina, 0.60 sec

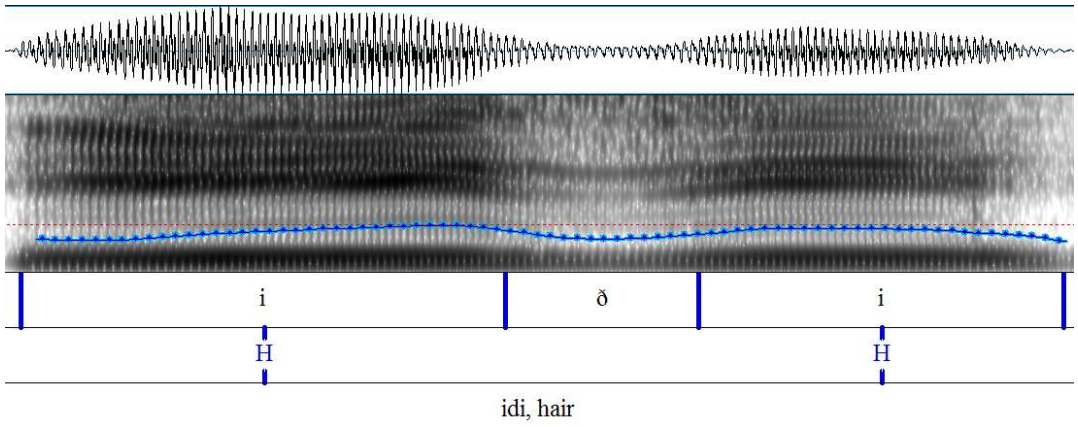


Figure 3.2d: *idi*, Sr Noe, 0.78 sec

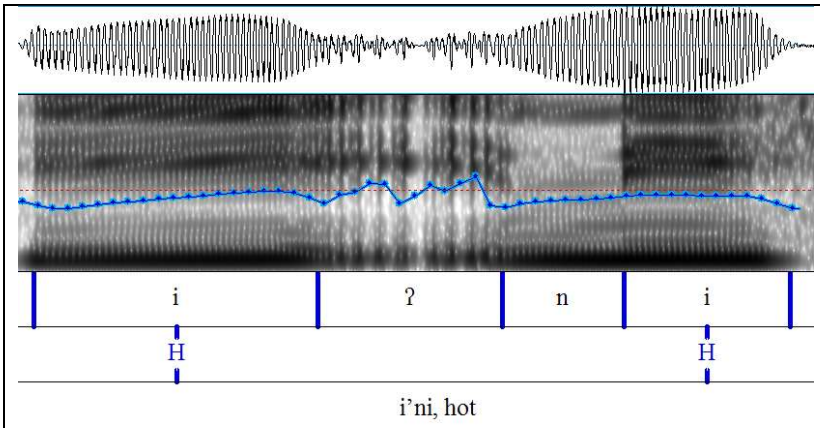


Figure 3.2e: *i'ni*, Sra Floralia, 0.50 sec

In table 3.3, words with an H HL surface tonal pattern are presented together. Figures 3.3a to 3.3d present Praat picture examples of the H HL tonal pattern on words of different prosodic types, showing the pitch patterns. Figure 3.3c when compared to figure 3.3a illustrates the similarity between the pitch patterns while it also shows that the pitch on the second syllable of figure 3.3c is more stretched as it has two sonorants to attach to. In figures 3.3a, 3.3b and 3.3d the second syllable has one sonorant. This means that the HL tone attaches differently to the prosodically different syllables, but the tone patterns are the same[40].

Table 3.3: Bisyllabic citation forms of words by prosodic type and pitch group (H HL)

Prosodic type	Pitch	Tone
CVCV/CVCV-S/CVV/CVV-S[41]/ CVCVS/CVCSV/VCV	34 41/45 52/35 51/23 31/ 3 31/45 53	H HL
CVCV: vixi (leaf), vixi (cold)[42], tutu (paper), dɨku (milk), dido (brother/sister in law), didi (aunt), dɨkɨ (head), dɨkɨ[43] (above), ditni (nose), ndixi (wing), doko (wing), xiti (stomach), xiti (inside)[44], du^{n}ju^{n} (neck), yata (back), ndika (chest), yute (river), mini (lake), viko (cloud), tachi (air, wind), tata (seed), tuchi (vein), nama (wall), xakwa (treebark), kuñu (flesh), nɨñɨ (blood), nino (below), xaku (few), dita (tortilla), nduchi (bean), kɨdɨ (pot), yodo (metate), nuni (corn), tila (bread), xiyo (comal), te'yu (will rot), vaxi (to come), ndo'yo (bog), da'ya (child). CVCV-S: ka'nde-r (I will cut), kachi-r (I will say), dɨka-r (I will open), kiku-r (I will sew), kaxi-r (I will choose), nda'i-r (I will cry). CVV: kɨu (day), kwia (year), ñau (eagle), du'a (tail, butt), yu'a (ice). CVV-S: ndua-r (I will fall). CVCVS: ñayiw (human). CVCSV: tatna (medicine). VCV: ita (flower), ite (grass), ina (dog), iñu (six), uña (eight), uni (three), uxa (seven), uxi (ten) ɨnka (other).		

[40] As will be seen in section 3, HL tone causes downstep on following morphemes which have H or HL tone. The question is whether there are two separate tones on the second syllable of *ñayiw*, *tatna* and other words of this type or whether it is one tone. Also, would this make a difference for the downstep rule or any of the other rules?

[41] I am following McKendry (2013) who considers CVV syllables with two different vowels to be bisyllabic.

[42] *Vixi*, 'leaf' and 'cold' need to be analyzed in tonal frames to see if there is a difference between the two.

[43] *Dɨkɨ*, 'head' and 'above' need to be analyzed in tonal frames to see if there is a difference between the two. Although body parts are used as directionals in Mixtec.

[44] *Xiti*, 'stomach' and 'inside' need to be analyzed in tonal frames to see if there is a difference between the two.

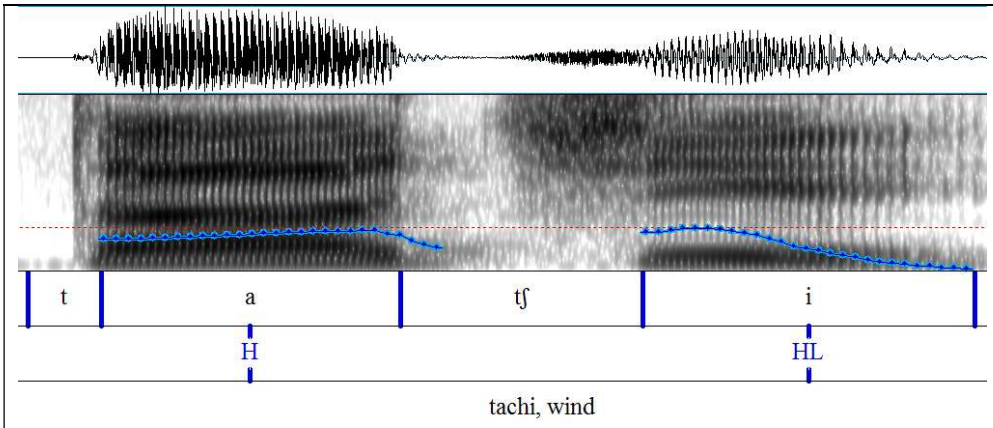


Figure 3.3a: *tachi*, Sr Noe, 0.77 sec

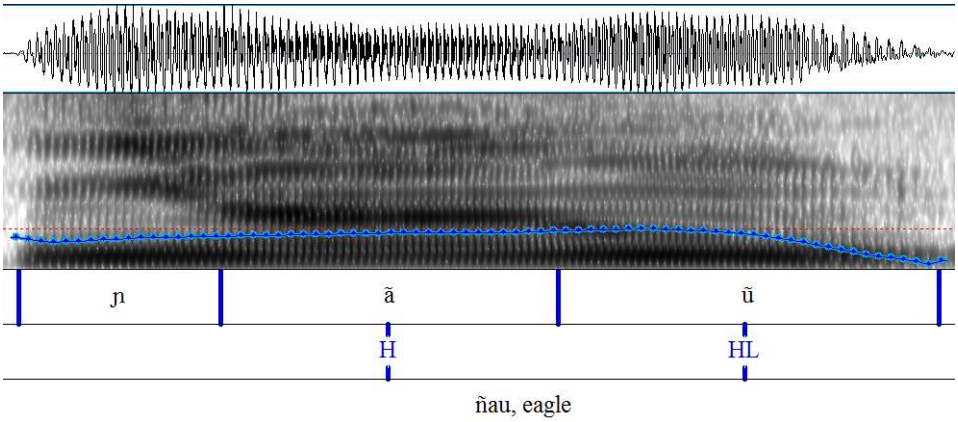


Figure 3.3b: *ñau*, Sr Noe, 0.74 sec

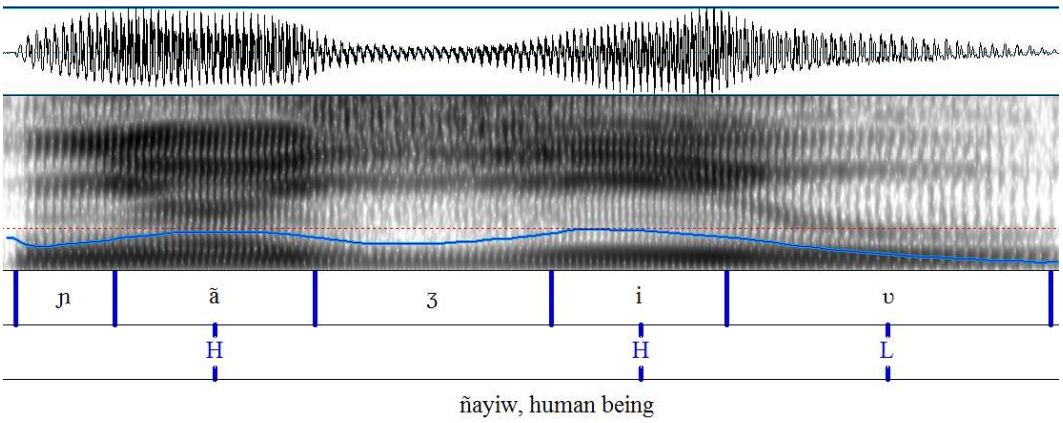


Figure 3.3c: *ñayiw*, Sr Noe, 0.88 sec

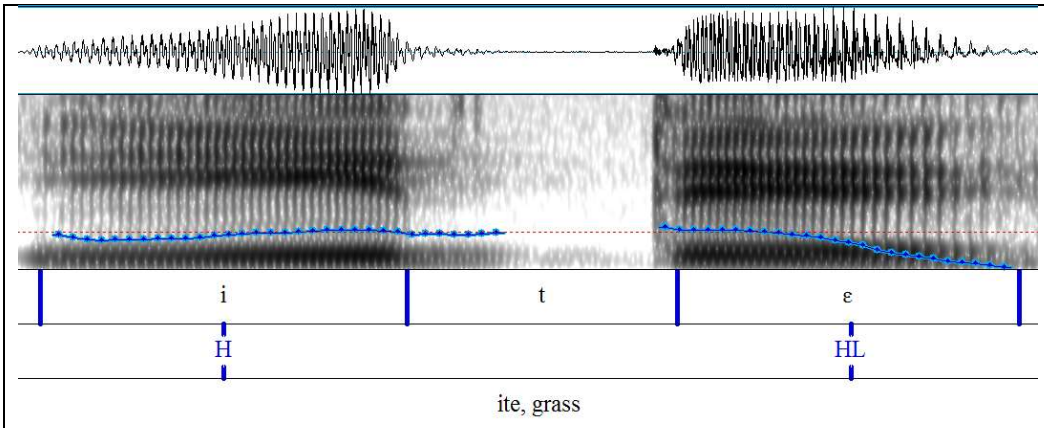


Figure 3.3d: *ite*, Sr Noe, 0.70 sec

In table 3.4, words with an L HL surface tonal pattern are presented together. Figures 3.4a and 3.4b present Praat picture examples of the L HL tonal pattern on words of different prosodic types, showing the pitch patterns.

Table 3.4: Bisyllabic citation forms of words by prosodic type and pitch group (L HL)

Prosodic type	Pitch	Tone
CVCV/CVCV-S/CVV/CVV-S/ VV[45]	4 51/3 41/3 51	L HL
CVCV: ndɨka (wide), kuchi (pig), chikwi (fox), kolo (turkey), ndoyo (be wet), te'yu (rot) CVCV-S: xa'nde-r (I cut), kachi-r (I say), dɨka-r (I open), kaxi-r (I choose), xene-r (I dream). CVV: ndɨu (egg). CVV-S: ndua-r (I fall), nda'i-r (I cry). VV: io (fear).		

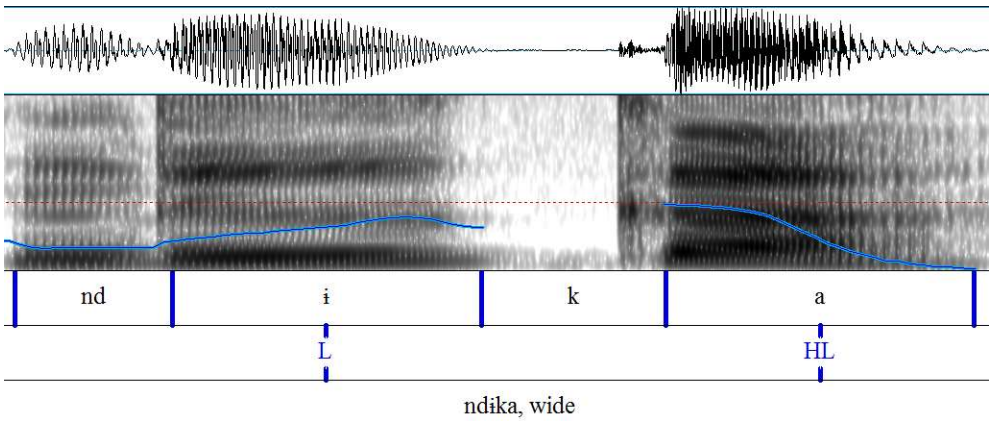


Figure 3.4a: *ndɨka*, Sr Noe, 0.80 sec

[45] I am following McKendry (2013) who considers CVV syllables with two different vowels to be bisyllabic.

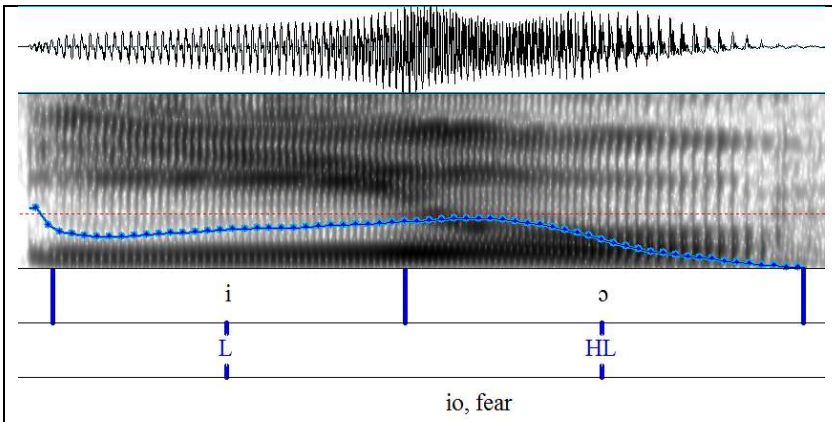
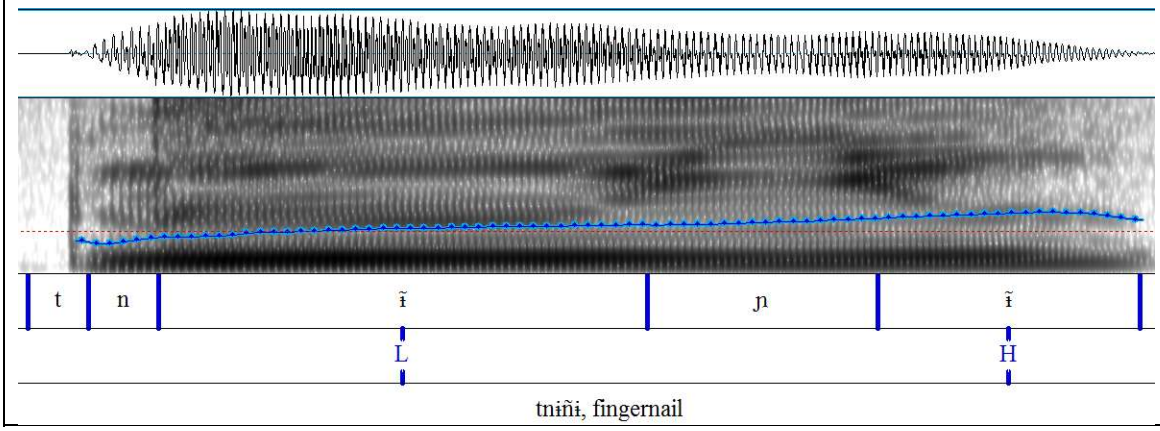


Figure 3.4b: *io*, Sr Noe, 0.63 sec

In table 3.5, words with an L H surface tonal pattern are presented together. Figures 3.5a to 3.5d present Praat picture examples of the L H tonal pattern on words of different prosodic types, showing the pitch patterns. Figure 3.5d when compared to figure 3.5a illustrates the similarity between the pitch patterns while it also shows that the pitch on the second syllable of figure 3.5d is more stretched as it has two sonorants to attach to. In figures 3.5a, 3.5b and 3.5c the second syllable has one sonorant. This means that the H tone attaches differently to the prosodically different syllables, but the tone patterns are the same.

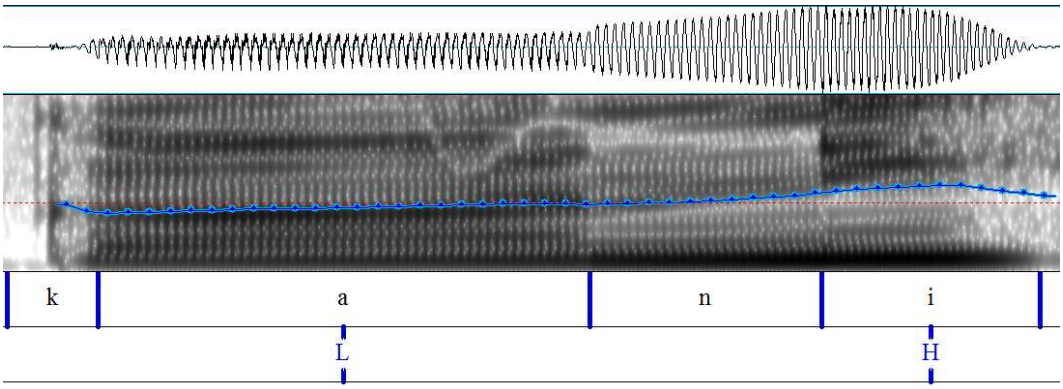
Table 3.5: Bisyllabic citation forms of words by prosodic type and pitch group (L H)

Prosodic type	Pitch	Tone
CVCV/VCV/CVCV-S/CVV/ CVV-S[46]/CVCVS	4 5/23 4/3 44	L H
CVCV: lelu (hat), tnɨñɨ (fingernail), pechu (sp:pecho, chest), nduku, nguxa, ngwixi (types of rabbits), kani (long), kwiñi (thin) kwiti (narrow), kwixi (white), yichi (dry), vilu (cat), xika (run/walk), yojo (push), ka'ndɨ (thunder). VCV: anu (heart), idu (deer). CVCV-S: dɨ'ɨ-r (my mother), xika-r (I walk), ki'ni-r (I squeeze), xita-r (I sing), kayu-r (I cough), tnani-r (I smell/will smell)[47], xa'ni-r (I kill), ka'ni-r (I will kill), duku-r (I tie), tetnɨ-r (I will fasten), xa'nu-r (I grow). CVV: meu (you plural), dɨu (name), te'a (be dirty). CVV-S: ka'u-r (I count/read). CVCVS: andɨw (sky).		



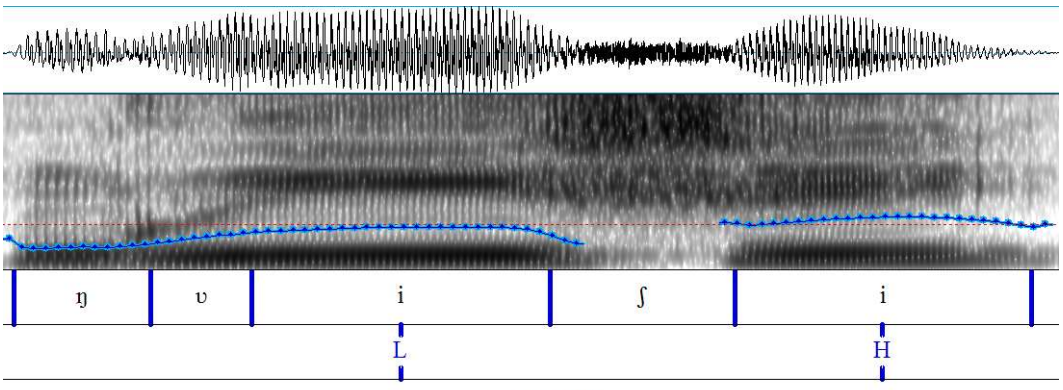
[46] I am following McKendry (2013) who considers CVV syllables with two different vowels to be bisyllabic.
[47] These two aspects need to be compared in tonal frames to see if there is a difference.

Figure 3.5a: *tnɨñɨ*, Sr Noe, 0.82 sec



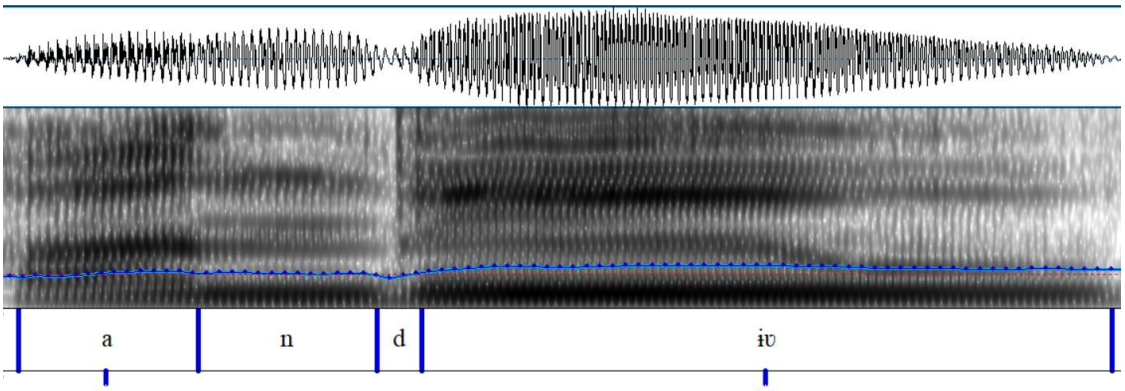
kani, long

Figure 3.5b: *kani*, Sra Floralia, 0.50 sec



ngwixi, rabbit

Figure 3.5c: *ngwixi*, Sr Noe, 0.82 sec



andɨw, sky

Figure 3.5d: *andɨw*, Sr Noe, 0.84 sec

In table 3.6, words with an HL L surface tonal pattern are presented together. Figure 3.6a presents a Praat picture example of the HL L tonal pattern, showing the pitch pattern.

Table 3.6: Bisyllabic citation forms of words by prosodic type and pitch group (HL L)

Prosodic type	Pitch	Tone
CVCV	41 1/42 2	HL L

CVCV: chaka (fish), chuku (louse), ndaku (worm), tnana (*jitomate*), chakwa (treebark).

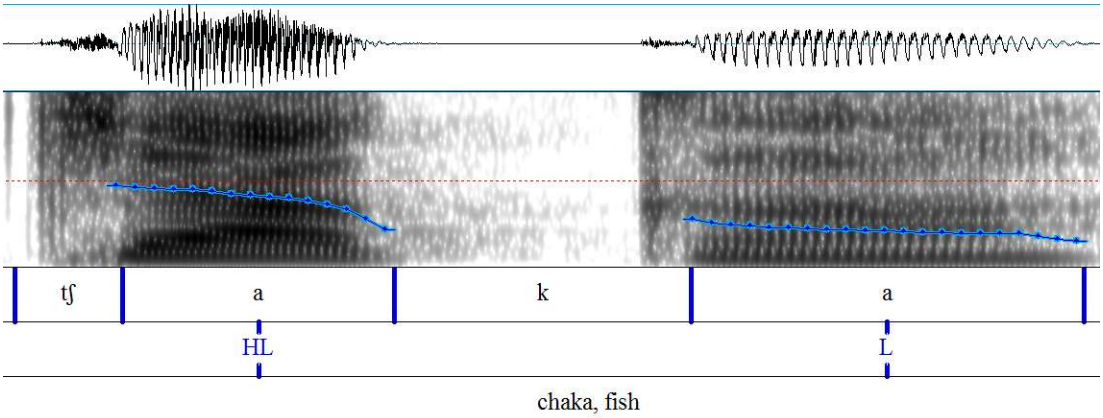


Figure 3.6a: *chaka*, Sra Adelina, 0.56 sec

In table 3.7, words with an H L surface tonal pattern are presented together. Figures 3.7a and 3.7b present Praat picture examples of the H L tonal pattern on words of different prosodic types, showing the pitch patterns. Figure 3.7b when compared to figure 3.7a illustrates the similarity between the pitch patterns while it also shows that the pitch on the second syllable of figure 3.7b is more stretched as it has two sonorants to attach to. In figure 3.7a the second syllable has one sonorant. This means that the L tone attaches differently to the prosodically different syllables, but the tone patterns are the same.

Table 3.7: Bisyllabic citation forms of words by prosodic type and pitch group (H L)

Prosodic type	Pitch	Tone
CVCV/VCV/CVCVV	5 21/42 33/43 33/3 22	H L

CVCV: kaka (crow), ndiko (cold), nte'yu (rotten), ndexi (where), naxi (what), ña'a (no), yundu (who), nanda (how).
VCV: itu (milpa or cornfield).
CVCVV: ngandii (sun).

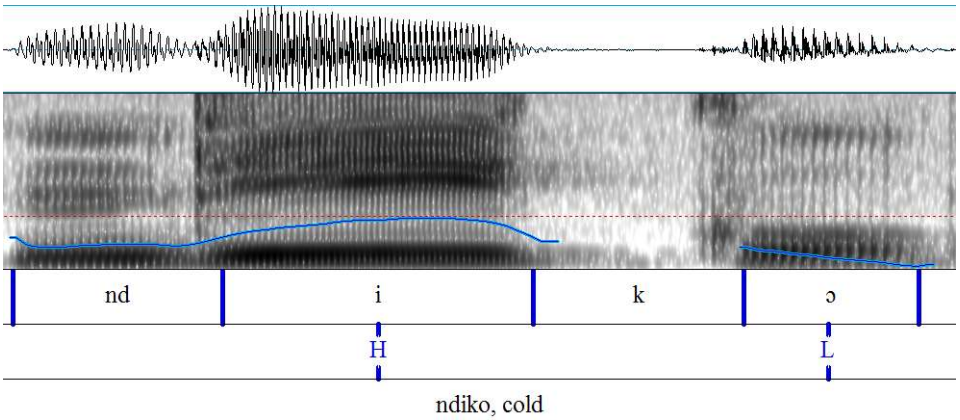


Figure 3.7a: *ndiko*, Sr Noe, 0.80 sec

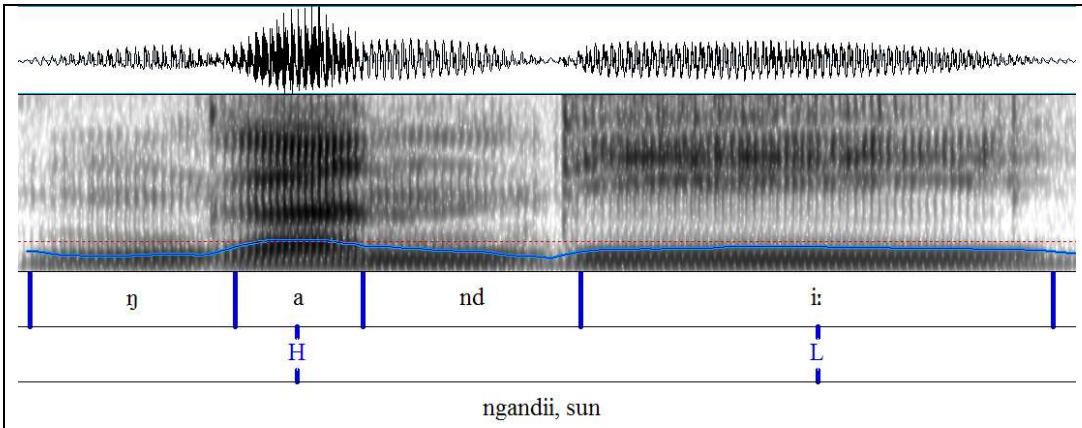


Figure 3.7b: *ngandii*, Sr Noe, 0.99 sec

In table 3.8, words with an HL LH surface tonal pattern are presented together. Figures 3.8a to 3.8c present Praat picture examples of the HL LH tonal pattern on words of different prosodic types, showing the pitch patterns.

Table 3.8: Bisyllabic citation forms of words by prosodic type and pitch group (HL LH)

Prosodic type	Pitch	Tone
CVCV/C-CVCV-C/C-CVCV	535/ 423/42 34/42 25	HL LH
CVCV: tiñu (snow), tkute (round). C-CVCV-C: n-tnani-r (I smelled), n-ya'ni-r (I killed), n-duku-r (I tied), n-tetn̈i-r (I fastened), n-ya'nu-r (I grew). C-CVCV: n-dyojo (pushed).		

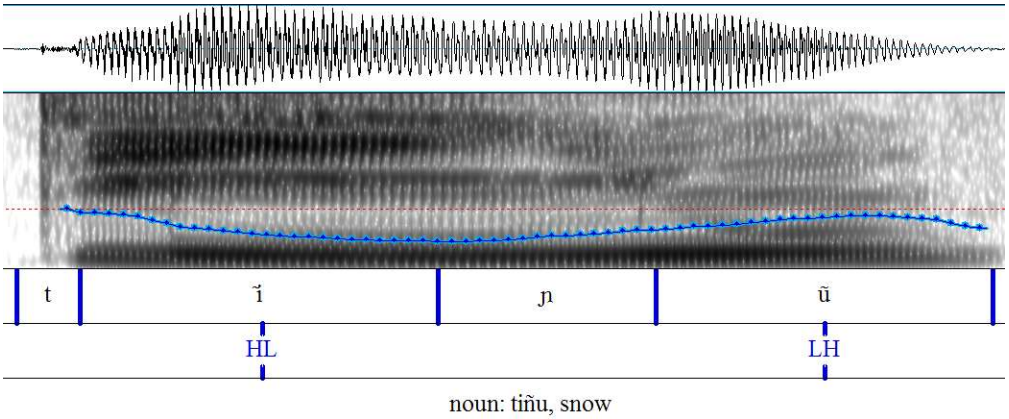


Figure 3.8a: *tiñu*, Sr Noe, 0.69 sec

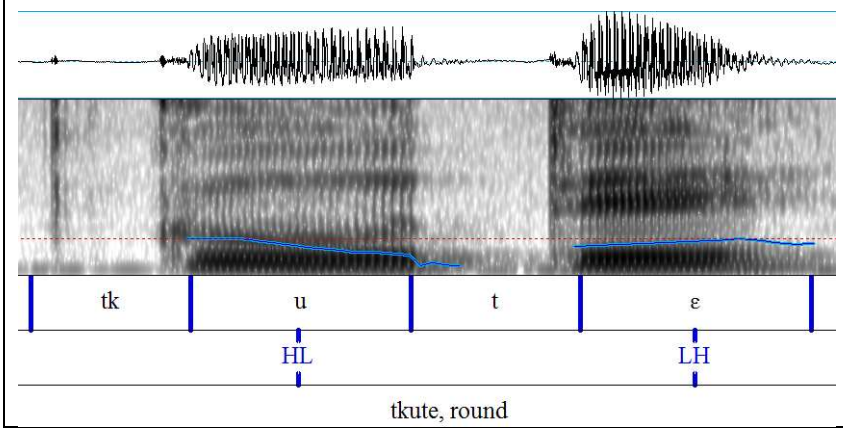


Figure 3.8b: *tkute*, Sr Noe, 0.68 sec

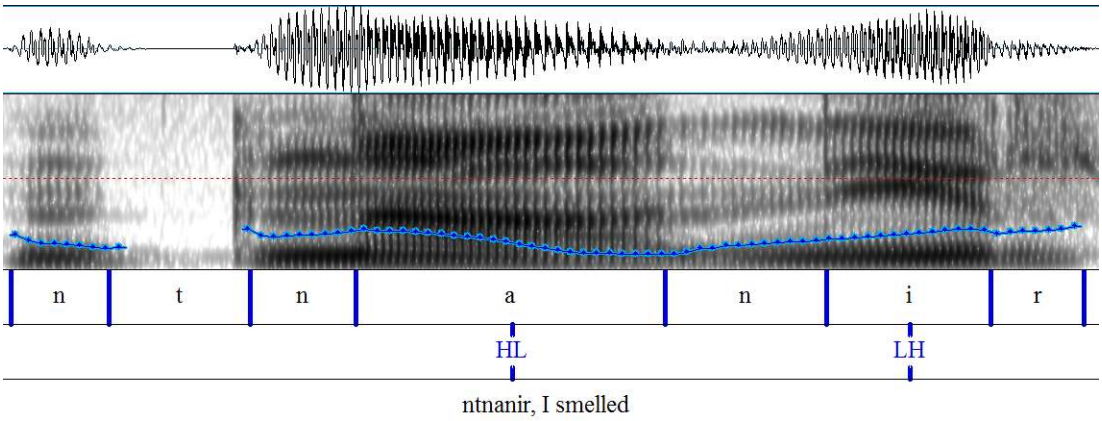


Figure 3.8c: *ntnanir*, Sr Noe, 0.83 sec

3.3.2.2. Monosyllabic word groups

In table 3.9, words with an HH surface tonal pattern are presented together. Figure 3.9a presents a Praat picture example of the HH tonal pattern, showing the pitch pattern.

Table 3.9: Monosyllabic citation forms of words by prosodic type and pitch (HH)

Prosodic type	Pitch	Tone
CVV/CVV-S/VV	44	HH
CVV: ñɨɨ^{n} (skin, body), nduu (daytime), tee (and), naa (if), xii (with), roo (we), ndoo (clean), yo'o (rope), yu'u (mouth), nda'a (hand), ñu'u (earth), ve'e (house), kwa'a (left (side), ya'a (here), ndo'o (you), xa'a (this). CVV-S: mee-s (he), tee-r (I will smoke), kwee-r (I will buy). VV: ɨɨ^{n} (one).		

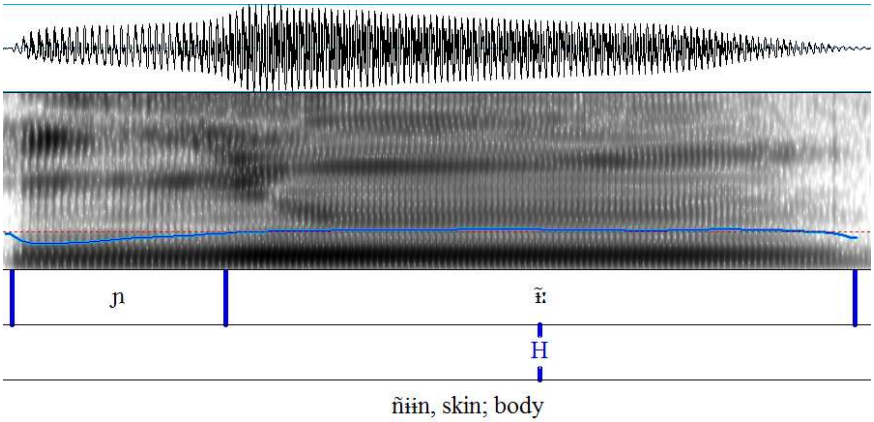


Figure 3.9a: *ñɨɨ^{n}*, Sr Noe, 0.80 sec

In table 3.10, words with an HHL surface tonal pattern are presented together. Figure 3.10a presents a Praat picture example of the HHL tonal pattern, showing the pitch pattern.

Table 3.10: Monosyllabic citation forms of words by prosodic type and pitch (HHL)

Prosodic type	Pitch	Tone
CVV/VV/CVV-S	451/331	HHL

CVV: ndaa (right), chuu^{n} (chicken), ndoo (sugarreed), de'e (fat), do'o (ear), nu'u (tooth), xe'e (foot), dɨ'ɨ (leg), ñu'u (fire), kwe'e (disease), kwe'e (many)[48], tndu'u (treetrunk), ndu'u (dull (edge)), ndi'i (short/low), tna'a (thin), ru'u (I).
VV: ɨɨ^{n} (nine), o^{n}'o^{n} (five).
CVV-S: kii-r (I will come), ku'ur (I will rub).

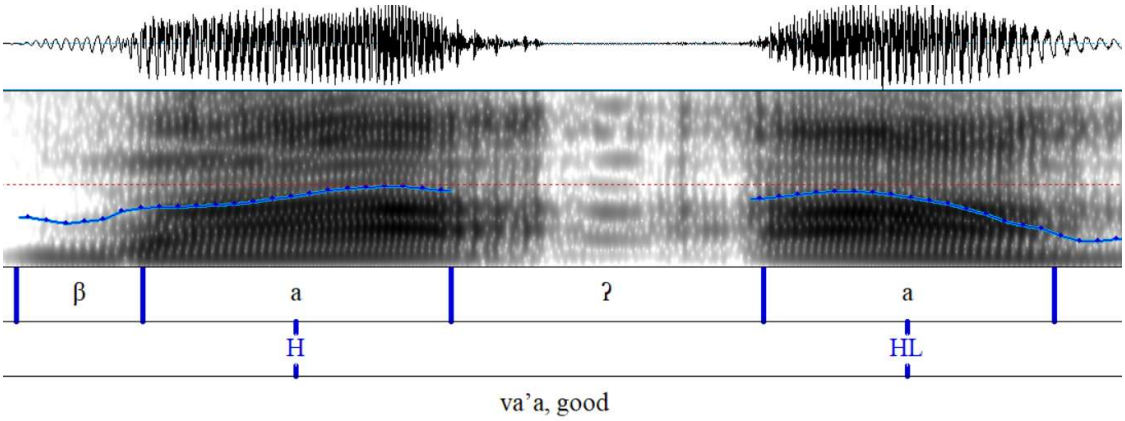


Figure 3.10a: *va'a*, Sra Adelina, 0.55 sec

In table 3.11, words with an LHL surface tonal pattern are presented together. Figures 3.11a and 3.11b present Praat picture examples of the LHL tonal pattern, showing the pitch patterns.

Table 3.11: Monosyllabic citation forms of words by prosodic type and pitch (LHL)

Prosodic type	Pitch	Tone
CVV/VV	351, 241	LHL

CVV: taa (father), koo (snake), koo^{n} (four)[49], yuu (stone), tnuu (feather), nuu (face) yoo (moon), dau (rain), ñɨɨ (salt), yaa (ashes), vee (heavy), ndaa (straight), ngoo (sit), ko'o (plate), li'i (rooster).
VV: uu (two).

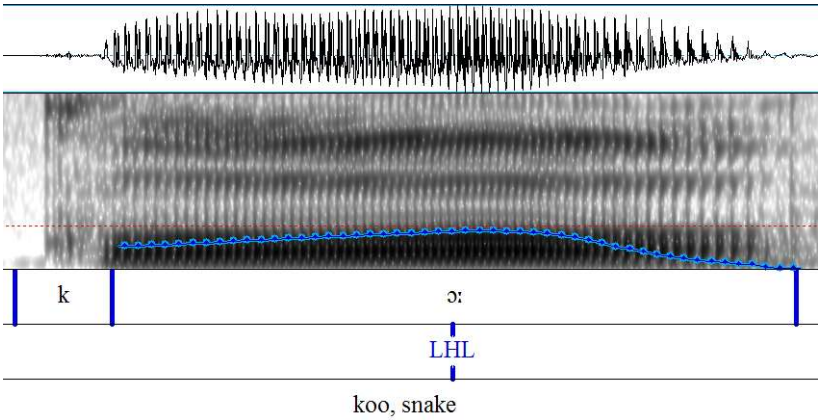


Figure 3.11a: *koo*, Sr Noe, 0.57 sec

[48] *Kwe'e*, 'many' and 'disease', need to be checked in tonal frames for differences.
[49] Need to be checked in tonal frames.

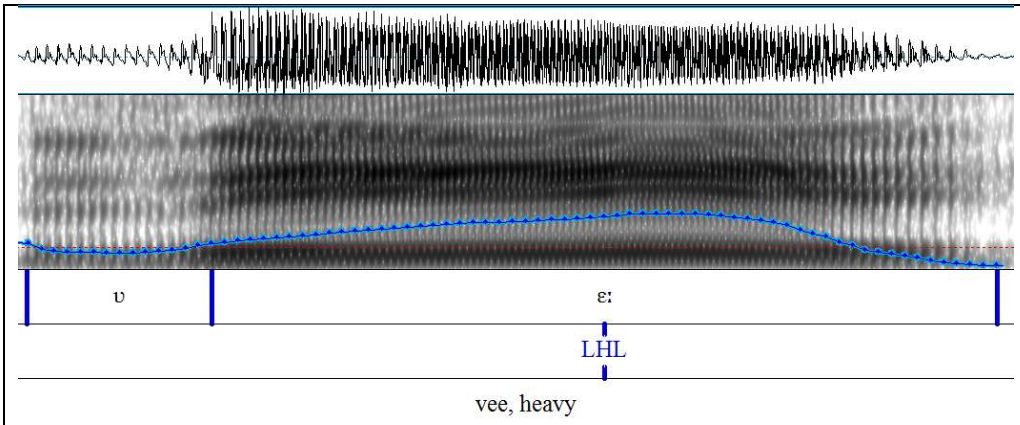


Figure 3.11b: *vee*, Sr Noe, 0.75 sec

In table 3.12, a word with an HLL surface tonal pattern is presented. Figure 3.12a presents a Praat picture example of the HLL tonal pattern, showing the pitch pattern.

Table 3.12: Monosyllabic citation forms of words by prosodic type and pitch (HLL)

Prosodic type	Pitch	Tone
CVV	4221	HLL
CVV: taa (bird).		

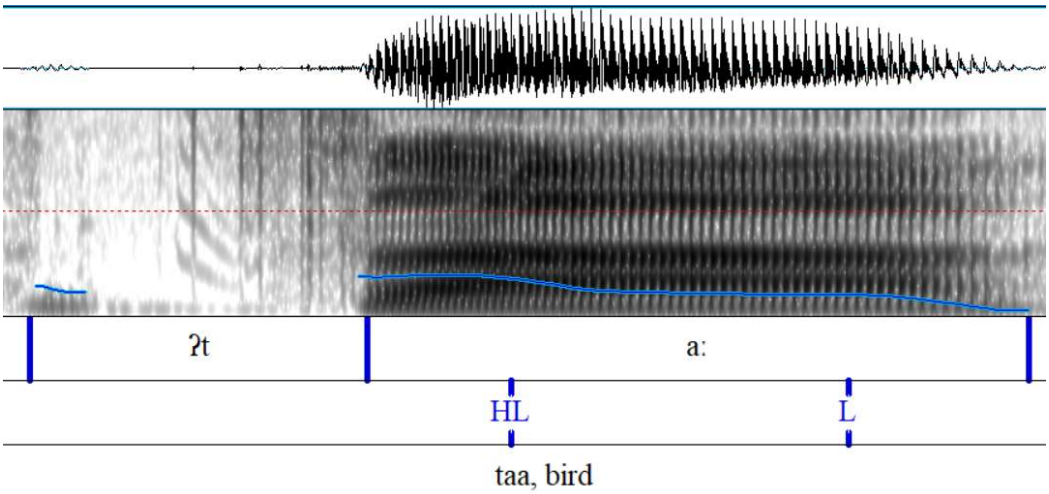


Figure 3.12a: *taa*, Sr Noe, 0.80 sec

In table 3.13, words with an HL surface tonal pattern are presented together. Figure 3.13a presents a Praat picture example of the HL tonal pattern on, showing the pitch pattern.

Table 3.13: Monosyllabic citation forms of words by prosodic type and pitch (HL)

Prosodic type	Pitch	Tone
CVV	52	HL
CVV: ndy̶i̶ (old (person)), chii (because), nd̶i̶'i̶ (all).		

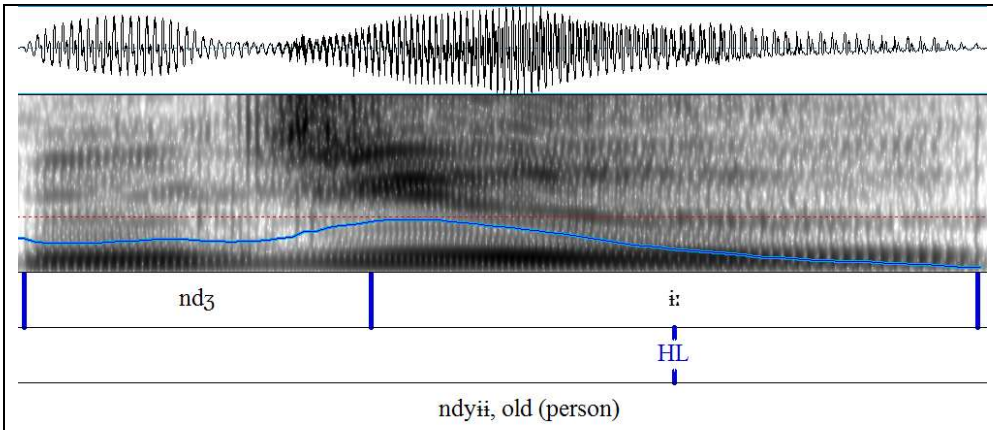


Figure 3.13a: *ndyɨɨ*, Sr Noe, 0.79 sec

In table 3.14, a word with an HLLH surface tonal pattern is presented. Figure 3.14a presents a Praat picture example of the HLLH tonal pattern, showing the pitch patterns.

Table 3.14: Monosyllabic citation forms of words by prosodic type and pitch (HLLH)

Prosodic type	Pitch	Tone
CVV	4113/4223	HLLH
CVV: tndoo (spider).		

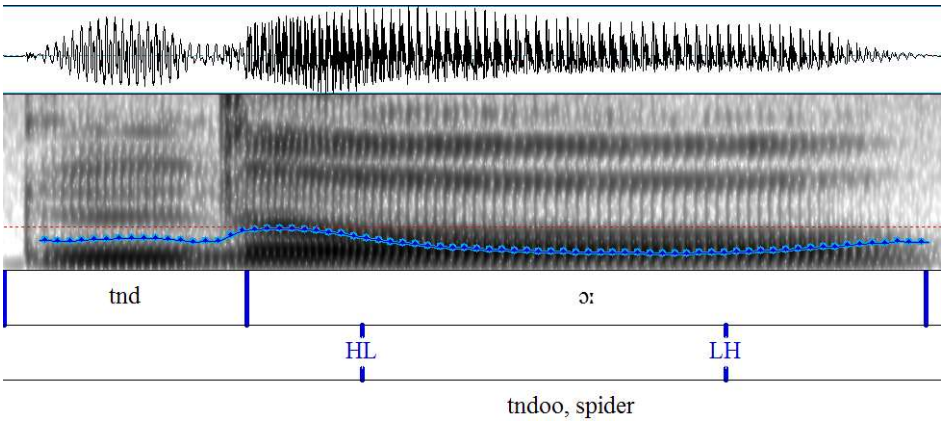


Figure 3.14a: *tndoo*, Sr Noe, 0.75 sec

In table 3.15, words with an LH surface tonal pattern are presented together. Figures 3.15a and 3.15b present Praat picture examples of the LH tonal pattern on words of different prosodic types, showing the pitch patterns.

Table 3.15: Monosyllabic citation forms of words by prosodic type and pitch (LH)

Prosodic type	Pitch	Tone
CVV, CVV-S	35/45	LH
CVV: kwii (green), kwaa (yellow), tnuu (black), xee (new), ndɨɨ (smooth), ndaa (everything), yaa (tongue), kwe'e (red), yo'o (you). CVV-S: kuu-r (I will die), tee-r (I smoke), xee-r (I buy), ku'u-r (I rub), ñe'e-r (I scratch), yɨɨ-r (husband-mine).		

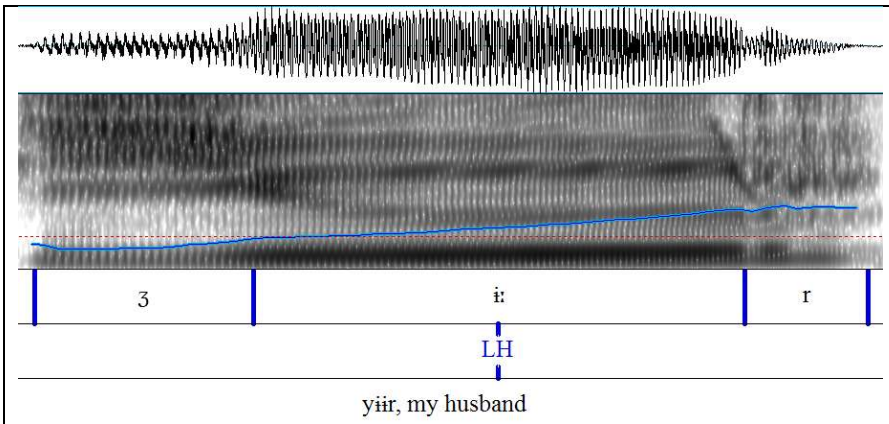


Figure 3.15a: *yiir*, Sr Noe, 0.76 sec

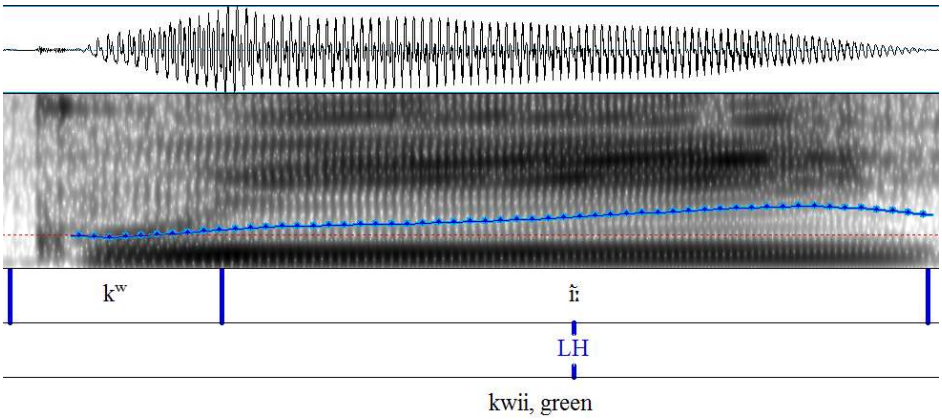


Figure 3.15b: *kwii*, Sr Noe, 0.59 sec

3.4. Understanding the relationship between tone, the couplet, syllable and mora

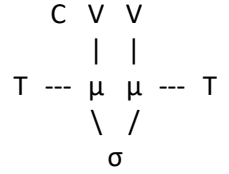
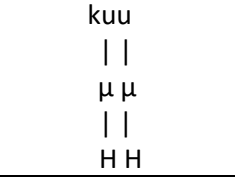
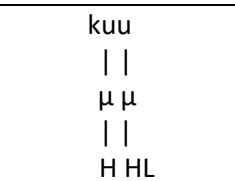
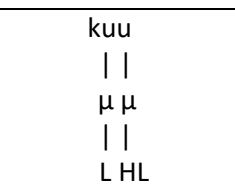
To proceed to stage II of tonal analysis, discovering tonal alternations, it is necessary to understand how tone links to the couplet, the syllable and the mora before moving on to how tone behaves and links on the phrase level. In order to illustrate the relationship between tone, the couplet, syllable and mora it is useful to look at minimal pairs. Pike (1953: 102) wrote that minimal pairs can be used to help focus on the general degree of pitch differences which are known to be relevant, but that they can be useless for analyzing the tonal system, while Hyman (2014: 531) wrote that minimal pairs are a luxury; Mixtec languages have some, but usually they do not illustrate all tonal contrasts present in the language. The minimal pairs in table 3.16 are not comprehensive sets of the minimal pairs present in Tilantongo Mixtec, but they do have representative recordings and will serve for the intended purpose. Table 3.16 contains six out of seven tonal patterns present in Tilantongo Mixtec in citation form; the pattern H L is not represented.

Pike (1948) wrote that in words which are CVCV there are no occurrences of two tones on one short vowel; so, there are no contours on short vowels. He writes that long vowels should be considered as a sequence of two short vowels as long vowels can have two tones associated with them. McKendry (2013: 21) writes that the one to one correlation between the number of vowels and the number of tones sponsored by a morpheme does not hold true for all varieties of Mixtec. Contours are permitted on short vowels in some varieties. In Mak's (1950, 1953, 1958 in McKendry, 2013: 46-47) papers on Mixtec tone, she documents that it is possible for two tones to be associated with one vowel. The purpose of table 3.16 is to show how tones connect and to show that Tilantongo Mixtec does have contour tones on short vowels and that it could be a true contour language. A true contour language is a language in which contour tones do not consist of

two level tones combined that form the contour, but a language in which the contour tone is a single phonological object or unit (Yip, 2002: 28)[50]. See Yip (2002: 47-52) for evidence on the existence of true contour languages. Yip (2002: 73) writes that if a language has both light monomoraic and heavy bimoraic syllables and if these differ in the number of tones they can bear, so that monomoraic syllables can have only one tone but bimoraic syllables can have two, then it must be the case that the TBU is the mora, not the syllable. In the previous section we have seen that CVCV words can have a contour tone on a light monomoraic syllable. We have also seen that CVV words can have two contour tones on a heavy bimoraic syllable. One of the tonal patterns distinguished on words in citation form in Tilantongo Mixtec is HL LH. On CVCV words the first contour tone associates with the first syllable and the second with the second syllable. On CVV words both contour tones associate with the one syllable. This would mean that the TBU in Tilantongo Mixtec is the mora.

Table 3.16: Minimal pairs and tone association

C: consonant
V: vowel
T: tone
μ: mora
σ: syllable.

Moraic representation of a monosyllabic word in citation form: to the right we see a diagram of a heavy bimoraic syllable. Each vowel links to one mora, which links to one tone. Floating tones are not represented in this diagram as this is a representation of a citation form and floating tones are only distinguished in combination with other morphemes. The diagram to the right does not show underlying tones; it just shows tonal association in citation form or surface form.[51]	
Minimal pair 1	
kúú; HH; to be (con) McKendry (2013: 106) writes that it is not possible to determine whether words that are pronounced HH, have one or two tones linked to them.	
kúû; HHL; to die (pot)	
kuû; LHL; small pot to burn *copal*[52]	
Minimal pair 2	

[50] The question is whether there is a difference in behavior in tonal frames between HL tones associated with one mora and H and L tones associated with two moras: see section 3.3.
[51] See McKendry (2013: 117) for how differences in alignment conventions of underlying tones can account for differences in surface tone even when underlying tones are the same across Mixtec languages.
[52] *Copal* is resin incense.

kóô; LHL; snake	koo | | μ μ | | L HL
koô^{n}; LHL; four The tones in citation form for both the words snake and four are the same, however only the word four is nasalized. These words need to be checked in tonal frames for differences.	koo^{n} | | μ μ | | L HL
(t)kôŏ; HLLH; tamal	tkoo | | μ μ | | HL LH
Minimal pair 3	
taá; LH; to give (con) Here we see two level tones that form a contour tone.	taa | | μ μ | | L H
taâ; LHL; father	taa | | μ μ | | L HL
tâa; HLL; bird	taa | | μ μ | | HL L

3.5. Discovering tonal alternations (stage II of how to analyze tones) (Hyman 2014)

Do all words that have been put in the same pitch group behave in the same way? Do tones undergo changes when they combine with each other (Hyman, 2014: 536)? Which phrase level alternations take place (Hyman, 2014: 539)? According to Pike (1953) frames with one or more unchanging tones are necessary for analysis. The frame tone is the unchanging tone in a context where it can be substituted by items from a substitution list that can be inserted to establish contrasts within those items. The frame tone can be changing in other contexts, but that is not relevant. Phonemic levels of tone in the unchanging frame can be equated with the same phonemic levels in tone in another unchanging frame. Mixtec languages are famous for the complexity of their tonal systems. In some cases, it is impossible to predict what triggers tonal changes or tone sandhi; floating tones have been suggested as a solution to explain certain tonal changes (Hyman and Daly, 2005: 129-130). As a starting point to discover tonal changes I analyzed the same tonal frames as Pike and Oram (1976) recorded and analyzed and which were later re-analyzed by Daly (1978).

Table 3.17 shows a comparison of the results. In the Pike and Oram, and Daly column underlining means the syllable with the underlined tone is stressed. In the Pike and Oram (1976: 324) data the final stressed H in a word, preceded by H, usually has a sharp downglide, so it is in essence a HL tone. The final stressed H in a word, preceded by a low tone, does not always

downglide. In the Daly column a superscript: ^{m} represents the feature modify (which appears to be a floating L tone). This means that the modified H represents the contour tone HL and the L tone represents a mid-tone while modified L represents a low tone. Pike and Oram use word classes to explain the tonal changes. Pike and Oram introduce two word classes (A and B), while Daly introduces two groups of classes that contain seven morpheme classes[53], -A and +A, 'to differentiate between arbitrary subclasses of morphemes with identical tone patterns but different perturbing power' (Daly, 1978: 100). Daly's tonal system is extremely complex and although he uses the same data as Pike and Oram he perceives different tones. Yellow highlighting in table 3.17 marks difference in tones between the Tilantongo data and the Pike and Oram and Daly data.

McKendry (2013: 77-82) writes that autosegmental phonology provides a much more satisfying way to account for tonal alternations than morpheme classes by claiming that perturbation is often the result of the association of a floating tone. She describes the following processes which result in floating tones. Clements and Ford (1979) show that floating tones are the result of rightward tone shift, in some cases these floating tones form word final contours and in others they cause downstep[54]. In most varieties the difference between the irrealis[55] and the imperfective forms of verbs is the presence of a high tone in the imperfective, which is a floating tone remnant of a lost prefix. To summarize, there are three sources of floating tones in Mixtec: tonal shift to the right; floating high tone delinks the low tone of the TBU with which it associates creating a floating low tone; loss of a vowel prefix enclitic etc.

Table 3.17: Tonal frames comparison Tilantongo and Diuxi (Pike and Oram 1976 and Daly 1978)

Ø: unspecified for tone

^{L}: floating low tone

L: low tone

H: high tone

HL: a contour tone that falls from high to low.

Spanish	Mixtec	Tilantongo Surface tone	Tilantongo Underlying tone	Pike and Oram 1976	Daly 1978
Uno	~~ii~~^{n}	HH	Ø Ø	HH	LL
Se vende	Diko	HH	Ø Ø^{L}	LH	L^{M}L (LM)
Bien	Va'a	H HL	Ø HL	HH	LH^{M}

[53] Pike (1948) wrote that surface tones found on some morphemes are determined by the context in which they are found. He calls this perturbation. He assigned morphemes to different classes according to the effect morphemes have on the following morpheme. Pike accounted for different results in tone patterns following class B morphemes by claiming that the segmental shape of the morpheme determines the surface pattern. Pike uses the term arbitrary tone sandhi for data in which the segments of words are the same, but their effect on the following words is different. Goldsmith (1990) writes that the concept that tones are independent of the vowels is the key to the understanding of autosegmental phonology. Goldsmith claims that K Pike's class B morphemes have a suffixal high tone that is underlyingly unassociated but which associates rightwards to the following word (floating H tone) (McKendry, 2013: xii, 41, 43, 53).

[54] Downstep refers to the lowering of H tone in certain contexts, typically after an L tone. When H lowers after an overt L tone, Yip (2002: 148,149) calls this downdrift, but it is sometimes called automatic downstep. When it lowers in the absence of a surface L, she calls it downstep, although sometimes the term non-automatic downstep is used. When there is no need to distinguish between the two, she uses the term downstep. Downstep and downdrift are recurrent processes reapplying every time a new L is encountered, and they are mostly found in two-tone languages.

[55] The irrealis is a verbal aspect that expresses a potential action.

Spanish	Mixtec	Tilantongo Surface tone	Tilantongo Underlying tone	Pike and Oram 1976	Daly 1978
Dos	Uu	LHL	LHL	HH	$H H^{M}$
Cuatro	Koo^{n}	LHL	LHL^{L}	HH	$H H^{M}$
Pequeño	Luchi	H H	Ø $Ø^{L}$	LH	$L^{M}L$ (LM)
Grande	Ka'nu	H H	Ø $Ø^{L}$	HH	LL
Pez	Chaka	HL L	HL L	HL	HL
Sombrero	Lelu	L H	L Ø	LH	$L^{M}L$ (LM)
Animal	k̶i̶t̶i̶	H H	Ø Ø	HH	LL
Cuchillo	Yuchi	H HL	Ø HL	HH	LL^{M} (ML)
Medicina	Tatna	H HL	Ø HL	HH	LH^{M}
Gallo	Li'i	L HL	L HL	LH	$L^{M}H^{M}$
Un pez	i̶i̶^{n} chaka	HH HL L	Ø Ø HL L	HH HL	LL HL
Un sombrero	i̶i̶^{n} lelu	LL L H	Ø Ø L Ø	HH LH	LL $L^{M}L$
Un animal	i̶i̶^{n} k̶i̶t̶i̶	HH H H	Ø Ø Ø Ø	HH HH	LL LL
Un cuchillo	i̶i̶^{n} yuchi	HH H HL	Ø Ø Ø HL	HH HH	LL LL^{M}
Una medicina	i̶i̶^{n} tatna	HH H HL	Ø Ø Ø HL	HH HH	LL LH^{M}
Un gallo	i̶i̶^{n} li'i	LL L HL	Ø Ø L HL	HH LH	LL $L^{M}H^{M}$
Se vende pez	Diko chaka	HH HL L	Ø $Ø^{L}$ HL L	LH HL →LL HL	$L^{M}L$ HL
Se vende sombrero	Diko lelu	L L L H	Ø $Ø^{L}$ L Ø	LH HH →LL HH	$L^{M}L$ $L^{M}L$ → $L^{M}L$ HH
Se vende animal	Diko k̶i̶t̶i̶	L L L H	Ø $Ø^{L}$ Ø Ø	LH HH →LL HH	$L^{M}L$ LL → $L^{M}L$ HH
Se vende cuchillo	Diko yuchi	L L L H	Ø $Ø^{L}$ Ø HL	LH HH →LL HH	$L^{M}L$ LL^{M} → $L^{M}L$ HH
Se vende medicina	Diko tatna	L L L HL	Ø $Ø^{L}$ Ø HL	LH HH →LL HH	$L^{M}L$ LH^{M} → $L^{M}L$ HH^{M}
Se vende gallo	Diko li'i	L L L HL	Ø $Ø^{L}$ L HL	LH LH →LL HH	$L^{M}L$ $L^{M}H^{M}$ → $L^{M}L$ HH^{M}
Buena pez	Va'a chaka	H HL !HL L	Ø HL HL L	HH HL → HH LL	LH^{M}(LH) HL → LH LL
Bueno sombrero	Va'a lelu	H HL L H	Ø HL L Ø	HH HH → HH LH	LH^{M} (LH) $L^{M}L$ → LH $L^{M}L$
Bueno animal	Va'a k̶i̶t̶i̶	H HL !H H	Ø HL Ø Ø	HH HH → HH LL	LH^{M} (LH) LL → LH LL
Bueno cuchillo	Va'a yuchi	H HL !H HL	Ø HL Ø HL	HH HH → HH LL	LH^{M}(LH) LL^{M} → LH LL^{M}
Buena medicina	Va'a tatna	H HL !H HL	Ø HL Ø HL	HH HH → HH LL	LH^{M} (LH) LH^{M} →LH LH^{M}
Buen gallo	Va'a li'i	H HL L HL	Ø HL L HL	HH LH	LH^{M}(LH) $L^{M}H^{M}$ → LH $L^{M}H^{M}$

Spanish	Mixtec	Tilantongo Surface tone	Tilantongo Underlying tone	Pike and Oram 1976	Daly 1978
Dos peces	Uu chaka	LHL !HL L	LHL HL L	HH HL → HH LL	HH^{M} HL →HH LL
Dos sombreros	Uu lelu	LHL L H	LHL L Ø	HH HH → HH HL	HH^{M} L^{M}L → HH HL
Dos animales	Uu kɨtɨ	LHL !H H	LHL Ø Ø	HH HH → HH HL	HH^{M} LL → HH HL
Dos cuchillos	Uu yuchi	LHL !H HL	LHL Ø HL	HH HH → HH HL	HH^{M} LL^{M} → HH HL^{M}
Dos medicinas	Uu tatna	LHL !H HL	LHL Ø HL	HH HH → HH LL	HH^{M} LH^{M} → HH LH^{M}
Dos gallos	Uu li'i	LHL LHL	LHL L HL	HH LH → HH HLH	HH^{M} L^{M}H^{M} → HH H^{M}H^{M}
Cuatro peces	Koo^{n} chaka	LHL !HL L	LHL^{L} HL L	HH HL	HH^{M} HL → HH^{M} HL/HH H^{M}L
Cuatro sombreros	Koo^{n} lelu	LHL L H	LHL^{L} L Ø	HH HH → HH HL	HH^{M} (LH)L^{M}L → HH HL
Cuatro animales	Koo^{n} kɨtɨ	LHL L H	LHL^{L} Ø Ø	HH HH → HH HL	HH^{M} (LH)LL → HH HL
Cuatro cuchillos	Koo^{n} yuchi	LHL L H	LHL^{L} Ø HL	HH HH → HH HL	HH^{M} (LH)LL^{M} → HH HL^{M}
Cuatro medicinas	Koo^{n} tatna	LHL L HL	LHL^{L} Ø HL	HH HH → HH HLH	HH^{M} (LH) LH^{M} → HH H^{M}H^{M}
Cuatro gallos	Koo^{n} li'i	LHL L HL	LHL^{L} L HL	HH LH → HH HLH	HH^{M} (LH)L^{M}H^{M} → HH H^{M}H^{M}
Pequeña pez	Luchi chaka	H H HL L	Ø Ø^{L} HL L	LH HL →LL HL	L^{M}L HL → L^{M}L HL/ L^{M}L H^{M}L
Pequeño sombrero	Luchi lelu	L L L H	Ø Ø^{L} L Ø	LH HH →LL HL	L^{M}L(LL) L^{M}L → L^{M}L HL
Pequeño animal	Luchi kɨtɨ	L L L H	Ø Ø^{L} Ø Ø	LH HH →LH HLL	L^{M}L(LL) LL → L^{M}L H^{M}L
Pequeño cuchillo	Luchi yuchi	L L L H	Ø Ø^{L} Ø HL	LH HH →LH HLL	L^{M}L(LL) LL^{M} → L^{M}L H^{M}L^{M}
Pequeña medicina	Luchi tatna	L L L HL	Ø Ø^{L} Ø HL	LH HH →LL HH	L^{M}L(LL) LH^{M} → L^{M}L HH^{M}
Pequeño gallo	Luchi li'i	L L L HL	Ø Ø^{L} L HL	LH LH →LL HLH	L^{M}L(LL) L^{M}H^{M} → L^{M}L H^{M}H^{M}
Grande pez	Ka'nu chaka	H H HL L	Ø Ø^{L} HL L	HH HL →LL HL	LL (HL) HL → LL HL/ LL H^{M}L
Grande sombrero	Ka'nu lelu	L L L H	Ø Ø^{L} L Ø	HH HH →LL LH	LL (HL) L^{M}L
Grande animal	Ka'nu kɨtɨ	L L L H	Ø Ø^{L} Ø Ø	HH HH →LL LH	LL (HL) LL → LL L^{M}L
Grande cuchillo	Ka'nu yuchi	L L L H	Ø Ø^{L} Ø HL	HH HH →LL LH	LL (HL) LL^{M} → LL L^{M}L
Grande medicina	Ka'nu tatna	L L L HL	Ø Ø^{L} Ø HL	HH HH →LL LH	LL (HL) LH^{M} → LL L^{M}H^{M}

Spanish	Mixtec	Tilantongo Surface tone	Tilantongo Underlying tone	Pike and Oram 1976	Daly 1978
Grande gallo	Ka'nu li'i	L L L HL	Ø Ø^{L} L HL	HH LH →LL LH	LL (HL) L^{M}H^{M}

In table 3.17, the following words are class B stems according to Pike and Oram: *ka'nu*; *diko*; *tatna*; *chaka*. The following stems are class A: *ɨɨ^{n}*; *kɨtɨ*; *yuchi*. The other words are not specified. In the frames above, we can see that *ka'nu* and *diko* appear to have a floating L tone which would account for the presence of an L tone in the surface tone of the following morpheme. *Tatna* and *chaka* need to be tested in frames where they are the first word followed by another to see if they fit this pattern and also have a floating L tone. Class A stems do not have a floating tone. *ɨɨ^{n}* and *kɨtɨ* both have HH patterns while *yuchi* has an HH pattern. *Yuchi* ends with an HL tone and should therefore behave differently to the other two words. To test this, we need to look at a tonal frame where *yuchi* is followed by another word.

In the Tilantongo data a floating L tone is only expressed when the word that sponsors the floating L tone is followed by a toneless or unspecified morpheme. Unspecified for tone morphemes when in citation form are pronounced with an H tone. There appear to be several rules in place that account for the tonal changes and associations in table 3.17:

1. A floating L tone attaches to an unspecified for tone morpheme to the right.
2. There is left spreading of L tone from the rightmost stressed syllable onto unspecified for tone morphemes.
3. There is HL de-association in specific contexts, and HL re-association on the next unspecified for tone morpheme when available[56].
4. The default tone H[57] links to unspecified for tone morphemes.
5. Downstep takes place when morphemes with an H or HL tone follow a word that ends in an HL tone[58].

These rules apply in the order above. This means that the rules are applied when their specification is met in that order, so you will never see a higher numbered rule, applied before a lower numbered rule. Examples 1 to 9 exemplify all the tonal behaviors and corresponding rules presented in table 3.17.

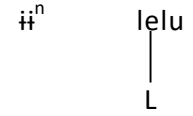
3.5.1. Examples from table 3.17 illustrating the tonal changes and association rules

[56] More research is needed to fully understand the contexts in which this rule applies. From the data in table 3.17, the HL de-attaches from the second syllable of *yuchi* when following a word with a floating L tone. However, *tatna*, which has the same tonal pattern in citation form, does not show this behavior. Also, as we will see in the examples below, the HL tone on the second syllable of *yuchi* also de-attaches and then re-attaches when *yuchi* is followed by the word *luchi*. At this point in time, the contexts in which this rule applies are not entirely clear. Although the rule does appear to be restricted to nouns.

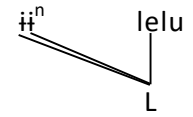
[57] McKendry (2013: 128) writes that high tone is an innovation since in some varieties it has a more limited distribution.

[58] Yip (2002: 129) writes that most literature on downstep says that tones are downstepped across the utterance. However, she goes on to write that this is likely an oversimplification: the domain may be smaller than the entire utterance. More research is needed to ascertain what the domain of downstep is in Tilantongo Mixtec. Yip (2002: 148) writes that there is some uncertainty whether L tones lower in the same environment as H tones. In the Tilantongo data, L and LH tones do not appear to be affected by downstep. Example 8 below exemplifies this. Example 7 exemplifies how floating L tone association on the following morpheme stops downstep from happening, while example 9 exemplifies how, when there is no space for floating L tone association and the first tone is HL, downstep does happen following the same word as in example 8.

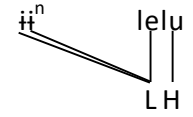
Example 1



Underlying representation of the citation forms of *ɨɨ^n* (HH) and *lelu* (L H)



Left spreading of L tone from the rightmost stressed syllable (Rule 2)

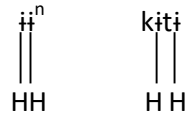


Default tone insertion (Rule 4)

Example 2

ɨɨ^n kɨtɨ

Underlying representation of the citation forms of *ɨɨ^n* (HH) and *kɨtɨ* (H H)



Default tone insertion (Rule 4)

Example 3

diko kɨtɨ

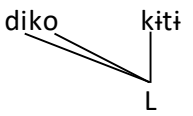
Underlying representation of the citation forms of *diko* (H H) and *kɨtɨ* (H H)

L

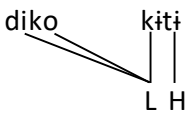
diko kɨtɨ

Floating L tone association (Rule 1)

L



Left spreading of L tone from the rightmost stressed syllable (Rule 2)



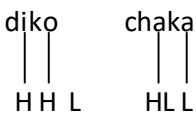
Default tone insertion (Rule 4)

Example 4

diko chaka

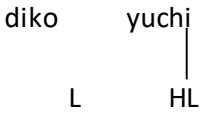
Underlying representation of the citation forms of *diko* (H H) and *chaka* (HL L)

L HL L

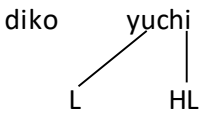


Default tone insertion (Rule 4)

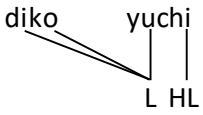
Example 5



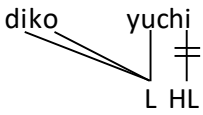
Underlying representation of the citation forms of *diko* (H H) and *yuchi* (H HL)



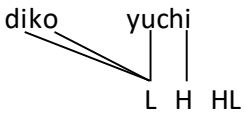
Floating L tone association (Rule 1)



Left spreading of L tone from the rightmost stressed syllable (Rule 2)

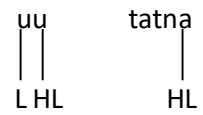


De-association of the HL tone (Rule 3)

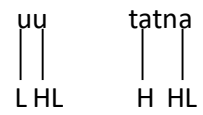


Default tone insertion (Rule 4)

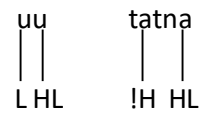
Example 6



Underlying representation of the citation forms of *uu* (LHL) and *tatna* (H HL)

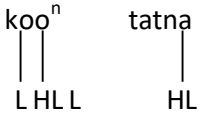


Default tone insertion (Rule 4)

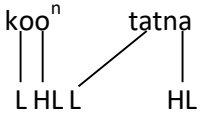


Downstep (Rule 5)

Example 7

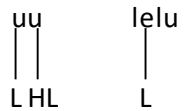


Underlying representation of the citation forms of *koo*^{n} (L HL) and *tatna* (H HL)

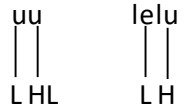


Floating L tone association (Rule 1)

Example 8

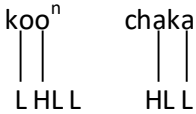


Underlying representation of the citation forms of *uu* (LHL) and *lelu* (L H)

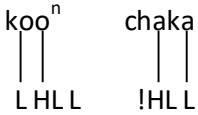


Default tone insertion (Rule 4)

Example 9



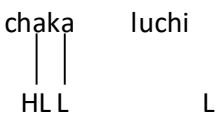
Underlying representation of the citation forms of *koo*^{n} (LHL) and *chaka* (HL L)



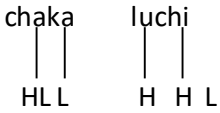
Downstep (Rule 5)

In order to test for floating tones, words have to be observed in an environment where they are followed by words which are receptive to floating L tone association. This means that in order to get a full picture of underlying tones in table 3.17 the words in the second group: *chaka*; *lelu*; *kɨtɨ*; *yuchi*; *tatna*; and *li'i*; need to be observed in that context. Unfortunately, I have no relevant tonal frame for *li'i*.

Example 10

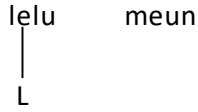


Underlying representation of the citation forms of *chaka* (HL L) and *luchi* (H H)

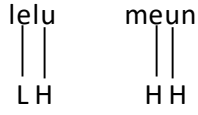


Default tone insertion (Rule 4)

Example 11[59]



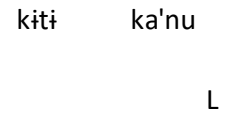
Underlying representation of the citation forms of *lelu* (L H) and *meun* (H H)



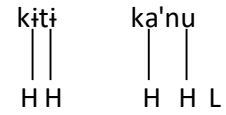
Default tone insertion (Rule 4)

Example 12

[59] The word *meun* could have a floating L tone attached, but in order to verify its underlying form it needs to be observed in a specific context within a tonal frame.

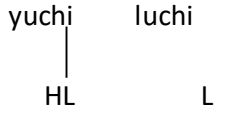


Underlying representation of the citation forms of *kɨtɨ* (H H) and *ka'nu* (H H)

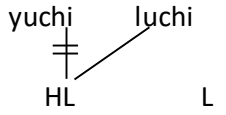


Default tone insertion (Rule 4)

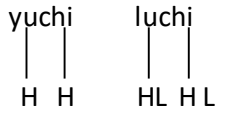
Example 13



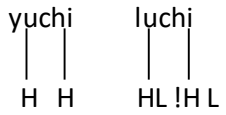
Underlying representation of the citation forms of *yuchi* (H HL) and *luchi* (H H)



De-association and re-association of the HL tone (Rule 3)

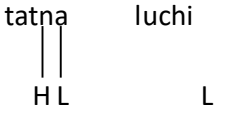


Default tone insertion (Rule 4)

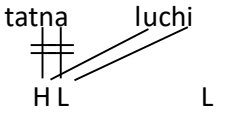


Downstep (Rule 5)

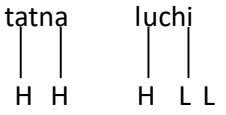
Example 14



Underlying representation of the citation forms of *tatna* (H HL) and *luchi* (H H)



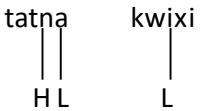
De-association and re-association of the HL tone (Rule 3)



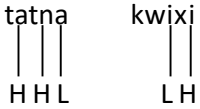
Default tone insertion (Rule 4)

Example 15[60]

[60] The word *kwixi* could have a floating L tone attached, but in order to verify its underlying form it needs to be observed in a specific context within a tonal frame.



Underlying representation of the citation forms of *tatna* (H HL) and *kwixi* (L H)



Default tone insertion (Rule 4)

3.5.1.1. Rule 1

Four out of seven words in the first group in table 3.17 sponsor a floating L tone: *diko*, *koo*^{n}, *luchi*, *ka'nu*. Underlyingly they have the following tonal patterns: Ø Ø^{L}, LHL^{L}, Ø Ø^{L}, Ø Ø^{L}. Examples 3, 5 and 7 illustrate floating L tone association. While examples 4 and 9 illustrate how floating L tones need an unspecified for tone morpheme to the right, in order to associate.

Pike and Oram (1976: 327-329) ascribe L H tone to *diko* and *luchi*, H H tone to *ka'nu* and HHL tone to *Koo*^{n}, *ka'nu* and *diko* are both ascribed to class B. In the tonal frames in table 3.17 all words following *ka'nu* begin with a surface L tone, except for *chaka*. The *ka'nu* tonal frames of Pike and Oram have exactly the same surface tones as the Tilantongo frames, with the exception of *ka'nu* before *chaka* (Pike and Oram ascribe L L tone where I ascribe H H tone). There are two other words in class B. Example 10 shows *chaka* does not have a floating L tone, while example 14 shows *tatna* also doesn't have a floating L tone. In the Pike and Oram data *ka'nu*, *diko* and *luchi* all get surface L L tone when between pause and a noun. This could be the result of rule 2 applying after rule 1. However, the surface tones on the words following *diko*, *koo*^{n} and *luchi* differ in the transcription by Pike and Oram from the Tilantongo data.

3.5.1.2. Rule 2

Table 3.17 shows there is left spreading of L tone from the rightmost stressed syllable onto unspecified for tone morphemes. The L tone that spreads can either be a floating tone that attaches to an unspecified morpheme to the right (see examples 3 and 5) or it can be a L tone that is specified (see example 1).

As I wrote above, in the Pike and Oram (1976: 327-329) data *ka'nu*, *diko* and *luchi* all get surface L L tone when between a pause and a noun. This could be the result of rule 2.

3.5.1.3. Rule 3

Two out of six words in the second group in table 3.17 have a moveable HL tone: *yuchi*, *tatna*. They both have the underlying tonal pattern Ø HL. However, they do behave differently, and they are ascribed to different word classes by Pike and Oram, who ascribe HHL tone to both in citation form. It appears that words with moveable HL have an empty floating tone slot.
Example 3 illustrates how the second syllable of *yuchi* changes from HL to H following floating L tone insertion on the first syllable. Rule 3 accounts for this but more research is needed into the mechanics of this rule. Pike and Oram observed the same and wrote that class A nouns with a word-final stress in citation form lose that stress when following class B words with L H or H H citation forms. *Yuchi* is their only class A word that has that final stress (Pike and Oram, 1976: 327). However, *tatna* which Pike and Oram (1976: 326) assign to class B, also shows participation in rule 3 (see example 14) while the other noun in class B, *chaka* does not (they do have different tonal patterns). Pike and Oram (1976: 326) wrote that some adjectives acquire a word-final stress when following H H-stressed class B nouns, *tatna* (H HL) followed by *luchi* (L H) becomes *tatna luchi* (H H H HL). Example 15 exemplifies how rule 3 only takes place when the HL has a space to

move to: it does not move when the syllable sponsoring the moveable HL is followed by a morpheme that has a tone already associated with it in underlying form. Pike and Oram wrote that in the same environment the adjective *kwixi* does not acquire word-final stress and that *tatna* (H HL) followed by *kwixi* (L H) becomes *tatna kwixi* (H H H L). Example 13 shows how rule 3 applies when *yuchi* is followed by *luchi*. Pike and Oram (1976: 326) wrote that adjectives do not acquire a word-final stress when following class A nouns. *Yuchi* (H HL) followed by *luchi* (L H) becomes *yuchi luchi* (H H H L)[61]. Example 13 and 14 illustrate the difference in which the moveable HL re-attaches to *luchi* following the two prosodically and segmentally different words. I theorize that this is because the HL tone has two moras to attach to on the second syllable of *tatna* and one mora on the second syllable of *yuchi*. More research is needed to verify if this is why the HL re-attaches differently. This could also explain why the HL on the second syllable on *tatna* does not de-attach when *tatna* is the last word in the tonal frame following a floating L tone. It might need two unspecified for tone moras to de-attach and re-attach to. This relates to the question whether there is a difference in behavior between two level tones that form a contour on two moras and a single contour tone on one mora. It could mean that there can only be one floating tone attached to the right edge of a word and that there is a difference between a HL on one mora (perceived as one tone) and H L on two consecutive moras (perceived as two tones). More research into this is needed.

Enclitics are another context where rule 3 is relevant. Pike and Oram (1976: 326, 329) write that when an H tone enclitic is added to class A stems with word-final stress, the stress changes from the stem to the enclitic, but it does not occur on an enclitic with L tone. However, when the same enclitic is added to class B stems, the stress does not change to the enclitic. Again, prosodic and segmental differences might play a role. It is however, outside the scope of this thesis to pursue this topic. See McKendry (2013: 90-101) on enclitics, their underlying forms and tonal association in San Miguel el Grande Mixtec to understand the complexities of this topic.

3.5.1.4. Rule 4

Five out of seven words in the first group in table 3.17 and four out of six words in the second group in table 3.17 have at least one unspecified for tone morpheme. Two words have the underlying tone pattern Ø Ø, three Ø $Ø^{L}$, three Ø HL and one has L Ø. The default tone H links to these unspecified for tone morphemes in citation form. It also links to the unspecified for tone morphemes in the tonal frames when its specification is met. See examples 1, 2, 3, 4, 6, 8, 10, 11, 12, 13, 14 and 15. The existence of unspecified for tone morphemes could explain why Daly ascribes a L L tonal patterns to *i̵^{n}*, *ka'nu* and *ki̵ti̵* while Pike and Oram transcribe these words as H H, as do I. However, I transcribe *diko* and *luchi* as H H, while Pike and Oram and Daly transcribe them as L H. Daly (1978: 107-108) gives examples of contexts in which L tone becomes mid and phonetic rules that have the effect of neutralizing the contrast between high and low tone. As I wrote above, in the Pike and Oram (1976: 327-329) data *ka'nu*, *diko* and *luchi* all get surface L L tone when between a pause and a noun. This could be the result of rule 2, for which one specification is that it needs unspecified for tone morphemes.

3.5.1.5. Rule 5

Three out of seven words in the first group in table 3.17 and two out of six words in the second group in table 3.17 have a HL tone on the second mora. Another word in the second group -*tatna*- also ends with an HL tone, however this tone appears to link to two moras, being made up out of two level tones. In the Pike and Oram data all these words also end with a sharp downglide, while in the Daly data they all end with a superscript ^{m}, this is the feature modify, which appears to be a floating L tone. With the exception of *yuchi*, they all end in a modified H which represents the

[61] Words I transcribe with a HL L tonal pattern, Pike and Oram (1976) transcribe as H L.

contour tone HL. Daly (1978: 104-105) recognizes tone lowering of a basic H tone following class III and IV morphemes (*va'a* LH^{M} (MHL) and *uu* HH^{M} (HHL)). He also introduces the feature downstep: a high tone is downstepped following a high tone plus one or more unmodified low tones or following pause plus one or more unmodified low tones. Elsewhere a high tone is phonetically high. The data from the Daly column do not show downstep though. In the Pike and Oram column the *va'a* tonal frames appears to show downstep, while the *uu* frames shows some lowering of tone. Example 6 illustrates downstep on a word with a default H tone, while example 9 illustrates downstep on a word with a specified HL tone on the first syllable. Example 13 shows downstep within a word after rule 3 and rule 4 are applied.

3.6. Summary

This chapter presents a preliminary analysis of tones in Tilantongo Mixtec. The seven tonal patterns that can be distinguished on bisyllabic and monosyllabic words in citation form in Tilantongo Mixtec need to be specified further with their underlying tonal patterns taken into account, in order to understand their tonal behavior in combination with other words. Rule 3 requires more research in order to be fully understood and specified. Regarding rule 5 more research is required to ascertain the downstep domain. More research is needed into the differences between an HL on one mora and H L on two consecutive moras. Enclitics and proclitics are another domain that requires research. Once the underlying patterns of words are determined through tonal frames, the five rules need to be tested in longer utterances. A full understanding of the tonal system is necessary to further analyze the data collected during the administration of the LVT in order to understand how people speak as opposed to whether they speak and thus assess the nuances of language shift.

4. The Linguistic Vitality Test (LVT) and language shift in Tilantongo

4.1. Introduction

The Mixtec language or *Sahin Sau* is spoken by approximately 450,000 people divided over three states of Mexico; Oaxaca, Puebla and Guerrero, as well as other parts of Mexico and the United states due to migration (Ferguson de Williams, 2007: 3). McKendry (2013: 4) writes that most Mixtec speech communities number less than 50,000 speakers. Language displacement in favor of Spanish has been going on for well over a century, and there is a wide range of displacement. According to the 2005 census 1,471 out of 3,348 people who reside in Tilantongo speak an Indigenous language (INEGI Conteo de Población 2005 II). The 2010 census only gives numbers of Indigenous language speakers at a state-level, but it does give a lower population total for Tilantongo; 3,210 people (INEGI Conteo de Población 2010). Ethnologue lists the Mixtec population of Diuxi-Tilantongo at 3,410[62] (using the 2000 INALI census), decreasing due to migration to the US. It says there are 150 monolinguals. Language use is given as spoken at home and taught to children in most Mixtec households. Mixtec is used in the following contexts; at home, between friends and at work. There are some Mixtec speakers of all ages and all use Spanish. The language status is given as threatened, or 6b (Eberhard *et al*., 2019). SIL uses the expanded graded inter-generational disruption scale (EGIDS) as a tool for assessing the vitality of languages. EGIDS 6b means the language is in trouble, inter-generational transmission is in the process of being broken, but the child-bearing generation can still use the language so it is possible that revitalization efforts could restore transmission of the language in the home (www.sil.org/about/endangered-languages/language-vitality). In order to understand the Mixtec language situation in Tilantongo better, I administered the Linguistic Vitality Test (LVT) developed by Margaret Florey (Margaret Florey: building tools for assessing linguistic vitality), to 34 randomly selected respondents.

4.2. Calculating the LVT score

There are three components to the LVT: lexical recognition, translation sentences and discourse. Lexical recognition consists of 53 test items, translation sentences consist of 75 items and the discourse component consists of 1 item. Percentages are given to score respondents for each component. Each component makes up 1/3 of the total LVT score. For example, someone who scores 87% for lexical recognition, 20% for translation sentences and 0% for discourse would have an overall LVT score of: 107/300 = 0.36 x 100 = 36%.

I prepared the LVT with Sr Marcial Cruz Cenobio (age 60, living in the center of Tilantongo) and we tested it with several speakers of varying language proficiency before administering it to the random sample participants.

4.2.1. Component 1: Lexical recognition

The person interviewed is shown a selection of photos and the researcher explains what each photo depicts in Spanish. After this a recording in Mixtec is played (see supplemental document for sound file). The respondent listens to the words (each word is repeated twice) and points to the corresponding image while the researcher notes down the response. Table 4.1 lists Set 1 items in the test in the order of the recording, not the order of the photographs. This is the order

[62] In contrast to the previous numbers that were only for Tilantongo, this number is for Diuxi and Tilantongo combined, and appears to refer to the number of speakers in 2000. INEGI 2005 states that in Tilantongo the language is spoken by 1,471 out of 3,348 people and in San Juan Diuxi 1,086 out of 1,469 (INEGI Conteo de Población 2005 II), giving a total of 2,557 out of 4,817.

adopted in all other tables. Sets 2 and 3 follow the same principle as Set 1 as they also test common nouns that increase in complexity.

Table 4.1: Set 1 of test component 1 of the LVT

Set 1	1	Ita	Flor
	2	Ndeyu	Comida
	3	Dita	Tortilla
	4	N~~ɨ~~ñ~~ɨ~~	Maíz
	5	Nduchi	Frijol
	6	Tila	Pan
	7	Taa	Pajaro
	8	Ko'o	Plato
	9	Kuchi	Puerco
	10	Ndute	Agua
	11	K~~ɨ~~d~~ɨ~~	Olla

Set 4 (table 4.2) tests recognition of simple sentences that gradually increase in complexity. After explaining what each photo depicts another recording is played (see supplemental document for sound file). The respondent listens to the sentences (each sentence is repeated twice) and points to the corresponding image while the researcher notes down the response. Set 5 follows the same principle as Set 4 as it also tests common sentences that increase in complexity.

Table 4.2: Set 4 of test component 1 of the LVT

Set 4	1	Ñad~~ɨ~~'~~ɨ~~ kidava'a ndeyu	La mujer prepara comida
	2	Mee da'ya dad~~ɨ~~k~~ɨ~~	El niño está jugando
	3	Ngutu xaxi	El toro está comiendo
	4	Sey~~ɨɨ~~ nat~~ɨ~~'u ve'e	El hombre está barriendo la casa
	5	Nukoo nana xa'nu	La abuela está sentada
	6	Xiko ñau	La aguila está volando
	7	Kaxi'i tata xa'nu	Los abuelos están bebiendo
	8	Sey~~ɨɨ~~ xi ñad~~ɨ~~'~~ɨ~~ kakidatnius	Los esposos (el señor y su mujer) trabajan
	9	Mee sey~~ɨɨ~~ xedis xe'es	El hombre está frotando su pierna
	10	Nda'i da'ya	El bebe llora

4.2.1.1. The results from the lexical recognition test or component 1 of the LVT

The lexical recognition test is designed to test receptive ability in the target language, i.e. how well the respondent understands Mixtec. Margaret Florey judged that, based on test experience, respondents who identified more than 35 items could take the second test and I followed the same rule. I found that the picture recognition task could prove difficult for elderly people. Even though it was clear they had no difficulty with understanding the Mixtec, they found it hard to

pinpoint the corresponding picture. I decided that in such cases translating the sentence into Spanish was equivalent to pointing to the right picture. Table 4.3 shows the results of the lexical recognition test for the 34 respondents. It gives the percentage of correct answers for each of the five sets. 21 out of 34 (61.7 %) respondents scored a perfect 100 on all five sets. 5 out of 34 (14.7%) respondents scored zero on one or more sets. 8 out of 34 (23.5%) had scores ranging from 60 to 100 on the five sets. Overall, over 85 percent of the respondents understand Mixtec when it is spoken.

Table 4.3: Lexical recognition test results

Respondent	lex_recognition set 1 %	lex_recognition set 2 %	lex_recognition set 3 %	lex_recognition set 4 %	lex_recognition set 5 %	Component 1%
6	72	100	91	80	90	**87**
15	100	100	100	100	100	**100**
12	36	0	0	0	0	**7**
13	45	0	0	0	0	**9**
11	91	81	64	90	100	**85**
10	100	100	91	90	100	**96**
16	81	100	100	60	60	**80**
1	100	100	81	60	80	**84**
2	100	100	100	100	100	**100**
7	55	45	0	0	0	**20**
5	100	100	100	100	100	**100**
3	100	100	100	100	100	**100**
17	100	100	100	100	100	**100**
19	64	82	73	60	60	**68**
18	100	100	100	100	100	**100**
14	73	64	36	40	0	**43**
9	100	100	100	100	100	**100**
20	100	100	100	100	100	**100**
21	100	100	100	100	100	**100**
22	100	100	100	100	100	**100**
23	100	100	100	100	100	**100**
24	100	100	81	100	100	**96**
25	100	100	100	100	100	**100**
26	100	100	100	100	100	**100**
27	100	100	100	100	100	**100**
28	100	100	100	100	100	**100**
29	100	100	100	100	100	**100**
30	100	100	100	100	100	**100**
8	100	100	100	100	100	**100**
31	91	64	27	0	0	**36**
32	100	100	100	100	100	**100**
33	100	100	100	100	100	**100**
34	100	100	100	100	100	**100**
4	100	100	100	100	100	**100**

4.2.2. Component 2: translation sentences

Table 4.4 provides the sheet that I used with the translation sentences. All answers from the random sample respondents were recorded. Notable is translation sentence 17 of set 3. Even though during the preparation and testing it became clear that the word *mar* (Spanish for sea) did not have a one word equivalent other than the Spanish loanword *maru*, and that it tended to confuse people, I decided to keep the sentence as it was to see what would come up. Interestingly Alvarado's dictionary gives the following entries for *mar*: *nduta caa canu*, *nduta canu*, *nduta ñuhu canu*; *mar estrecho*: *nduta canu ninduvui tuu*, *nduta canu yonduvui cuiñe*, *nduta canu yonu cuino cuiñe*; *mar alto*: *nduta cono* and *mar bajo*: *nduta ña cono*; *golfo de mar*: *nduta ña sino saha*; and *mar baja*: *nduta yadzi* (Jansen and Pérez Jiménez, 2009: 63-64). Alvarado's dictionary from 1593 has a different orthography from the ones used in modern Mixtec texts. Jansen and Pérez Jiménez (2009: 12) write that the Mixtec orthography[63] employed by Alvarado is not always consistent and that it is difficult to see the tilde on ñ and that it can be hard to distinguish between /n/y/u/ (between /qni/ and /qui/ for example). Accordingly, they made some changes from the original text. See the introduction to *Voces del Dzaha Dzavui* for more on this and on how the orthography from 1593 compares to modern Mixtec orthographies (Jansen and Pérez Jiménez, 2009).

There are many ways in which a sentence can be translated into Mixtec. With Sr Marcial we recorded all the variants he could think of when we were preparing the LVT. When the test was administered there were still more variants that turned up. It is outside of the scope of this thesis to show all the variants. It is also outside of the scope of this thesis to include a tonal analysis of components 2 and 3. This means that the respondents were scored on whether they provided translation sentences and the discourse element[64], while their speech was analyzed by the expert language focus group. There were respondents who were able to translate parts of sentences for which they were scored partially. The scores of component 2 reflect the extent to which respondents were able to translate from Spanish to Mixtec. Table 4.5 is included to give an indication of the translated Mixtec sentences, and shows the variants that were given by Sr Marcial.

Table 4.4: Component 2 translation sentences question sheet

Set 1	1	El animal es grande
	2	La flor es bonita
	3	Me duele la cabeza
	4	Tengo hambre
	5	El niño tiene sed
	6	Mi esposo/a se fue
	7	La niña llora
	8	Ella es mi hermana
	9	Este animal es un toro
	10	Ese es una casa
	11	El cerro está cerca
	12	Tu eres una persona buena
	13	Fui al jardín
	14	Los abuelos están comiendo
	15	Nuestro padre está durmiendo

[63] They note that the Spanish orthography is also inconsistent (Jansen and Pérez Jiménez, 2009: 13).

[64] Due to the binary results of component 2, only those respondents scoring 100% on this component moved onto component 3: discourse. The large amount of data for component 2 means that it was not possible for the expert language focus group to listen to all these results; they have, however, analyzed the speech of all respondents through component 3.

	16	Quiero dormir
	17	La abuela tiene sed
	18	Los sabinos son altos
	19	Tengo fiebre
	20	No lo hagas!
	21	Agarra un poco de frijol!
	22	Esto no es verdad
	23	Aquí me lastimé
	24	Hay muchos gatos aquí
	25	El tenate está pesado
Set 2	1	Tráeme tres palos
	2	El hombre está delgado
	3	El niño tiene espanto
	4	Ella fue a traer leña
	5	El sacerdote viene
	6	La mujer estaba cantando
	7	Ella vende maíz
	8	El conejo está comiendo frijol
	9	El niño se está mirando
	10	El está en su casa
	11	El venado está corriendo hasta el cerro
	12	La niña ya comió su tamal
	13	El dio tabaco a su padre
	14	La abuela entró al temazcal
	15	Ella está hablando con sus hijos
	16	Te voy a dar las tortillas
	17	El señor sembró frijol
	18	Voy a tomar pulque
	19	El animal va estar grande
	20	Mi padre me dio la ropa
	21	El llegó ayer
	22	La muchacha tiene el cabello largo
	23	Yo trabajo en el cerro
	24	La reina se casó
	25	Tilantongo es un lugar antiguo
Set 3	1	El ratón comió todo el queso
	2	En la mesa hay una taza de leche frío
	3	Ahora voy a ir a mi casa, mañana regreso
	4	Está nublado, no se ve el sol
	5	Mis tíos llegaron ayer, se van a quedar 3 días
	6	¿Dónde estabas? te busque, pero no te encontré
	7	Mi hija cuida los borregos en el campo
	8	El coyote se llevó una gallina
	9	Los pajaros cantaron en la mañana
	10	Vamos a salir al campo buscar quelites
	11	Esta piedra no se quiere romper
	12	El niño está vomitando y tiene fiebre
	13	Está bien que ya fuiste a ver la ayer
	14	Ella está moliendo la masa en el metate

	15	Vamos a piscar la mazorca
	16	¿ Qué escribiste en el papel que te di?
	17	El cielo, el mar y los lagos son de color azul
	18	¿Estás enojado por lo que dije?
	19	No sé porque el señor lo hizo
	20	El enfermo siempre está en su cama
	21	Regresé para visitarte
	22	No creo en lo que estás diciendo
	23	Ustedes se quieren mucho
	24	El no tiene mucho miedo
	25	El niño pegó a su hermano otra vez

Table 4.5: Component 2 translation variants

Set 1	1	ka'nu kɨtɨ
		kɨtɨ ka'nu
		kɨtɨ nyixa
		nyixa kɨtɨ
		kɨtɨ nyɨɨ
		nyɨɨ kɨtɨ
		kɨtɨ duju
		duju kɨtɨ
		dujutɨ
		kɨtɨ tata ka'nu
	2	ita vilikaa
		vilikaa ita
	3	ku'u dɨkɨr
		xaxia'aⁿ dɨkɨr
		kaja dɨkɨr
	4	koⁿjoⁿr
		vichi koⁿjoⁿr
		nde'e koⁿjoⁿr
		io koⁿjoⁿr
	5	se luchi yichis ndute
	6	kwa'a yɨɨr (ws)
	7	nda'i dai luchi
		nda'i da'ya
	8	dichi ya'a kuu ku'ar
	9	kɨtɨ ya'a kuu ngutu
	10	xa'a kuu ɨɨn ve'e
	11	yatni yuku
	12	do'o kuu ɨɨn ñayiw va'a
	13	nye'er nuu io ita
	14	tata xa'nu xaxde'ñus
	15	taaro kidis
	16	kwinir xa kidir
	17	nana xa'nu yichiña ndute
	18	tnuyuⁿjuⁿ duⁿjuⁿtnu
	19	tna'ar ka'ni
	20	maxku kadan!
	21	tnɨɨ xaku nduchi!

	22	xa'a ña ndaa
	23	ya'a tni kwe'er
	24	io kwe'e vilu
	25	vee ndo'o
Set 2	1	taxi uni yutnude
	2	kwini seyɨɨ (ms)
	3	yu'u se luchi
	4	meeña nyee ke'e tutnu
	5	vaxi dutu
	6	xita ñadɨ'ɨ
	7	meeña diko nuni
	8	gwixi xaxitɨ nduchi
	9	nde'a ña'a da' ia luchi
	10	mees tuus ve'es
	11	xino idu kwa'a yuku
	12	dichi dɨ luchi xa nyaxi koo
		dɨ ña dɨ luchi xa nyaxi koo
	13	mees nyia'a inu taas
	14	nana xa'nu ngɨuña ñɨ'ɨ
	15	meeña ndatnu'u xi da'yaña
	16	na taar dita
	17	mees ndakee nduchi
		ndakees nduchi
	18	ko'or ndɨdɨ
	19	kwenu du^{n}ju^{n} kɨtɨ
	20	taar taxi da'ma
		da'ma taxi taar
	21	iku nyees
		nyees iku
	22	dichi dɨ'ɨ kani idi
		kani idi dɨkɨi
		kani idi dɨkɨña
	23	kida tniur yuku
		yuku kida tniur
	24	tnanda'a dichi dɨ'ɨ
		tnanda'a ñadɨ'ɨ kuu nya'nu
	25	Ñuu tnuu kuu ɨɨn ñuu xa na'a
Set 3	1	tɨtnɨñɨ ndandɨ'ɨ xaxitɨ yuxa dɨku
		tɨtnɨñɨ xaxitɨ yuxa dɨku
		ndandɨ'ɨ tɨtnɨñɨ xaxitɨ yuxa dɨku
	2	nuu mexa yodo tuu ɨɨn taxa dɨku xa ndiko
		xa ndiko dɨku ñu'u nuu taxa yodo tuu nuu mexa
	3	vitna nu'ur ve'er te kwikor tnee
	4	i viko, te ña kanda ngandii
		i viko, te ña kandar ngandii
		i viko andɨw te ña kanda ngandii
		ña kanda ngandii, chi i viko
		i viko te ña keer ngandii
	5	iku nyee ditor te kutus uni kɨu
		ditor nyees iku te kutus uni kɨu

		ditor nyee iku te kutus uni kɨu
		nga nyee ditor te kutus uni kɨu
	6	ndexi nyia'an, nyia'an nduku ña’ar te ña naniña’ar
		ndexi nyion? chi nanduku ña'ar te ña naniña'ar
		Nanduku ña'ar te ña naniña'ar
		ndexi ion te nandukuña'ar te ña naniña'ar
		ndexi nye'en te nandukuña'ar te ña naniña'ar
	7	da'yar ndekai kachi nuu ku'u
		ndekai kachi nuu ku'u kwa'a da'yar xi kachi nuu ku'u
	8	ndeka ñaña chuuⁿ
		ñaña ndekatɨ ɨɨn chuuⁿ
	9	nyita taa nde datne
		nde datne nyita taa
	10	kɨndukuro yuwa titi
		kɨndukuro titi
	11	kaxi yuu te ña ta'u
		ña ndata yuu
		ña ta'u yuu
		ña kwini xa ta'nde yuu
	12	ku'u da'ya chi kane inis te tna'as ka'ni
		kane ini da'ya chi ku'us te tna'as ka'ni
		kane ini da'ya te tna'as ka'ni
		ku'u da'ya te kane inis te tna'as ka'ni
	13	io va'a xa nyeen koton xi iku
		io va'a nyeen xa kotoña iku
		na ka va'a xa nyeen kotoña iku
	14	ndiko yuxa nuu yodo
		ndikoña yuxa nuu yodo
		nuu yodo ndikoña yuxa
	15	kɨdɨ dakeero nɨñɨ
		na kɨɨro na dakeero nɨñɨ
		na kɨɨro na dakeero itu
	16	naxan chidotnunin nuu tutun taxir
	17	ndute xe andɨw xi ndute mini ka'nu kwiite
	18	kiti inin xa nga'ar
		xa nga'ar kiti inin
	19	ña xinir chi mees ngida
		ña xinir na kwenda mees ngida
		ña ntekur na kwenda mees ngida
	20	se ku'u kandodos nuu xitos
		ku'us kandodos nuu xitos
		kas nuu xitos te ku'us
	21	nyikor chi vax kɨ kotoña'ar
		nyikor xa vax kɨ kotoña'ar
	22	ña jangixar xa ka'un
		ña jangixar xa ka'an
		ña xinir nax ka'an
	23	meen ka tna ini tna'a

		meen io ka tna ini tna'a
		meen io ka kuu tna'a
	24	mees ña tuu yu'us
		mees ña tuu yu'u
		ña tuu yu'us
	25	se luchi nganis ñanis
		ngani se luchi ñanis

4.2.2.1. The results from the translation test or component 2 of the LVT

Table 4.6 presents the results from the translation test or component 2 of the LVT. 22 out of 34 (64.7 %) respondents scored a perfect 100 on all three sets. 11 out of 34 (32.4%) respondents scored zero on one or more sets. None out of 34 (0.0%) had scores ranging from 60 to 100 on the three sets. Overall, nearly 65 percent of the respondents are able to translate sentences into Mixtec. The results of component 2 are very binary: respondents are either able to translate sentences into Mixtec or they can only translate loose words.

Table 4.6: Translation test results

Respondent	translation set 1 %	translation set 2 %	translation set 3 %	Component 2%
6	20	0	0	**7**
15	100	100	100	**100**
12	0	0	0	**0**
13	0	0	0	**0**
11	12	0	0	**4**
10	0	0	0	**0**
16	6	0	0	**2**
1	8	0	0	**3**
2	100	100	100	**100**
7	0	0	0	**0**
5	100	100	100	**100**
3	100	100	100	**100**
17	100	100	100	**100**
19	8	0	0	**3**
18	100	100	100	**100**
14	0	0	0	**0**
9	100	100	100	**100**
20	100	100	100	**100**
21	100	100	100	**100**
22	100	100	100	**100**
23	100	100	100	**100**
24	32	24	4	**20**
25	100	100	100	**100**
26	100	100	100	**100**
27	100	100	100	**100**
28	100	100	100	**100**
29	100	100	100	**100**

30	100	100	100	**100**
8	100	100	100	**100**
31	0	0	0	**0**
32	100	100	100	**100**
33	100	100	100	**100**
34	100	100	100	**100**
4	100	100	100	**100**

4.2.3. Component 3: discourse

Participants who complete all three translation sets can move to the discourse task. Margaret Florey used 6 photos from the lexical recognition task to trigger discourse or asked the respondents to make up a story in the target language. I asked people to tell a story in Mixtec and told them they could talk about whatever they felt like sharing; they could talk about their life or any activities that they had done or were planning to undertake that day. All discourse tasks were recorded and transcribed. The recordings and transcriptions were listened to and analyzed by the expert language focus group.

4.2.3.1. Discourse example

See supplement document for sound file.

\tx Vitna kɨu uu oktubri, kwia ya'a lugar
\ge now day two sp: October year this sp: place
\tx nuu ndaxio -ro ngixi ɨɨn ña,
\ge on, place con: to live -1p pl com: to arrive one she
\tx ngixi xa kuu ña ɨnka nasion.
\ge com: to arrive for, when con: to be she other sp: nation
\tx Nduku ña na mudu dakwa'a ña tnu'u
\ge con: to search she what fight pot: to learn she word
\tx io dova'anga ñuu ñayiw te kada -ro
\ge con: to exist any part world and pot: to make/to do -1p pl
\tx gana xa tnu'u ya'a maxku kɨndɨ'ɨ
\ge sp: effort for, when word this will not pot: come to an end
\tx chi ko nga se xa'nu dawa -ro ka
\ge because but just masculine old (person) some -1p pl more
\tx ka'a na kuu se kwechi
\ge con: to speak what con: to be masculine small plural
\tx ña io ka -s ka ka'a te
\ge no con: to exist plural -he (ms) more con: to speak and
\tx xija kuu xa nda'u nai chi ndondoo
\ge that con: to be for, when poor always because everything
\tx xandɨ'ɨ xa kadanaro tnu'u ya'a
\ge con: to finish for, when con: to finish -1p pl word here
\tx xa nga ka'a taadɨ'ɨ -ro
\ge for, when com: plural con: to speak parents -1p pl
\tx se nga kixi xa kwia
\ge masculine com: plural pot: come about to, already year
\tx te na kada -ro xa na tnu'u
\ge and what pot: to make/to do -1p pl for, when what word
\tx ya'a na ngondita na kwa'a na maxku
\ge here what pot: return what pot: to be able as will not
\tx kɨna tnu'u ya'a chi io ndandɨ'ɨ
\ge pot: to end word here because con: to exist important

\tx nde'a -ro xa ɨnka nasion te ka
\ge con: to see -1p pl for, when other sp: nation and plural
\tx ka'a -s naku ingles, naku olandes,
\ge con: to speak -he (ms) like sp: english like sp: dutch
\tx portuges. Da na kwa'a -ro ndaa tnu'u te
\ge sp:portugese then what pot: to be able -1p pl all word and
\tx ija na ka va'a chi kɨ'ɨ -ro nuu
\ge that what more good because pot: to go -1p pl on, place
\tx kɨ'ɨ -ro te ma kada sufrir -ro
\ge pot: to go -1p pl and no pot: to make/to do sp: to suffer -1p pl
\tx chi ndaa tnu'u ija teku -ro xa kuu
\ge because all word there pot: to hear -1p pl for, when con: to be
\tx xa ka'a -r te se kada
\ge for,when con:to speak -1p sg fam and masculine pot: to make/to do
\tx na kunini koio ña te dani na
\ge what pot: to listen pl she and in the same manner what
\tx kane ini koio -s na kuña'a -ro
\ge pot: to think pl -he (ms) what pot: to give -1p pl
\tx nuu da'ya dɨ'ɨ -ro, nuu da'ya yɨ'ɨ -ro xa
\ge face child woman -1p pl face child man -1p pl for, when
\tx na kada -s xamani xa
\ge what pot: to make/to do -he (ms) please for, when
\tx na dakwa'a koio -s ya'a kuu
\ge what pot: to learn pl -he (ms) this con: to be
\tx tnu'u ka'a -r kɨu ya'a te na
\ge word con: to speak -1p sg fam day this and what
\tx kuu ta'u -ro xa ka xiko
\ge con: to give thanks -1p pl for, when who con: to walk
\tx nuu ñayiw ɨnka xichi xa kada
\ge on, place human being other part for, when pot: to make/to do
\tx kwa'a ña -i o xa na kwa'a
\ge pot: to be able she -its or for, when what pot: to be able
\tx koio tnu'u -ro te ndaa tnu'u ya'a kɨ'ɨ
\ge pl word -1p pl and all word here pot: to go
\tx ɨnka xichi nadu ya'a ni ndoo.
\ge other part only here just pot: to stay
\ft *Hoy el día 2 de octubre, este año al lugar donde vivimos, vino una. Vino ella, es de otra nación, ella busca la lucha para que ella aprende la palabra que existe en cualquier parte del mundo y hacemos el esfuerzo para que esta palabra no se termine porque solamente la gente grande algunos de nosotros todavía hablan, que son los jóvenes que ya no existe quien habla y esto es pobreza para siempre porque todo termina cuando acabamos la palabra aquí que hablaron nuestros padres, que vinieron en los años pasados y que hacemos para que la palabra aquí regrese para que no se acabe la palabra aquí porque es importante que estamos viendo otras naciones, quienes hablan como inglés, holandés, portugués. Así que aprendemos toda palabra y esto que bueno porque vamos donde vamos y no sufrimos porque toda palabra allí entendemos como lo que yo hablo. Ellos que lo hacen escuchen y también lo piensen y avisen nuestras hijas, nuestros hijos por favor para que aprenden esta palabra que yo hablo. Este día es para que damos gracias que alguien de otra parte anda para que yo enseño ella para que aprenden nuestra palabra y todas palabras aquí y que van a otra parte y que no se van a quedar aquí solo.*

Today on the second of October of this year came one female to the place where we live. She who came is from a different nation, she fights to learn the words that exist in all parts of the world and we are making the effort that these words do not end because only the elderly amongst us still speak. Of the young people there are no more those who speak, and this is poverty forever, because everything ends when we end the words that our parents spoke here, who came in the years before. We have to make an effort so the words return so that the words

do not end because it is important that we are seeing other nations, that speak such languages as English, Dutch, Portuguese. So that we learn all words, and this is good because we will go where we go and we will not suffer because we will understand all words as we understand that what I speak. Those who do this listen and think about it and notify our daughters and our sons please so that they learn the words that I speak. This day is for giving grace that someone from a different part of the world walks here so I can teach her so that they learn our words and all words here and that they will go to other parts of the world and not stay here alone.

4.2.3.1.1. Expert language focus group comments

The experts gave Mixtec equivalents for the Spanish loanwords used in the sound recorded discourse example:

lugar → ñuu ya'a

nasion → ñuu

mudu → ini ña

ma kada sufriro → ma tuu ndo'oro

4.2.3.2. The results from the discourse test or component 3 of the LVT

Table 4.7 presents the results from the discourse test or component 3 of the LVT. The expert language focus group remarked that it is difficult to come up with a spontaneous story and that people therefore sometimes repeated themselves or used filler words such as *naxku*. People also used loanwords from Spanish for which the focus group provided Mixtec alternatives. Interestingly they concluded that all of the people who said they didn't speak good Mixtec spoke well tonally, although there was some confusion concerning aspect usage. 22 out of 34 respondents completed the discourse task. 21 respondents scored 100, while one young respondent in their twenties who had learned the language at a later age was scored 80 because there were some issues with tones.

Table 4.7: Discourse test results

Respondent	Discourse %
6	**0**
15	**100**
12	**0**
13	**0**
11	**0**
10	**0**
16	**0**
1	**0**
2	**80**
7	**0**
5	**100**
3	**100**
17	**100**
19	**0**
18	**100**

14	**0**
9	**100**
20	**100**
21	**100**
22	**100**
23	**100**
24	**0**
25	**100**
26	**100**
27	**100**
28	**100**
29	**100**
30	**100**
8	**100**
31	**0**
32	**100**
33	**100**
34	**100**
4	**100**

4.3. Overall results of the Linguistic Vitality Test

The results of the LVT are set out in table 4.8. Overall, 65 percent of the respondents completed all three tasks, with the exception of one respondent who scored 93 they all scored 100 and are fluent Mixtec speakers. There were no respondents who scored zero. 35 percent scored between 2 and 39, thus emphasizing the binary nature of the results: almost everyone understands the Mixtec language in varying degrees, but people either speak it or they don't. Testing the variation of speech is more complex as it includes tonal and sound inventories, so how people speak, as opposed to whether they speak. However, the language expert focus group found that overall, even the people who said they didn't speak well did, in fact, do so. The preliminary speech and tonal analysis of the LVT data, however, suggests that the group of fluent Mixtec speakers is divided into two subgroups based on sound and tonal differences in speech. The first subgroup consists of mostly elderly speakers, while the second consists of young people who have taken active measures to learn to speak the Mixtec language. Overall, the second subgroup of speakers appear to no longer use the sound /ɨ/ replacing it with /u/, some of them also don't appear to use contour tones, where the first subgroup of speakers does. More research into the extent and consequences of these differences in speech is required.

There are a few other things that stand out in the LVT recordings and transcriptions. Most people put focus on the subject by placing it first in the sentence in part 2 of the LVT that requires translation from Spanish to Mixtec. Almost everyone uses Spanish loanwords that have become more salient than their Mixtec equivalents. When Margaret Florey (1993: 297) tested the language proficiency in Alune of 33 speakers, she identified four groups of speakers based on the test results: near-passive bilinguals, imperfect speakers, younger fluent speakers and older fluent speakers. The Tilantongo data suggest three groups of speakers based on the LVT results: near-passive bilinguals, younger fluent speakers and older fluent speakers. There were no imperfect speakers amongst the 34 random sample participants. Perhaps this is related to the negative associations and pressures attached to speaking Mixtec. The young fluent speakers have shown strong will and resolve in going against the negative pressures attached to speaking Mixtec. From conversations it has become clear that this was not an easy process and that people had to

consciously seek out opportunities to learn to speak, as learning to speak Mixtec was no longer a natural process. This might be why there are no imperfect speakers amongst the random sample participants.

Table 4.8: LVT Results

Respondent	Lexical Recognition	Translation	Discourse	Overall
6	87	7	0	**31**
15	100	100	100	**100**
12	7	0	0	**2**
13	9	0	0	**3**
11	85	4	0	**30**
10	96	0	0	**32**
16	80	2	0	**27**
1	84	3	0	**29**
2	100	100	80	**93**
7	20	0	0	**7**
5	100	100	100	**100**
3	100	100	100	**100**
17	100	100	100	**100**
19	68	3	0	**23**
18	100	100	100	**100**
14	43	0	0	**14**
9	100	100	100	**100**
20	100	100	100	**100**
21	100	100	100	**100**
22	100	100	100	**100**
23	100	100	100	**100**
24	96	20	0	**39**
25	100	100	100	**100**
26	100	100	100	**100**
27	100	100	100	**100**
28	100	100	100	**100**
29	100	100	100	**100**
30	100	100	100	**100**
8	100	100	100	**100**
31	36	0	0	**12**
32	100	100	100	**100**
33	100	100	100	**100**
34	100	100	100	**100**
4	100	100	100	**100**

4.3.1. Predictors of Mixtec language ability

Linear regression was used to explore the predictive relationship between age and the LVT score; education and the LVT score; and time living in the community and the LVT score. I used SPSS to run the linear regressions.

4.3.1.1. Impact of age on the LVT score

All assumptions of regression were met, which means conclusions pertaining to the population can be drawn based on the sample. The result is a significant correlation between the predictor and the outcome: r = .507 p < .01. The correlation coefficient squared or coefficient of determination 'R^2 = .257'. This means that the predictor, age explains 25.7 percent of the variation in the LVT score. 'Adjusted R^2 = .234'. It indicates how much variance in the outcome would be accounted for if the model would have been derived from the population from which the sample was taken, which here is 23.4 percent. Age is, therefore, a strong predictor of the LVT score as it explains 25% of the variation. The model can be used to draw conclusions about the population.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	24.151	15.488	
	age	.891	.268	.507

R^2 = .257. p < 0.01

Figure 4.1: B-coefficients of the linear regression of the impact of age on the LVT score

4.3.1.2. Impact of education on the LVT score

All assumptions of regression were met, which means conclusions pertaining to the population can be drawn based on this sample. The result is a significant negative correlation between the predictor and the outcome: r = -.588 p < .0001. The correlation coefficient squared or coefficient of determination 'R^2 = .346'. This means that the predictor, education explains 34.6 percent of the variation in the LVT score. 'Adjusted R^2 = .326'. It indicates how much variance in the outcome would be accounted for if the model would have been derived from the population from which the sample was taken, which here is 32.6 percent. Education is, therefore, a strong predictor of the LVT score as it explains almost 35% of the variation. The model can be used to draw conclusions about the population.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	96.698	8.156	
	education	-5.027	1.221	-.588

R^2 = .346. p < 0.0001

Figure 4.2: B-coefficients of the linear regression of the impact of education on the LVT score

4.3.1.3. Impact of time living in the community on the LVT score

All assumptions of regression were met, which means conclusions pertaining to the population can be drawn based on the sample. The result is a significant correlation between the predictor and the outcome: r = .544 p < .0001. The correlation coefficient squared or coefficient of determination 'R^2 = .296'. This means that the predictor, age explains 29.6 percent of the variation

in the LVT score. 'Adjusted R^2 = .274'. It indicates how much variance in the outcome would be accounted for if the model would have been derived from the population from which the sample was taken, which here is 27.4 percent. Time living in the community is, therefore, a strong predictor of the LVT score as it explains almost 30% of the variation. The model can be used to draw conclusions about the population.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	31.991	12.281	
	time living in the community	.877	.239	.544

R^2 = .296. p < 0.0001

Figure 4.3: B-coefficients of the linear regression of the impact of time living in the community on the LVT score

4.3.1.4. Relationship between the predictors

To test the strength of the relationships of the predictor variables in conjunction; the impact of age, education and time living in the community on the LVT score, I used SPSS to run a multiple regression. Multiple regression, however, showed multicollinearity between the predictor variables. The problem with multicollinearity is that it makes *b* coefficient values less trustworthy; it makes it difficult to assess the individual importance of each predictor; and it limits the size of *R* (Field, 2009: 224). I considered factor analysis to deal with multicollinearity, however severe multicollinearity makes factor analysis problematic. To test for this, I used the following formula:

Haitovsky's $\chi^2_{H} = \left[1 + \frac{(2p+5)}{6} - N\right] ln\ (1 - |R|)$

$= \left[1 + \frac{(6+5)}{6} - 34\right] ln\ (1 - .070)$

$= [1 + 1.83333 - 34] ln\ 0.93$

= -30,16667 x -0.07257
=2,18920

Haitovsky's χ^2_{H} uses the determinant from the correlation matrix to test whether this determinant is significantly different from zero. If it is not significantly different from zero it implies severe multicollinearity (Field, 2009: 648-649). This test statistic has $p(p\text{-}1)/2$ degrees of freedom, which is equal to 3(3-1)/2 = 3. For 3 *df* the chi-square distribution table shows that for *p* 0.05 the chi-square is 7.81. The observed chi-square value is lower than this which means that the determinant is not significantly different from zero, so multicollinearity would be a problem for factor analysis. There is a significant correlation between age and time living in the community: r = .883, p < .0001, between age and education: r = -.826, p < .0001, and between time living in the community and education r = -.723, p < .0001.

4.4. Summary

This chapter gives an overview of the Linguistic Vitality Test methods and results. Overall, 65 percent of the 34 random sample respondents completed all three components: lexical recognition; translation sentences; and discourse. Almost all of these respondents scored 100 and are fluent Mixtec speakers. There were no respondents who scored zero. The remaining 35

percent scored between 2 and 39, thus emphasizing the binary nature of the results: almost everyone understands the Mixtec language in varying degrees, but people either speak it or they don't. Testing the variation of speech is more complex as it includes tonal and sound inventories, so how people speak, as opposed to whether they speak. However, the language expert focus group found that overall, even the people who said they didn't speak well did, in fact, do so. The preliminary speech and tonal analysis of the LVT data, however, suggests that the group of fluent Mixtec speakers is divided into two subgroups based on sound and tonal differences in speech. The first subgroup consists of mostly elderly speakers, while the second consists of young people who have taken active measures to learn to speak the Mixtec language. This suggests three groups of speakers based on the LVT results: near-passive bilinguals, younger fluent speakers and older fluent speakers. More research into the extent and consequences of the differences in speech between the two groups of fluent speakers is required. Testing for predictors of Mixtec language ability showed that age and time living in the community are strong positive predictors of Mixtec language ability, while education is a strong negative predictor. Age and time living in the community have a high significant positive correlation, while they both have a high significant negative correlation with education.

5. Traditional environmental knowledge in Tilantongo

5.1. Introduction

What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community? In Chapter one I presented a literature review of previous studies into changes of traditional environmental knowledge. With the exception of Margaret Florey's work, there are no studies that examine the relationship between language shift and traditional environmental knowledge. The main hypothesis that was extracted from the literature review is that language shift is often accompanied by cultural erosion, thus I will test whether there is no difference between the traditional environmental knowledge expressed in Mixtec and Spanish. Since Chapter four demonstrates that language shift is occurring in Tilantongo, then, if the main hypothesis that is present in the literature is correct, there should be a difference between the traditional environmental knowledge expressed in Mixtec and Spanish. The question is, how will this difference be expressed if it is present, and is it measurable? This chapter will start by analyzing the results of the freelisting interviews, both in Mixtec and in Spanish. This analysis will be used to test the null hypothesis 'there is no difference between the plant knowledge expressed in Mixtec and Spanish'. Disproving this null hypothesis would allow to tentatively accept the alternative hypothesis 'there is a difference between the plant knowledge expressed in Mixtec and Spanish', allowing to further analyze the results by looking into the meaning of this difference and its implications.

5.2. Results of the freelisting exercises and testing of the main hypothesis

I collected 68 freelists (59 when the 9 Mixtec freelists that people were unable to give are counted) with 34 randomly selected respondents. With each respondent two freelists were collected at different points in time, one freelist in Mixtec and one in Spanish. After name checks with the expert focus group (different names that refer to a single plant were grouped together) there are 128 out of originally 154 items in the Mixtec freelists for *yuku tatna* and 240 out of originally 261 items in the Spanish freelists for *plantas medicinales*. See Appendix 8.1 for the freelisting results of *yuku tatna* and Appendix 8.2 for the freelisting results of *plantas medicinales.* Of the plants that were freelisted in both Mixtec and Spanish 73 were collected out of 105. Out of the plants that were only freelisted in Mixtec 18 were collected. Out of the plants that were only freelisted in Spanish 53 were collected. In total 91 out of the 128 plants freelisted in Mixtec were collected and 126 out of the 240 plants freelisted in Spanish were collected.

Two things stand out immediately when comparing the freelisting results of *plantas medicinales* with *yuku tatna:* there are 240 items in *plantas medicinales* while there are 128 items in *yuku tatna*, the highest frequency in *plantas medicinales* is 23 while it is 13 in *yuku tatna*. Of the 34 random sample participants all freelisted *plantas medicinales*. The range is 3 to 127. Mean 23.7, median 16, standard deviation 24.67. This distribution has a very long tail. Of the 34 random sample participants 9 did not freelist any *yuku tatna*. Including the 9 that did not list any *yuku tatna* the range is 0 to 41. The mean is 11.7 and the median is 9.5. The standard deviation is 11.56. Excluding the participants that did not list anything the range is 1 to 41. The mean is 15.9 and the median is 14. The standard deviation is 10.67. This means that the standard error of the mean of *yuku tatna* is $11.56 \div \sqrt{34}$ or 1.98. The t-table shows that for d.f. 33 (34-1) p=0.05 the t value is 2.03. The 95 % confidence interval is 11.7-2.03 x 1.98 to 11.7 + 2.03 x 1,98 = 7.68 to 15.72. I am 95% confident the freelisting mean of *yuku tatna* of the population of Tilantongo lies between 7.68 to 15.72. The standard error of the mean of *plantas medicinales* is $24.67 \div \sqrt{34}$ or 4.23. The t-table shows that for d.f. 33 (34-1) p=0.05 the t value is 2.03. The 95 % confidence interval is 23.7-2.03 x 4.23 to 23.7 +2.03 x 4.23 = 15.11 to 32.29. I am 95% confident the freelisting mean of *plantas medicinales* of the population of Tilantongo lies between 15.11 to 32.29.

5.2.1. Analysis of the freelists

I input the data from the collected freelists into Microsoft Excel, and with the help of my partner Roger Gamble used COUNT formulas to ensure all data had transferred accurately. Then the data were analyzed for four statistical measures: frequency; frequency %; average rank; and Smith's S. Frequency is the number of informants listing a specific item. We used the following Excel formula: =COUNTIF(B2:AI2;">0"). Frequency % is the number of informants listing a specific item out of the total number of informants. We used the following Excel formula: =COUNTIF(B2:AI2;">0")/34 (34 being the total number of informants). Average rank is the average ranking amongst those informants that listed that specific item. We used the following Excel formula: =SUM(B2:AI2)/COUNTIF(B2:AI2;">0"). Smith's S is defined as the sum of the saliences of the items divided by the total number of informants. Salience is the inverse of the rank assigned by each informant to each item divided by the total of items listed by that informant. Salience is derived using the following Excel formula: =IF(Frequency!B2>0;(MAX(Frequency!B$2:B$262)+1-Frequency!B2)/COUNTIF(Frequency!B$2:B$262;">0");0). This formula refers to the rankings of the items on the Frequency sheet. Smith's S is derived using the following Excel formula: =SUM(B2:AI2)/COUNT(B2:AI2).

The higher the frequency and the lower the average rank the more salient an item is within its specific domain. Puri (2011: 151) writes that Smith's S is supposed to be a more sophisticated measure of salience. Borgatti (1998) writes that Smith's S is a frequency count in essence that is weighted inversely by the rank of the item in each informant's list, but that in practice Smith's S tends to be very highly correlated with simple frequency. Smith's S combines frequency and average rank into a single measure, as they both reflect the same underlying property (salience) The results from the freelisting analysis for the Mixtec interviews can be found in Appendix 8.1, and for the Spanish interviews in Appendix 8.2. The data have been sorted by order of frequency from highest to lowest. 105 plants were freelisted both in Mixtec and Spanish and Appendix 8.3 allows for comparison between their frequency, average rank and salience index, ranked by high to low frequency of the Mixtec plant names.

To test the null hypothesis 'there is no difference between the plant knowledge expressed in Mixtec and Spanish', two approaches were taken. I made a comparison of the plants that were mentioned both in Mixtec and Spanish and I compared the number of plants that were mentioned per participant in Mixtec and Spanish. I used SPSS to run the statistical analysis programs that I chose to analyze the data with. I treated each plant mentioned both in Mixtec and in Spanish as though it is the same participant in a repeated measure design. So, the plant or participant is mentioned in the Mixtec interview and then it is mentioned in the same context in the Spanish interview. I used a dependent t-test to compare Smith's S, which reflects the salience of the plant, in the Mixtec and Spanish interviews. The paired-samples or dependent t-test compares the means of two related quantitative variables in the same cases. The following assumptions must be met for the paired-samples or dependent t-test to work: differences between scores are normally distributed; and data are measured at least at the interval level. The second assumption is met: the data are measured at least at the interval level. The difference between the Smith's S scores, $D(105) = .21$, $p < .001$, is significantly not normal, therefore the first assumption is not met. However, the t-test is a robust test; it will work with a non-normally distributed sample if it is large enough. A sample of 30 participants is generally perceived to be large enough; a sample of 34 is therefore adequate. To make sure, however, an equivalent non-parametric test, the Wilcoxon signed-rank test, will also be performed.

5.2.2. Paired-samples t-test and Wilcoxon signed-rank test results

On average, Smith's S or the salience of the plant mentioned in the Mixtec freelisting interviews (M= .0553, SE=.00567) is significantly lower than the salience of the plant mentioned in the Spanish freelisting interviews (M= .0948, SE=.00879), *t* (104) = -6.728, p < .001, *r* =0.55
There is a significant correlation between Mixtec Smith's S or the salience of plants mentioned in the Mixtec freelisting interviews and Spanish Smith's S or the salience of plants mentioned in the Spanish freelisting interviews: r = .752, p < .001. This means that as Smith's S or the salience of plants mentioned in the Mixtec freelisting interviews increases, it also increases for the plants mentioned in the Spanish freelisting interviews. The correlation coefficient squared or coefficient of determination, R^2, is a measure of the amount of variability in one variable that is shared by the other (Field, 2011; 179). $R^2 = .752^2 = .566$. This means Mixtec Smith's S or the salience of plants mentioned in the Mixtec freelisting interviews shares 57 % of the variability in Spanish Smith's S or the salience of plants mentioned in the Spanish freelisting interviews. Note the two outliers for the difference in Smith's S in figure 5.1: number 8 is *yuku tatna ruda* which in the Spanish freelisting interviews has the highest Smith's S (.43), but is more on the mid-range for the Mixtec freelisting interviews with Smith's S (.17); number 57 is *manzaniya* which has a reasonably high Smith's S in the Spanish freelisting interviews (.24), but a relatively low Smith's S for the Mixtec freelisting interviews (.4). Both plants are introduced species and their Mixtec names are loanwords from Spanish.

The effect size[65] *r* =0.55.

Calculating the effect size: $r = \sqrt{\frac{t^2}{t^2 + df}}$ (Field, 2011: 332).

So, in this case $r = \sqrt{\frac{-6.728^2}{-6.728^2 + 104}} = \sqrt{\frac{45.266}{149.266}} = 0.55$

Because the difference between M Smith's S or the salience of plants mentioned in the Mixtec freelisting interviews and S Smith's S or the salience of plants mentioned in the Spanish freelisting interviews is significantly not normal I have also run a Wilcoxon signed-rank test. On average, M Smith's S or the salience of the plant mentioned in the Mixtec freelisting interviews is significantly lower (*Mdn* = .0350) than S Smith's S or the salience of the plant mentioned in the Spanish freelisting interviews (*Mdn* = .0590), z = -5.87, p < .05. r=-.41. Figures 5.2 and 5.3 illustrate this difference and show that the Mixtec Smith's S has more outliers than the Spanish Smith's S, including one extreme outlier: number 2, which is *tnutayuxi* and has the highest Smith's S of all the Mixtec freelisted plants (.28) and is one of the most important plants for *limpias*[66].

Calculating the effect size $r = \frac{Z}{\sqrt{N}}$, *N* stands for the number of observations (Field, 2011: 550, 558). $r = \frac{Z}{\sqrt{N}} = \frac{-5.871}{\sqrt{210}} = -.41$

[65] Field (2011: 785) gives the following definition of effect size: an objective and (usually) standardized measure of the magnitude of an observed effect. Measures include Cohen's *d*, Glass' *g*, and Pearson's correlations coefficient, *r*.
[66] *Limpias* are cleansing ceremonies.

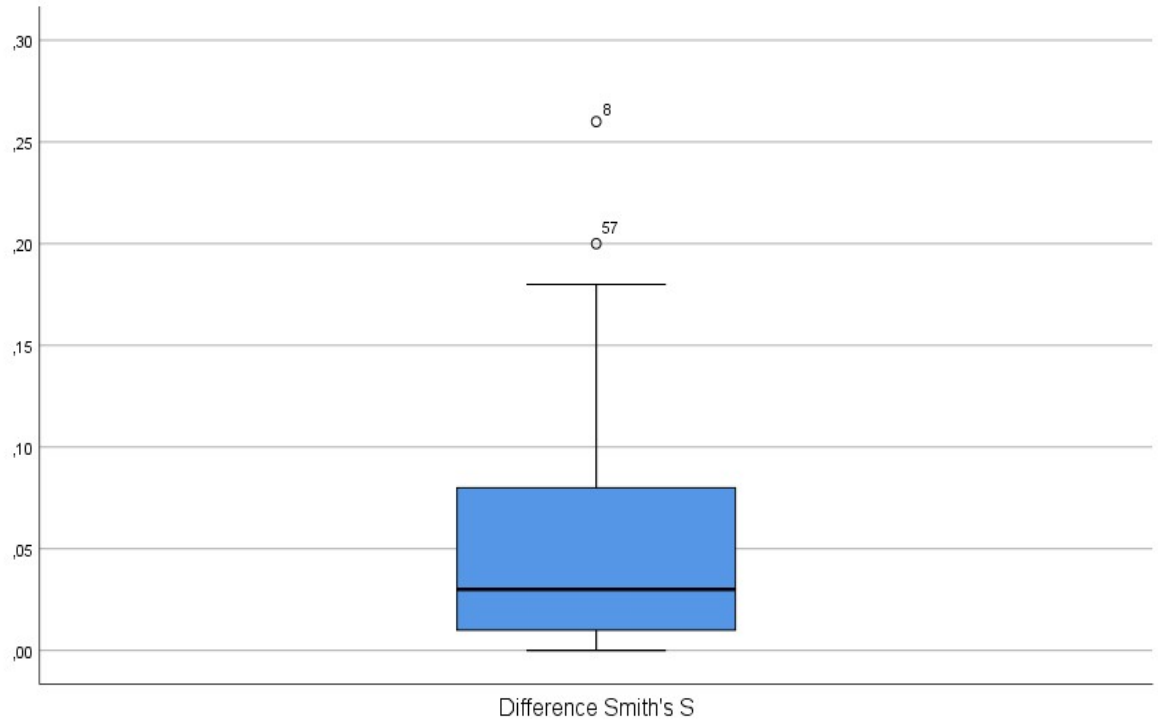


Figure 5.1: Boxplot of the difference between the Mixtec freelist and Spanish freelist Smith's S

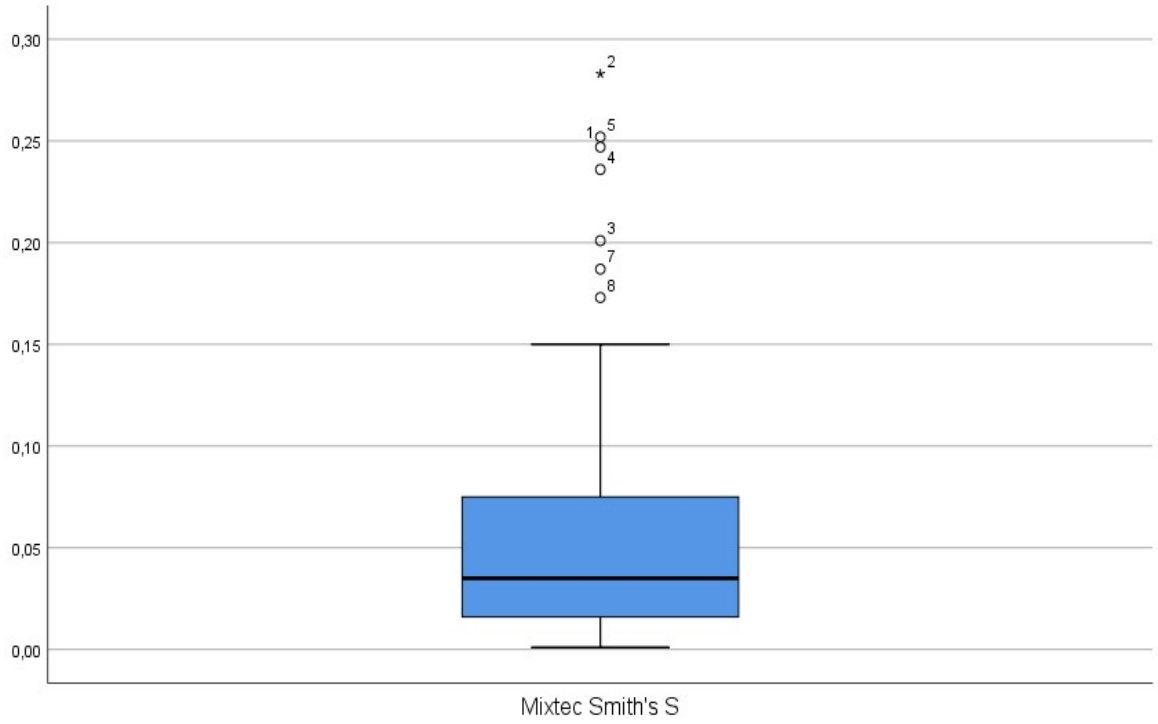


Figure 5.2: Boxplot of Mixtec freelist Smith's S

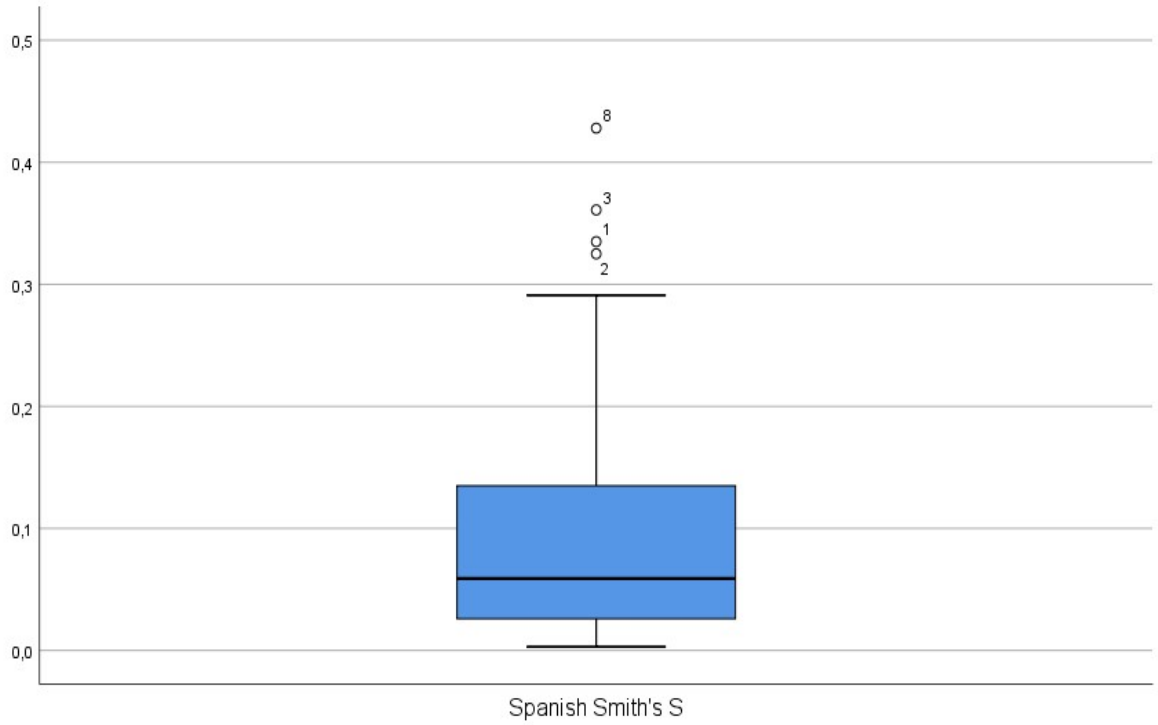


Figure 5.3: Boxplot of Spanish freelist Smith's S

5.2.3. Comparing the number of plants that were mentioned per participant in Mixtec and Spanish

I used a paired-samples t-test to compare the number of Mixtec plant names with the number of Spanish plant names given per participant. Again, the assumptions that have to be met for the paired-samples or dependent t-test to work are that the differences between scores are normally distributed and data are measured at least at the interval level. The second assumption is met; the data are measured at least at the interval level. The difference between the Mixtec plants listed and Spanish plants listed scores, $D(34) = .27$, $p < .05$, is significantly not normal, therefore the first assumption is not met. However, the sample size is adequate for this robust test, even without the first assumption being met. On average, respondents mentioned significantly more plants in Spanish (M= 23.74, SE= 4.23) than in Mixtec (M= 10.85, SE=1.94), t (33) = 2.70, p < .05, r = 0.43.
There is no significant correlation between the number of Mixtec and Spanish plants that respondents mentioned: r = -.063, p > .05. The effect size r = 0.43.

Calculating the effect size: $r = \sqrt{\frac{t^2}{t^2 + df}} = \sqrt{\frac{2.70^2}{2.70^2 + 33}} = \sqrt{\frac{7.29}{40.29}} = 0.43$

Because the difference between the Mixtec plants listed and Spanish plants listed scores is significantly not normal, I have also run a Wilcoxon signed-rank test. On average, respondents mentioned significantly more plants in Spanish (*Mdn* = 16) than in Mixtec (*Mdn* = 9), z = -3.10, p < .05. Effect size $r = \frac{Z}{\sqrt{N}} = \frac{-3.10}{\sqrt{68}} = -.38$

5.2.4. Summary of testing the main hypothesis

For the plants that were mentioned both in Mixtec and in Spanish, both the results from the paired-samples t-test and the Wilcoxon signed rank test show that on average, Mixtec Smith's S or

the salience of the plant mentioned in the Mixtec freelisting interviews is significantly lower than the salience of the plant mentioned in the Spanish freelisting interviews. There is a significant correlation between the Mixtec Smith's S or the salience of plants mentioned in the Mixtec freelisting interviews and Spanish Smith's S or the salience of plants mentioned in the Spanish freelisting interviews. For the number of plants that were mentioned per participant in Mixtec and Spanish both the results from the paired-samples t-test and the Wilcoxon signed rank test show that on average, respondents mentioned significantly more plants in Spanish than in Mixtec. There is no significant correlation between the number of Mixtec and Spanish plants that respondents mentioned.

These results disprove the null hypothesis 'there is no difference between the plant knowledge expressed in Mixtec and Spanish'. Therefore, we can tentatively accept the alternative hypothesis 'there is a difference between the plant knowledge expressed in Mixtec and Spanish'. The effect sizes represent a medium to large difference in knowledge expressed in Mixtec and Spanish (between Cohen's criteria of .3 and .5 for a medium and large effect respectively). The 95% confidence interval for the freelisting mean of *yuku tatna* of the population of Tilantongo lies between 7.68 to 15.72, while the 95% confidence interval for the freelisting mean of *plantas medicinales* of the population of Tilantongo lies between 15.11 to 32.29. This supports the alternative hypothesis and shows that the difference between the knowledge expressed in Mixtec and Spanish is in favor of the knowledge expressed in Spanish. Plant species salience correlates significantly in Spanish and Mixtec, while the amount of plants a respondent knows in both languages does not. This means that in general the respondents do not remember or know the same amount of plants in Mixtec and Spanish, overall people know or remember more plants in Spanish. The plants that are most salient in Spanish share 57% of variability with the plants that are most salient in Mixtec. This means that there is a core of medicinal plants that is best known and that this core is shared, to an extent, in Mixtec and in Spanish. Ellen and Fischer (2013: 40) write that some researchers have distinguished between core and periphery cultural traditions. They may have different rates of change where the cores may remain intact because they are transmitted in a conservative way. Considering that overall far less plants are mentioned in Mixtec, the plant species that lay outside this core and their Mixtec names appear to be endangered. There is also a different focus when it comes to most salient plants: in Spanish the most salient plants are introduced species, while in Mixtec they are plants dealing with *limpias*. *Limpias* require knowledge of the religious domain within the conglomeration that constitutes medicinal plant knowledge. This appears to be indicative of a shift in focus.

5.3. Analysis of the difference between medicinal plant knowledge in Mixtec and Spanish

One of the most important questions in a situation of language shift is whether all knowledge contained in the displaced language shifts into the dominant language and whether it changes when it does. In a situation of language shift the question in the literature is 'what happens to the traditional environmental knowledge? How much is translated into the language the community is shifting towards'. How do we regard the medicinal plant knowledge in the non-Indigenous language? Is it still traditional environmental knowledge? Traditional environmental knowledge is defined as being linked to a cultural continuum, as well as to place while being dynamic at the same time. See Puri (2013: 267) for example for a description of Penan basketry, which shows how TEK is adaptive and continuative at the same time, illustrating this dynamic concept. Medicinal plant knowledge within an Indigenous community in the language the community is shifting towards is traditional environmental knowledge by definition. This is supported by the finding that there is a core of medicinal plants that is best known and that this core is shared, to an extent, in Mixtec and in Spanish. However, Section 5.2 also demonstrates that there is a significant difference between the medicinal plant knowledge expressed in Mixtec and in Spanish

in Tilantongo. So, while the medicinal plant knowledge in Spanish constitutes TEK, it is a shifted form of the Mixtec TEK; its focus, and therefore parts of its content, has changed.

This section will explore the difference between the plants freelisted in Mixtec and in Spanish. 105 out of 128 plants freelisted in Mixtec are freelisted in Spanish. Table 5.1 presents an overview of the plants freelisted in Mixtec but not freelisted in Spanish. Note that *Yuku kwedayu* is one freelist entry in Mixtec (*Yuku kwedayu* was only freelisted once in Mixtec, although the name refers to two species), but two in Spanish (*estafiate* and *gordolobo*), so there are 24 Mixtec plant entries that don't have a Spanish equivalent in the freelist data. Table 5.1 lists Mixtec names followed by Spanish names if they can be given, botanical identification and additional comments. When there is no information about the botanical identification, it means the plant was not collected. All the plants listed in table 5.1 can be found in Appendix 1. Seven out of the 24 Mixtec plant names in table 5.1 have no Spanish name that could be given. One plant was almost extinct in 2003 and another was not allowed to be cultivated. Four Mixtec plant names refer to multiple species. In the ethnobotanical database in Appendix 1 a total of 24 Mixtec plant names do not have Spanish names that could be given. Table 5.2 lists 17 Mixtec plant names that don't have Spanish equivalents in the ethnobotanical database in Appendix 1 after subtracting the seven plant names already given in table 5.1. Table 5.2 also contains botanical identifications of these plants when available.

The ethnobotanical database in Appendix 1 has 367 plant entries. 280 have Mixtec name entries, 344 have Spanish name entries. That means only 46 % of the Mixtec plant names in the ethnobotanical database were freelisted, versus 70 % of Spanish plant names in the ethnobotanical database that were freelisted. For 87 Spanish name plant entries Mixtec equivalents could not be given. This includes Spanish names for fruits and vegetables that probably do or did exist as (loan)words in Mixtec, as well as one Mixtec loanword *yuku vixi* 'cold herb' of which experts did not know to what species it refers. Why did the participants list more Spanish names than Mixtec names? Especially considering 65% of the participants were found to be fluent Mixtec speakers (see Chapter four). Could it have something to do with the speech domains that Mixtec is used in? Earlier, I wrote that people know or remember more plant names in Spanish than in Mixtec. Remembering here could be key. It is easier for people to remember things that they more actively or recently engaged in. In situations of language shift some language domains are lost before others. Florey (1998: 219) writes that as language shifts there is a perceptible narrowing of functions of the Indigenous language. No longer using certain language domains and its effect on memory is illustrated by the difficulty a *Luma Matai*[67] in Lohiatala had in trying to recall the precise form of a rice planting incantation he had used in his younger life (Florey, 1998: 221).

The Mixtec speaking people of the random sample were generally older and had been living in the community for longer, but the most knowledgeable were unable to freelist as many plants as the most knowledgeable younger Spanish speaking people that were included in the random sample. This is similar to what Komaromi (2009: 58) observed; older Mambila women had more knowledge than became apparent during formal freelisting elicitation. This could be related to the speech domains still or most used in Mixtec: if people in general don't use Mixtec to speak about medicinal plants, this could affect their ability to recall plant names. Plant focus groups in Mixtec, plant specimen collection trips, and discussions about plant uses act as mnemonic devices as they activate the Mixtec speech domain related to traditional environmental knowledge. The results presented in section 5.2 suggest a shift in medicinal plant knowledge. Medicinal plant knowledge in Tilantongo nowadays appears to be more salient in Spanish. This shift in medicinal plant knowledge is accompanied by a shift in focus, indicative of change and linked to the language shift that is taking place. As language shift entails the endangerment of the original language, medicinal plant knowledge shift entails the endangerment of the original knowledge framework. Some elements are transferred into the new language and the new medicinal plant

[67] An Alune ritual specialist who is the male head of a lineage.

knowledge framework, while others are not. This is related to the focus of the discourses that differ between the original and the new language, reflecting changes in the social and physical environment. Language revitalization efforts by the community focused on traditional environmental knowledge could change this. A better understanding of the transmission mechanisms of the TEK conglomeration that constitutes medicinal plant knowledge could help with this.

Table 5.1: Plants freelisted in Mixtec that were not freelisted in Spanish

yuku tatna	
1	tnu yaka, cuatillo: FABACEAE *Eysenhardtia subcoriacea* Pennell. Compare with tnúyákú (Kuiper 2003): Kuiper writes tnúyákú is almost extinct.
2	yuku tnani ñu'u, no Spanish name could be given: ASTERACEAE waiting for identification.
3	yuku tachi tnuu, samarrial: ASTERACEAE waiting for identification.
4	yuku tuchi, refers to two species; altamisa and amola de Monterrey: waiting for identification
5	tnu tkee, engreña, modroño, modroñal: ERICACEAE *Comarostaphylis polifolia* (Kunth) Zucc. ex Klotzsch
6	yuku ndo'o, no Spanish name could be given
7	tnu tndɨdɨ, no Spanish name could be given (tndɨdɨ kaka means elotes de cuervo)
8	ruta kuchi, no Spanish name could be given
9	tnu ñuu kwixi, encino blanco
10	yuku chaa, refers to two species; cola de gato: FABACEAE *Dalea bicolor* Humb. & Bonpl. In Willd. yuku chaa da'ya ndute, da'ya chaa yuku, helecho, cría de agua: waiting for identification
11	yuku disipela, hierba de calavera, disípela, hierba de pasma: waiting for identification
12	yuku ita dini, refers to multiple species; ita kuwa, ita dini, ita xa niñi, bella atardecer: ONAGRACEAE Gaura mutabilis Cav., ONAGRACEAE Oenothera tetraptera Cav., ONAGRACEAE Gaura coccinea Nutt. ex Pursh. ita kwaa, ita dini, pericón: ASTERACEAE *Tagetes lucida* Cav.
13	ita ndɨyɨ, refers to multiple species; flor de muerto: ASTERACEAE, PLANTAGINACEAE Penstemon sp. Floripondio: SOLANACEAE *Brugmansia candida* Pers. Hierba de muerto: ASTERACEAE
14	vi'inde ñuu vidi, no Spanish name could be given
15	yau twixi, maguey vedo
16	chɨyɨ, cucharilla: waiting for identification
17	tnu ta'u, pipal: FABACEAE Erythrina sp.
18	yuku hierba nuestra, no Spanish name could be given
19	yuku chɨ'ɨ ñaña, ruibarbo: EUPHORBIACEAE CrotonCroton[68]
20	yuku nu toto/yuku yuu: hierba mata gusano: APOCYNACEAE *Asclepias linaria* Cav.
21	ndewa tɨtnɨñɨ, chichicaxtle de ratón: EUPHORBIACEAE *Tragia nepetifolia* Cav.
22	ita san jose. Kuiper writes that the government does not allow cultivation of this plant (Kuiper, 2003).
23	tnu ñuu kwe'e, encino rojo
24	yuku da'ya/ita kwixi kwechi, no Spanish name could be given

Table 5.2: Mixtec names in Ethnobotanical database with no Spanish equivalent

[68] I have not been able to find this botanical identification in any of the online botanical databases.

yuku tatna	
1	chɨ'ɨ kwechi: ASTERACEAE waiting for identification
2	chɨ'ɨ yuku burru: waiting for identification
3	ita di de'e: ASTERACEAE waiting for identification
4	ita ka'i: LAMIACEAE *Salvia cinnabarina* M. Martens & Galeotti
5	ita koneju, yuku konejo, yuku gwixi: ASTERACEAE *Tridax coronopifolia* Hemsl.
6	ita kwii: APOCYNACEAE *Vinca major* L.
7	ita tnu yatu: ASTERACEAE waiting for identification
8	kɨndɨ yuku: LAMIACEAE *Salvia mexicana* L.
9	nduwa chi'na: APIACEAE *Berula erecta* (Huds.) Coville
10	tnu ndɨu yuku, kɨndɨ yuku: SOLANACEAE *Solanum pubigerum* Dunal
11	tnuta ve'yu kwechi: CAMPANULACEAE *Lobelia laxiflora* Kunth
12	yau ngichi
13	yuku ndichi tkute: SCROPHULARIACEAE *Mecardonia procumbens* (Mill.) Small
14	yuku nduku da'ya: ASTERACEAE waiting for identification
15	yuku nu ndo'io: RESEDACEAE *Reseda luteola* L.,
16	yuku tndaka: DENNSTAEDTIACEAE Pteridium sp.
17	yuku tne'e: VERBENACEAE Verbena sp.

5.4. Medicinal plant knowledge as a traditional environmental knowledge conglomeration and what this mean for its categorization and transmission

We categorize different knowledge types to enable us to better study differences in their transmission. Medicinal plant knowledge is complex because it is intrinsically linked to other traditional environmental knowledge domains related to cosmovision, illness etiology, religion and the hot cold system. Because these TEK domains interlink and overlap, it makes more sense to speak of a TEK conglomeration of medicinal plant knowledge. The question is, how to categorize this TEK conglomeration?

Reyes-García *et al.* (2007b) differentiate between theoretical ecological knowledge and ecological skills. They write that theoretical knowledge is learned in childhood and that ecological skills are learnt in adulthood. In their case study among the Tsimane, theoretical knowledge is spread evenly among the adult population and there is more variation in the spreading of ethnobotanical skills. Puri (2013: 268-269) writes knowledge includes the knowing of facts as well as the knowing of how to use those facts. It includes verbal and non-verbal (tacit) knowledge, and both theoretical (known but not used) and practical knowledge (enacted or instantiated). In his work regarding practical knowledge, Puri distinguishes between physical or kinesthetic skills (termed behavioral) and managerial skills (termed performance). Often non-verbal and tacit, but also involving verbal explanations and instructions. In this conceptualization of knowledge there is no strict distinction between knowledge (as text) and practice. Ellen and Fischer (2013: 18) write that in the world of practical knowledge of the environment much knowledge is substantive, meaning it might be quite complex and extensive but not in itself ordinarily committed to language, though it may emerge through performance. Examples of this type of knowledge relate to plant maturation and ecology. This contrasts with lexical knowledge, which they write is that part encoded in language or where the language provides a key for accessing substantive knowledge that is not itself lexicalized. One step up from lexical knowledge is textual knowledge, in which words are organized into sequences of utterances.

How should medicinal plant knowledge be categorized? Following Reyes-García *et al.* (2007b) naming ability is theoretical knowledge, while knowing how to use and prepare a plant is practical knowledge. Following Puri (2013) knowing how to use and prepare a plant is theoretical

knowledge as well, until it is used and prepared when it becomes instantiated or enacted knowledge. Table 5.3 presents the self-reported levels of instantiation of the preparations that the random sample participants gave. It shows that the 34 respondents had used 835 out of the 1135 preparations that they mentioned or 73.6%. 245 or 21.6% of the preparations they mentioned they had seen and experienced, while only 55 or 4.8% of the preparations they had heard about. There are 129 more uses than preparations - each use, such as: for food; eaten by livestock; used to make brooms from; used for soap; eaten by deer etc., was counted as a use but doesn't have a preparation that goes with it. Participants would also sometimes mention medicinal uses, but not know the preparation. Except for one respondent (who had the second highest overall plant naming score) and who had only seen and experienced the uses and preparations, every other respondent had used at least a number of the preparations they mentioned. Here the question arises, how much experience with medicinal plant preparations is necessary to be able to apply theoretical knowledge of a preparation one has seen or heard into one that one can apply?

5.4.1. Medicinal plant knowledge categorization

In the introduction I wrote that medicinal plant knowledge is intrinsically linked to other domains of TEK related to cosmovision, illness etiology, the hot cold system and religion. This means that when dealing with the TEK conglomeration of medicinal plant knowledge, there are multiple traditional environmental knowledge frameworks or systems that interact. There are also other knowledge frameworks that can interact such as the biomedical. Each of these knowledge frameworks potentially contains different forms of knowledge and the extent to which a person is fluent in all of them and their integration will vary. Puri (2013: 282) writes that people's competences in domains vary and no one person has knowledge of an entire domain. Imagine the complexity when multiple domains are involved.

Perhaps the basis of all these knowledge frameworks related to medicinal plants is the framework that deals with knowing the names of plants and their uses. This would primarily fall in the lexical category. Although one could argue that sensory experience and knowledge not necessarily linked to words (such as smell, feel or even habitat) plays a role when people identify plants and name them, people might also know the use of a plant for which they do not have or don't know the name. There are also multiple plant species that are recognized as being different but that have the same name. So, there must be a substantive element to this framework as well.

Related to the knowledge framework that deals with knowing the names of plants and their uses is the illness etiology framework which overlaps with the biomedical framework, the hot-cold framework, cosmovision and religious framework. Considering its scope, it is perhaps to be expected that the illness etiology framework combines lexical, substantive, textual and kinesthetic elements. Lexical because of how people categorize and name illnesses, substantive because in order to identify an illness people use sensory experiences and knowledge, textual because sequences of utterances describing illnesses or illness groups are used in order to transform the sensory experiences into an identifiable illness (biomedical, hot-cold, cosmovision and religious) and kinesthetic because even the way people measure a person's temperature is learned in a specific physical way. Performance elements may also be present when multiple people are involved in the process and are either discussing what the illness might be or instruction takes place about the illness involved.

Another important knowledge framework is that of preparations or treatment, how a plant is obtained, prepared and applied and what other elements can or should be combined in order to make the treatment more effective. Again, there is overlap with other knowledge frameworks such as the biomedical, hot-cold, religious and cosmovision frameworks. Because of its complexity, it combines many forms of knowledge: substantive, kinesthetic, textual and performance. Substantive because people use sensory experience to determine whether a

remedy is done to be applied when heated up, whether the *temazcal* (steambath) is hot enough to enter for the specific purpose one is entering and because elements of treatment are finetuned to the illness and patient involved. Kinesthetic because the way a person *hojea* (the branch or multiple branches (depending on the size of the branches and whether a child or grown up is treated) are swept along the face, the head and the body to cleanse the person undergoing the treatment), rubs with an egg (part of a *limpia* or cleansing treatment) etc. is physically learned. Textual because ritual speech consisting out of sequences of utterances may be involved in the treatment such as with *limpias, the temazcal, espanto* (fright, see Chapter six) etc. Performance because when treating a patient, the healer will instruct the patient on what to do with their body, this instruction could be verbal or physical where the healer moves the body in the right position for treatment.

There are at least two more important knowledge frameworks involved, although already mentioned above as overlapping frameworks, they need to be mentioned on their own. The knowledge framework that deals with ritual, religious and cosmovision knowledge. It combines the performance (managing the ritual, ensuring everything is in its place, including the patient and participants), textual (ritual speech), kinesthetic (knowing the movements necessary to perform the ritual) and lexical (knowing the names of the *ñu'u* (see Chapter seven) knowledge types. The hot-cold knowledge framework combines substantive (where plants grow, different climate types, the effects illness has on the patient's body etc.), lexical (the names of different plants and their qualities) and textual elements (sequences of utterances that in combination allow to identify hot or cold qualities of items, places and illnesses).

Considering the immense scope of knowledge involved in medicinal plant expertise, it stands to reason that there is variation in how versed people are in all of them. In the literature medicinal plant knowledge is described as specialist knowledge, because it takes so much effort on the part of an individual to become well versed and specialized in this knowledge. Because different domains are involved it is likely that different professional healers will specialize more in some than in other domains. The domains overlap though, and certain elements once known can be reproduced in different contexts. For example, if a person knows how to *hojear* with one plant, they can reproduce this with another plant or plant bundle in another illness context. Ritual speech on the other hand is very specific to the situation and the way one speaks with the *Xitna ñi'i* when asking permission (see Chapters six and seven) is very different from when an *espanto* ritual is performed. With plant preparations or remedies, however, a person who has prepared some, should be able to prepare others they have seen and experienced, although they might not be as good at quantities and adjusting the remedy to the body of the patient as a professional healer.

On this note family members of professional healers or *curanderos,* who have taken an active interest in the profession, do have an enormous advantage. The second most knowledgeable respondent, who is the only person who has only seen preparations, is a child who took active interest from a *curandero* family. This person might not have used the preparations or remedies, but has assisted when they were made in their home. To what extent is this instantiation? Because some elements are transferable to different contexts and because of the immersion this person experienced and the interest they took, there must be a high level of instantiation. Ellen and Fischer (2013: 18) write that transmission by example involves not simply copying, but the inculcation of a set of principles and practices that can be used to instantiate behavior that is logically equivalent in a given context, not materially equivalent as copying implies. This supports the argument that people can reproduce logically equivalent elements in different contexts, meaning that the level of instantiation must be higher than the reported 73.6%.

Table 5.3: Instantiation of preparations (each row represents a respondent)

number of plants mentioned in total	number of uses mentioned in total	number of preparations mentioned in total	number of preparations used	number of preparations seen	number of preparations heard	% used	% seen	% heard
5	9	8	7	1	0	87.5%	12.5%	0.0%
49	54	54	44	3	7	81.5%	5.6%	13.0%
41	47	40	40	0	0	100.0%	0.0%	0.0%
17	19	17	17	0	0	100.0%	0.0%	0.0%
9	14	12	12	0	0	100.0%	0.0%	0.0%
32	43	35	20	14	1	57.1%	40.0%	2.9%
21	21	18	10	4	4	55.6%	22.2%	22.2%
21	27	23	21	2	0	91.3%	8.7%	0.0%
34	45	38	34	2	2	89.5%	5.3%	5.3%
9	11	9	9	0	0	100.0%	0.0%	0.0%
17	23	19	17	2	0	89.5%	10.5%	0.0%
94	128	119	0	119	0	0.0%	100.0%	0.0%
23	27	25	19	4	2	76.0%	16.0%	8.0%
128	209	180	180	0	0	100.0%	0.0%	0.0%
15	19	19	16	3	0	84.2%	15.8%	0.0%
32	43	38	18	16	4	47.4%	42.1%	10.5%
47	60	59	51	8	0	86.4%	13.6%	0.0%
20	21	23	23	0	0	100.0%	0.0%	0.0%
20	25	24	5	4	15	20.8%	16.7%	62.5%
20	23	21	15	6	0	71.4%	28.6%	0.0%
18	30	23	19	3	1	82.6%	13.0%	4.3%
20	29	21	21	0	0	100.0%	0.0%	0.0%
9	10	10	10	0	0	100.0%	0.0%	0.0%

number of plants mentioned in total	number of uses mentioned in total	number of preparations mentioned in total	number of preparations used	number of preparations seen	number of preparations heard	% used	% seen	% heard
15	23	23	22	0	1	95.7%	0.0%	4.3%
40	47	47	47	0	0	100.0%	0.0%	0.0%
59	65	54	16	38	0	29.6%	70.4%	0.0%
53	62	56	42	7	7	75.0%	12.5%	12.5%
27	27	26	26	0	0	100.0%	0.0%	0.0%
23	24	22	11	5	6	50.0%	22.7%	27.3%
14	15	14	12	1	1	85.7%	7.1%	7.1%
14	20	14	10	3	1	71.4%	21.4%	7.1%
12	16	17	17	0	0	100.0%	0.0%	0.0%
3	3	3	3	0	0	100.0%	0.0%	0.0%
24	25	24	21	0	3	87.5%	0.0%	12.5%
985	**1264**	**1135**	**835**	**245**	**55**	**73.6%**	**21.6%**	**4.8%**

5.4.2. Medicinal plant knowledge transmission

Ellen and Fischer (2013: 18) write that how knowledge and practice are transmitted depends on their form, all cultural transmission depends on some sort of bodily interface, but what varies is the extent to which language is involved in the process. Transmission paths might be different between lexical and substantive knowledge. They write that Reyes-Garcia's data suggest that amongst the Tsimane names of plants are strongly associated with the parental cohort, while substantive knowledge is weakly associated with it. When describing medicinal plant knowledge above and the other TEK domains that intersect and overlap, and together form the TEK conglomeration of medicinal plant knowledge, it became clear that every knowledge framework related to medicinal plants contains multiple knowledge types simultaneously that interact to form the domain. This is similar to what Puri (2013: 269) describes for the Penan. Penan hunting and basketry, like most environmental knowledge, is embedded in activity and can be defined as a series of tasks in which the declarative, behavioral, and performance knowledge forms are integrated. These knowledge forms can be thought of as cultural, in the sense of being mostly socially learned and transmitted. This means that in the case of medicinal plant knowledge in Tilantongo, it does not appear that the different types of knowledge are easily separable and that there are different paths of transmission for them. This seems similar to what Puri (2013: 281) describes in the case of Penan basketry, where all people involved will admit that knowing and doing are difficult to separate, and to know something well, is to be able to do it well, consistently and under varying circumstances. However, there are different contexts and therefore there could be different paths of transmission for the different domains that interact and overlap within the TEK conglomeration of medicinal plant knowledge. This seems plausible considering the shift in medicinal plant knowledge associated with a change in focus, which appears to be related to some of the domains, as described in section 5.2. Investigating these paths of transmission is outside the scope of this thesis, so here I only describe what the respondents answered in relation to medicinal plant knowledge in general, not taking into account the complexity of all the domains involved.

Ellen and Fischer (2013: 28-32) write that cultural transmission is not obviously either simply vertical, horizontal or oblique (Cavalli-Sforza and Feldman 1981). This is due to the role of ego-centered learning through rediscovery, because learning is situational and not wholly reciprocally dyadic, because it is ecologically constrained, and because of the evidence from multiple temporal reinforcements. Core behaviors, concepts and skills may initially pass vertically, but they are only instantiated through horizontal sharing, while stories will be told many times in different ways. Learning is neither a one-off nor unidirectional act. Oversimplification of the transmission model (Cavalli-Sforza model) means it might be safer to distinguish any transmission through kin from transmission through unrelated individuals and are we referring to horizontal and vertical transmission between individuals or between groups? In reality we have a network. It is better to refer to it in terms of graph theory where all that matters is the direction of flow between nodes. Because of the question of scale at the interpersonal micro level we see a network of lines of causation and reinforcement, while at a macro level this might look like simple vertical transmission.

I am following a simplified version of Ellen and Fischer (2013): the first column of table 5.4 indicates whether knowledge was transmitted between kin (K), and whether the respondent indicated horizontal (H), vertical (V), oblique (O) or a combination of transmission pathways. The transmission pathways below all refer to transmission between individuals. Table 5.4 contains the answers the respondents gave to the question 'how did you learn this knowledge?' and 'what does this knowledge mean to you?' Puri (2013: 276) writes that elicitation of life-history accounts from respondents is used to identify their sources and means of acquiring the knowledge of interest. The answers to the second question do not identify the sources or means but they do provide some insight into the motivation of why people learned about medicinal plants.

There are four different patterns reported in table 5.4: KVHO, KVO, HO, and KV. KVHO (kin, vertical, horizontal and oblique) was reported by 15% of the 34 respondents. KVO (kin, vertical, oblique) was reported by just one or 3% of respondents. HO (horizontal, oblique) was reported by 15% of the respondents. KV (kin, vertical) was reported by 68% of respondents. 97% of transmission was reported to have been through kin and to have been vertical. This is in accordance with Ellen and Fischer (2013: 10) who write that all core transmission is still strongly correlated with biological relatedness. 33% of transmission was reported to have been oblique, while only 18% of reported transmission was horizontal. From the answers to the question 'what do medicinal plants mean to you?', it is clear that the majority of respondents have either been cured from some illnesses by using medicinal plants, or that they have cured their children or have seen their family members being cured using medicinal plants. Several respondents mentioned that in the past there was no access to a biomedical doctor and so people used medicinal plants to treat illnesses. While others mentioned that medicinal plants are better than pharmaceutically produced medicine because they are natural. Two respondents mentioned that pharmaceutically produced medicine is produced using plants and that therefore medicinal plants are important. Two other respondents mentioned having more faith in medicinal plants than in biomedical medicine, while one respondent said they cure illnesses that the biomedical doctor cannot cure, and two others mentioned that they cause less harm than tablets. Two people mentioned that medicinal plants and biomedical medicine both have their worth.

97% of transmission was reported to have been through kin and vertical, this suggests that children of *curandero* families have more exposure and better opportunities to learn about medicinal plants than others. Personal choice and motivation determine whether people take advantage of this. Puri (2013: 270) writes that intelligence, social status, wealth, fame and prejudice are all factors that influence the likelihood that an idea or a bit of knowledge is passed from teacher(s) to student(s) and remembered and acted upon. The motivation of the student is clearly an important factor as well. Prejudice and social status in a community experiencing language shift might also affect transmission of some of the domains involved in the TEK conglomeration that constitutes medicinal plant knowledge. This could explain the shift in focus between Mixtec and Spanish medicinal plant knowledge. Ellen and Fischer (2013: 33) write that specialists will, by definition, always be a smaller part of the whole, and therefore opportunities for transmission will be reduced in a population as a whole. They also write that it is likely that many cultural populations contain much more knowledge than a small set of individuals can bear- some knowledge transmission and enactment require considerable specialization and even populations of a critical size (Ellen and Fischer, 2013: 25).

As section 5.2 illustrated, medicinal plant knowledge is shifting towards Spanish, which means that in the random sample it was the people who didn't speak Mixtec who scored highest on medicinal plant knowledge. The two people who had the highest plant naming scores overall are young people who have spent lots of time outside the community, but they do both come from *curandero* families and they both love medicinal plants and have tried to learn as much as they could. One of the two people is a professional healer. It appears that plant naming ability overall does not depend on where one lives or what language one speaks. If someone is interested in medicinal plants, they will pursue that interest, no matter where they are, in whatever language is available to them. This coincides with what Ellen and Fischer (2013: 4-5) write; the way people acquire knowledge and skills is interactive and complex. People become experts not by passively absorbing knowledge, but by actively selecting it, which can take the form of several potential biases. The TEK conglomeration that constitutes medicinal plant knowledge is very complex and interacts across multiple knowledge domains. Ellen and Fischer (2013: 9) write that certain things have to be known to acquire other things and that some cultural knowledge is age-phase dependent. Together with the selection bias this means that specialists will specialize more in some than in other domains. Language shift means that the opportunity to transmit medicinal plant knowledge in Mixtec is reduced because there are fewer young people who speak Mixtec. This might also affect which domains are more accessible for

transmission, interacting with the shift in medicinal plant knowledge which also affects the domains that are accessible for transmission because it entails a change in focus.

According to Ellen and Fischer (2013: 8-9) learning to copy that which cannot be directly observed is what makes something cultural (so the meaning behind the action). Human cultural transmission is about the ability to transmit representations of outcomes. They write that there can be no form of cultural transmission that is simple replication, therefore there is always space for minor correction loops, reflection and innovation. With medicinal plant knowledge shifting, there is lots of space to reflect and innovate, while simultaneously there are domains that are less accessible (their transmission is more limited) and therefore more endangered than others. Ellen and Fischer (2013: 19) write that if we acknowledge the arbitrary or fuzzy character of domain boundaries then the question is what is the relevance to transmission of simultaneous membership of several domains? In the case of ethnobotanical knowledge, erosion or maintenance in one domain may accelerate the same in another domain a particular plant is a member. The more complex the domain, the more this kind of overlap is likely to be significant. This is relevant for the TEK conglomeration that constitutes medicinal plant knowledge, as I have shown that the domain is extremely complex and spreads across multiple other cultural domains. More research is needed into transmission of the separate domains that constitute the TEK conglomeration of medicinal plant knowledge, especially in relation to language and medicinal plant shift. Life histories of domain specialists, such as offspring of *curanderos*, could be of special interest here.

Table 5.4: Transmission of medicinal plant knowledge

	¿Cómo aprendió? (how did you learn?)	**¿Qué significan las plantas medicinales para usted? (What do medicinal plants mean to you?)**
KVHO	curando a los niños (while curing my children)	curando a los niños se les puede curar uno del ojo, diarrea, gripe con las plantas (curing children, you can cure them from *ojo*, diarrhoea, flue, using plants)
KV	por medio de mis padres (through my parents)	un arma elemental en cuestión de la salud (an elemental weapon in the question of health)
KV	vivía yo con mi madre y ella me enseñó (I lived with my mother and she taught me)	conocí porque los estoy tomando (I knew them because I am taking them)
KV	a través de mi abuelita, mi mama (through my grandmother and my mother)	muy importante (very important)
KV	por mis padres (through my parents)	tengo más fe a las plantas medicinales que al médico (I have more faith in medicinal plants than in the biomedical doctor)
KV	por mi mama (through my mother)	significa mucho, a través de unos hemos sanado (it means a lot, through several we have healed)
KV	por mi mama y mi papa (through my mum and my dad)	tengo más fe en las plantas medicinales que en la medicina tradicional (I have more faith in medicinal plants than in traditional medicine (meaning biomedical medicine in this context)
KV	por mi papa y los abuelitos (through my dad and grandparents)	las plantas medicinales son importantes (medicinal plants are important)
HO	con el mismo trabajo (through my work)	es muy importante porque me curé como niño (it is very important because it cured me as a child)
KV	Mama (mum)	mucho, es importante porque nos cura (a lot, it is

	¿Cómo aprendió? (how did you learn?)	¿Qué significan las plantas medicinales para usted? (What do medicinal plants mean to you?)
		important because it cures us)
HO	por distintas personas, vecinos (through different people, neighbors)	es importante, porque hay cosas que nos curan, es mejor lo natural (it is important, because there are things that heal us, natural (remedies) are better)
KV	por medio de mis papas y abuelos (su abuelo es un curandero) (through my parents and grandparents (their grandfather is a healer)	mucha ayuda (a lot of help)
KV	por mi mama (through my mum)	las plantas medicinales no hacen tanto daño como las pastillas (medicinal plants don't cause as much harm as tablets)
KVHO	primero por mi papa y luego es algo que me gusta y investigué con más personas y sigo aprendiendo (first through my father and then it was something I liked and investigated with more people and I keep on learning)	es lo máximo! (it is the maximum! (greatest!)
KV	de mis abuelitos, porque así nos curamos (through my grandparents, because this is how we heal ourselves)	así nos curamos antes, ahora ya no porque hay clínica. A veces se calma la enfermedad con el doctor y a veces con las plantas medicinales, con el temazcal, las dos maneras de curar tienen su valor (this is how we used to cure us before, not anymore because the clinic exists. Sometimes the illness calms with the doctor and sometimes with medicinal plants, with the *temazcal*. Both ways of curing have their worth.
HO	de la enfermedad de mi esposa, buscamos mucha medicina, aprendí de todos, los vecinos, curanderos (the illness of my wife, we searched for much medicine, I learned from all, the neighbors, healers)	es bueno, se cura muchas cosas que no cura el médico (it is good, it cures many things that the doctor does not cure)
HO	preguntando a las personas que saben (asking people who know)	a veces nos hemos tratado con las hierbas y más o menos nos curan (sometimes we have treated us with herbs, and they cured us more or less)
KV	por los papas (through my parents)	ya conociendo algunas plantas, todos sirven (when you know some plants, all of them help)
KV	a través de mis papas y abuelos (through my parents and grandparents)	lo llevamos a cabo cuando sea necesario (we procure them when it is necessary)
KV	Mama (mum)	las plantas son buenas (plants are good)
KVHO	Por los abuelitos y observando (through the	es bueno porque nos podemos curar, antes no había médico, antes se curaba con las plantas (it is good

	¿Cómo aprendió? (how did you learn?)	¿Qué significan las plantas medicinales para usted? (What do medicinal plants mean to you?)
	grandparents and observing)	because we can cure ourselves, in the past there was no doctor, in the past people cured themselves using plants)
KV	por los abuelitos (through the grandparents)	como no había médico antes es importante porque curan algunas enfermedades, se cura los niños con las plantas y el medicamento del médico (as there was no doctor in the past, it is important because they cure some illnesses, you cure children with plants and the medicine of the doctor)
KV	por medio de mi mama (through my mum)	es bueno (it is good)
KVO	lo conocí por mi mama, por mi suegra (I got to know it through my mum, my mother in law)	es curativo, lo conocí para curar mis hijos (it is curative, I got to know it to cure my children)
KV	por mi abuelita (through my grandmother)	como antes no había doctor había que buscar la abuelita que tuve y ella me decía y yo lo tomaba, también la mama de mi señora estaba diciendo a ella para que curaba a los hijos (as there was no doctor before, my grandmother that I had, had to search, and she told me and I took it, also the mother of my wife was telling her what to use to cure the children)
KVHO	por la mama, papa, los conocidos (through my mum, dad, and acquaintances)	es más sano las hierbas que están en el campo que lo que hay en la farmacia, los pastillos hacen daño (the herbs that are in the rural land are healthier than that what they have in the pharmacy, tablets cause harm)
KV	tuve una abuelita que fue curandera (I had a grandmother who was a healer)	es de proteger a la salud (it is to protect our health)
KV	de su mama (from their mother)	el médico no hace lo que hace la persona con la hierba y luego sana (the doctor does not do what the person does with the herb and then gets better)
KV	a través de mi bisabuela (through my great grandmother)	mucho, a través de las plantas los especialistas sacan todos los medicamentos (a lot, through plants the specialists extract all the medications)
KV	de mis papas (from my parents)	antes no había doctores, hasta Oaxaca, Nochixtlán, pura hierbita, hierba natural que curaron mis papas, no está contaminada (In the past there were not doctors, not until Oaxaca, Nochixtlán, purely herbs, natural herbs that my parents used to cure, it is not contaminated)
KV	a través de mis papas (through my parents)	es bueno saber que existen plantas para curar algunas enfermedades (it is good to know that plants exist to cure some illnesses)
KV	de mis papas (from my parents)	es bueno porque de las plantas se han recopilados varias medicinas, ya casi no se ocupa la planta, la medicina de la farmacia se ha mejorado mucho (it is good, because from the plants various medications

	¿Cómo aprendió? (how did you learn?)	¿Qué significan las plantas medicinales para usted? (What do medicinal plants mean to you?)
		have been produced, now the plants are almost no longer used, the medicine from the pharmacy has improved a lot)
HO	de conocidos (from acquaintances)	es bueno porque en verdad curan (it is good because truthfully they cure)
KVHO	aprendió de su mama y de otras personas (learned from their mother and other people)	es bueno por ser natural (it is good for being natural)

5.5. Testing whether plant naming ability predicts plant use and preparation knowledge

According to the literature, plant naming knowledge ability is correlated with plant use and preparation knowledge. When this is the case, especially when the correlation is very high, one can be used as a proxy for the other. This is useful when testing for predictors of knowledge. The medicinal plant naming knowledge score for each random sample participant is calculated by counting the medicinal plants mentioned by the respondent and comparing them to the data gathered from the expert focus groups. A medicinal plant mentioned in both languages counts as one, while each plant only mentioned in Mixtec or Spanish also counts as one (so the total amount of known plants regardless of language will be counted). Plants unknown to the expert focus group were investigated further before the decision was made if they should be counted. Each use mentioned for one specific plant is compared with the expert answer key and the depth of the use knowledge is scored (1: knows the use; 2: knows the use and how to prepare the plant) and added up for the total of uses and preparations mentioned per respondent to arrive at a use and preparation competence score. If a use was uncertain it was investigated further before the decision was made whether it should be counted.

I have decided to use an expert answer-key. Romney´s consensus analysis (1986) is a popular and very useful tool to establish answers to questions the researcher does not know the answer to, based on the principle of independent informant agreement, when a shared cultural domain is believed to exist. Reyes-García *et al.* (2005a) write that Romney´s consensus analysis does not capture specialized knowledge and only works if plant nomenclature does not differ between respondents. Considering the situation of language shift which in theory could lead to an enormous diversification and even idiosyncrasy of medicinal plant knowledge together with the bilingual character of the research and therefore at least two different names for each plant, an expert answer-key is preferable over Romney´s consensus analysis. Additionally, Romney's consensus analysis is intended for questions that require a single answer (even if the range of possible answers to that question is open-ended), not for questions that are expected to generate a list of answers from the same respondent, as in the case of a freelisting exercise (Romney, Weller and Batchelder, 1986: 316-318).

5.5.1. Impact of medicinal plant naming competence on medicinal plant preparation competence

I ran a simple linear regression testing medicinal plant naming ability as a predictor of medicinal plant use and preparation knowledge. I started by assessing the assumptions. Durbin-Watson should be above 1.63 at 2.5 % (1.641) for the assumption of independent errors to be tenable (Durbin and Watson, 1951: 174). The residual plots show that there might be heteroscedasticity and non-linearity, this might mean that the assumptions of homoscedasticity and linearity are not

met (Field, 2011: 247). The histogram and normal probability plot for the residuals show that the distribution is pretty much normal. I tested the standardized residuals for normality to make sure. The standardized residuals, D (34) = .095, p > 0.05, are significantly normal. All assumptions of regression are met, with the possible exception of homoscedasticity and linearity, which might mean that it is impossible to draw conclusions about the population based on this sample.

The following results were obtained from this linear regression. There is a significant correlation between the predictor and the outcome: r = .989 p < .001. The model summary further shows that this is a very good model. The correlation coefficient squared or coefficient of determination 'R^2 = .977'. This means that the predictor, plant naming ability explains 97.7 percent of the variation in plant preparation. 'Adjusted R^2 = .976'. It indicates how much variance in the outcome would be accounted for if the model would have been derived from the population from which the sample was taken, which here is 97.6 percent. Stein's formula can be used to assess how well the model cross-validates:

Adjusted R^2 = $1-\left[\left(\frac{n-1}{n-k-1}\right)\left(\frac{n-2}{n-k-2}\right)\left(\frac{n+1}{n}\right)\right](1-R^2)$, n is the number of participants and k is the number of predictors in the model (Field, 2011: 221-222).

Adjusted R^2 = $1-\left[\left(\frac{34-1}{34-1-}\right)\left(\frac{34-2}{34-1-2}\right)\left(\frac{34+1}{34}\right)\right](1-.977)$

= $1-[(1.031)(1.032)(1.029)](.023)$

= 1-.025

= .975

This value is very close to the observed value of R^2 (.977) indicating that the cross-validity of the model is very good. F is 1371.927 p < .001, meaning that this regression model results in significantly better prediction of score preparations (practical knowledge) than if the mean value of score preparations (practical knowledge) would be used (Field, 2011: 207). Figure 5.4 presents the B-coefficients of the regression model.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-3.121	1.200	
	score plant naming	1.164	.031	.989

R^2 = .977. p < 0.001

Figure 5.4: B-coefficients of the linear regression of the impact of medicinal plant naming ability on medicinal plant use and preparation knowledge

How accurately does the model fit the data? Case 26 has a standardized residuals value of -3.186. The rest of the standardized residuals are below 2.5. 94.12 % of the sample cases have standardized residuals below 1.96 which is almost within the norm of 95 %. Case 14 has a Cook's distance greater than 1 (3.928). The average leverage value is (k + 1)/n in which k is the number of predictors and n is the number of participants. Here it is 2/34 or 0.059. Values that are twice this value should be investigated and values thrice this value have undue influence. Case 14 has a leverage value higher than 0.177 (.465) as does case 12 (.201). Case 14 has the highest Mahalanobis distance (15.35). Its Mahalanobis distance is above 13.67 so there is cause for concern (Reinard 2006). Case 14 has a standardized DFBeta for score plant naming above 2

(3.091) indicating that it substantially influences that model parameter. Case 14 also has the largest Standardized DFFit (3.187). Case 26 also has a standardized DFFit larger than 1 (-1.119).

If $CVR_i > 1 + [3(k + 1)/n]$, then deleting the *i*th case will damage the precision of some of the model's parameters. If $CVR_i < 1 - [3(k + 1)/n]$, then deleting the *i*th case will improve some of the model's parameters. *k* is the number of predictors, CVR_i is the covariance ratio for the *i*th participant and *n* is the sample size. So, values smaller than .74 are of interest. Case 26 has a CVR of .498. (Field, 2011: 216-219). Because of the Cook's distance there is reason to delete case 14 and run the regression again. Rerunning the regression without case 14 improves the model, but the Cook's distance for case 12 is now 5.491, giving reason to do the regression again without case 12 as well. When the regression is re-run without cases 14 and 12, all assumptions for regression are met and the data fit the model well. Because of this it is possible to draw conclusions about the population based on this sample. Figure 5.5 presents the B-coefficients of the regression model once cases 14 and 12 are excluded.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	1,402	1,080	
	score plant naming	,956	,039	,976

$R^2 = .952$. $p < 0.001$

Figure 5.5: B-coefficients of the linear regression of the impact of medicinal plant naming ability on medicinal plant use and preparation knowledge (excluding cases 14 and 12)

In summary, plant naming ability (theoretical knowledge) is an excellent predictor for plant preparation ability (practical knowledge). Whether or not cases 12 and 14 are included this remains a very good model with great cross-validity. When they are excluded however the model can be used to draw conclusions about the population (with the certainty that all assumptions are met).

5.6. Testing for predictors of traditional environmental knowledge

Most studies related to change in traditional environmental knowledge focus on acculturation as a predictor for change in individual traditional environmental knowledge. Often proxies such as education and bilingual ability as well as economic variables are used (Zent 1999a; 2001; Voeks and Leony 2004; Benz *et al.* 2004). However, as the review of previous studies on language and traditional environmental knowledge has shown, rather than acculturation it appears to be continued exposure to the traditional cultural and natural environment that influences change or retention of traditional environmental knowledge. It is possible that people adopt elements from cultures outside their own, while they retain the elements of their own culture. Acculturation seems often equated with cultural erosion, and even though acculturation can be a symptom of cultural erosion, it is not necessarily always so. Puri (2013: 266) for example, writes that although it is claimed that global capitalism and modernization contribute to the loss of biodiversity, this does not happen everywhere. More attention should be given to products that show inertia to change, their economic and cultural uses and meanings, as they serve to maintain traditional knowledge (traditional knowledge is dynamic), with adaptations and innovations.

Section 5.2 shows that there is a shift in medicinal plant knowledge related to change in focus. In this section, I will be testing predictors of Traditional Environmental Knowledge mentioned in the literature on the Tilantongo data. As shown in section 5.5, medicinal plant naming ability is a very good proxy for medicinal plant use and preparation knowledge. I have chosen the predictor variables age, Mixtec language ability, self-reported medicinal plant

experience and education. The first three variables represent exposure to the Indigenous culture, while education, according to the literature, could either represent exposure or the opposite, depending on the education system. I used SPSS to run three sets of two multiple regressions, using two predictor variables per regression, testing three outcome variables: plant naming ability in general; plant naming ability in Mixtec; and plant naming ability in Spanish. The first two predictor variables in each set are age and Mixtec language ability, while the second two predictor variables in each set are self-reported medicinal plant experience and education.

When it comes to sample size in the case of regression, according to Field (2011: 222-223), the two most common rules of thumb are: 10 cases of data for each predictor; 15 cases of data per predictor. He goes on to write that this does oversimplify things as the sample size depends on the effect size that you are trying to detect. For a large effect size a sample size of 80 (with up to 20 predictors) should suffice, while for a medium effect size a sample size of 200 (with up to 20 predictors) and for a small effect size at least a sample size of 600 or more if you have more than six predictors. Green (1991) has the following rules for the minimum sample size: for overall fit testing of the model (R^2) the sample size is 50 +8k, where k is the number of predictors; for testing of the contribution of the predictors the sample size is 104 + k. If you want to test both you use the larger sample number. Following the first two rules of thumb, 34 is a sample large enough for three or two predictors.

All six regression models have multiple assumptions that are not met, which means that the regression results only allow us to draw conclusions about the random sample of participants, and not the population of Tilantongo. Relating to the random sample, age and Mixtec language ability are not significant predictors of medicinal plant naming competence in general, while they are significant predictors of medicinal plant naming competence in Mixtec. Mixtec language ability is a significant negative predictor of medicinal plant naming competence in Spanish, while age is not a significant predictor. Education is not a significant predictor of medicinal plant naming competence in general, while self-reported medicinal plant experience is a significant predictor. Education is a significant negative predictor of medicinal plant naming competence in Mixtec, while self-reported medicinal plant experience is a significant predictor. Education is not a significant predictor of medicinal plant naming competence in Spanish, while self-reported medicinal plant experience is a significant predictor.

This shows that for our random sample, age is only a significant predictor of Mixtec plant knowledge, not of plant knowledge in general or in Spanish. This is contrary to expectation based on the literature wherein age was described as a predictor of medicinal plant knowledge (in general). In section 4.3.1, I showed that there is a significant correlation between age and time living in the community: $r=0.883$, $p <0.0001$. Mixtec language ability, in accordance with the literature, is a significant predictor of medicinal plant knowledge in Mixtec for the random sample. Interestingly, and not described in the literature, in the case of the random sample, it was also a negative predictor for medicinal plant knowledge in Spanish. Self-reported medicinal plant experience is a significant predictor of medicinal plant knowledge in general, in Mixtec and in Spanish for the random sample. Self-reported medicinal plant experience appears to be the variable that most effectively represents exposure as a concept extracted from the literature for the random sample. This means that the self-reported medicinal plant experience scores that people gave themselves corresponded well with their knowledge when tested, therefore respondents accurately assessed their own medicinal plant experience. Education is not a significant predictor of medicinal plant knowledge in general or in Spanish, while it is a significant negative predictor of medicinal plant knowledge in Mixtec. Section 4.3.1 showed that there is a significant negative correlation between age and education: $r=-0.826$, $p <0.0001$, and between time living in the community and education: $r=-0.723$, $p <0.0001$. While talking about the language shift from Mixtec to Spanish with older people, they told me about the punishment they experienced at school for speaking Mixtec. In section 4.3.1, education was shown to be a significant negative predictor of Mixtec language ability for the population of Tilantongo in general. There is a relationship between Mixtec language ability, the negative impact of

education, age and medicinal plant knowledge in Mixtec. This is indicative of changes that the people of Tilantongo have undergone that have resulted in language shift and medicinal plant knowledge shift as described in section 5.2. Medicinal plant knowledge in Tilantongo appears nowadays to be more salient in Spanish. This is apparent in the medicinal plant knowledge competence score in general and reflects the pressures and changes that older generations of Tilantongo underwent. The predictors of medicinal plant knowledge for the random sample (with the exception of self-reported medicinal plant experience) reflect these changes and subsequent differences as they interact differently with medicinal plant knowledge in general, in Mixtec and in Spanish.

5.6.1. Testing impact of age, and Mixtec language ability on medicinal plant naming competence in general

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is a significant correlation between age and Mixtec language ability: r is 0.507, p <0.005. None of these predictors correlate significantly with medicinal plant naming competence in general. The correlation coefficient squared or coefficient of determination 'R^2 = .052', which means the predictors explain 5% of the variation in plant naming competence in general. None of the predictors are significant. This is a very poor model.

5.6.2. Testing impact of education and self-reported medicinal plant experience on medicinal plant naming competence in general

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is no significant correlation between education and self-reported medicinal plant experience. Self-reported medicinal plant experience correlates significantly with medicinal plant naming competence in general: r is 0.735, p <0.0001. The correlation coefficient squared or coefficient of determination 'R^2 = .540', which means the predictors explain 54% of the variation in plant naming competence in general. Medicinal plant experience is the only significant contributor to the model, where t(31)=5.879, and p < 0.0001. See figure 5.6 for the B-coefficients of this regression model.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-21.506	9.014	
	self-reported medicinal plant experience	9.460	1.609	.736
	education	-.033	.695	-.006

R^2 = .540. p < 0.0001

Figure 5.6: B-coefficients of the linear regression of the impact of education and self-reported medicinal plant experience on medicinal plant naming competence in general

5.6.3. Testing impact of age, and Mixtec language ability on medicinal plant naming competence in Mixtec

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is a significant correlation between age and Mixtec language ability: r is 0.507, p <0.005. The predictors correlate significantly with medicinal plant naming competence

in Mixtec: r is 0.491, p <0.005 for age; r is 0.665, p <0.0001 for Mixtec language ability. The correlation coefficient squared or coefficient of determination 'R^2 = .474', which means the predictors explain 47% of the variation in plant naming competence in general. Mixtec language ability is the only significant contributor to the model, where t(31)=3.706, and p < 0.005. See figure 5.7 for the B-coefficients of this regression model.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-6.491	3.989	
	age	.106	.077	.207
	Mixtec language ability	.163	.044	.560

R^2 = .474. p < 0.005

Figure 5.7: B-coefficients of the linear regression of the impact of age, and Mixtec language ability on medicinal plant naming competence in Mixtec

5.6.4. Testing impact of education and self-reported medicinal plant experience on medicinal plant naming competence in Mixtec

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is no significant correlation between education and self-reported medicinal plant experience. There is significant negative correlation between education and medicinal plant naming competence in Mixtec: r is -0.441, p <0.01. The correlation coefficient squared or coefficient of determination 'R^2 = .326', which means the predictors explain 33% of the variation in plant naming competence in Mixtec. Both education (t(31)=-3.484, and p < 0.005) and medicinal plant experience (t(31)=2.460, and p < 0.05) are significant contributors to the model. See figure 5.8 for the B-coefficients of this regression model.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	5.847	4.887	
	self-reported medicinal plant experience	2.146	.872	.373
	education	-1.312	.377	-.529

R^2 = .326. p < 0.05

Figure 5.8: B-coefficients of the linear regression of the impact of education and self-reported medicinal plant experience on medicinal plant naming competence in Mixtec

5.6.5. Testing impact of age, and Mixtec language ability on medicinal plant naming competence in Spanish

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is a significant correlation between age and Mixtec language ability: r is 0.507, p <0.005. There is significant negative correlation between Mixtec language ability and medicinal plant naming competence in Spanish: r is -0.378, p <0.05. The correlation coefficient squared or coefficient of determination 'R^2 = .143', which means the predictors explain 14% of the

variation in plant naming competence in Spanish. None of the predictors are significant. This is a very poor model.

5.6.6. Testing impact of education and self-reported medicinal plant experience on medicinal plant naming competence in Spanish

Multiple assumptions are not met, which means this model can't be used to draw conclusions about the population. There is no significant correlation between education and self-reported medicinal plant experience. Self-reported medicinal plant experience correlates significantly with medicinal plant naming competence in Spanish: r is 0.655, p <0.0001. The correlation coefficient squared or coefficient of determination 'R^2 = .441', which means the predictors explain 44% of the variation in plant naming competence in Spanish. Self-reported medicinal plant experience is the only significant contributor to the model: t(31)=4.548, and p < 0.0001. See figure 5.9 for the B-coefficients of this regression model.

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	-21.454	9.705	
	self-reported medicinal plant experience	7.879	1.733	.628
	education	.610	.748	.113

R^2 = .441. p < 0.0001

Figure 5.9: B-coefficients of the linear regression of the impact of education and self-reported medicinal plant experience on medicinal plant naming competence in Spanish

5.7. Summary

This chapter addressed the main research question 'What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community?' To test the main hypothesis that was extracted from the literature review, that language shift is often accompanied by cultural erosion, I tested whether there is no difference between the traditional environmental knowledge expressed in Mixtec and Spanish. The traditional environmental knowledge tested pertains to the TEK conglomeration that constitutes medicinal plant knowledge. Section 5.2 demonstrated that there is a significant difference between the medicinal plant knowledge expressed in Mixtec and in Spanish in Tilantongo (the salience of the plant mentioned in the Mixtec freelisting interviews is significantly lower than the salience of the plant mentioned in the Spanish freelisting interviews, respondents mentioned significantly more plants in Spanish than in Mixtec, and there is no significant correlation between the number of Mixtec and Spanish plants that respondents mentioned). The most salient plants in Mixtec are associated with *limpias*, while the most salient plants in Spanish are introduced species. 70% of Spanish plant names in the ethnobotanical database in Appendix 1 were freelisted by the random sample participants, versus 46% of Mixtec plant names. This could be related to the Mixtec speech domains that are most used, suggesting that it was harder for the Mixtec speaking participants to remember plant names in Mixtec because they did not often have the opportunity to use them. Section 5.2 also showed that there is a core of medicinal plants that is best known and that this core is shared, to an extent (57% of variability in salience is shared), in Mixtec and in Spanish. So, while the medicinal plant knowledge in Spanish constitutes TEK, it is a shifted form of the Mixtec TEK; its focus, and therefore parts of its content, has changed. These

finding suggest that medicinal plant knowledge in Tilantongo is shifting. The shift in medicinal plant knowledge is linked to the language shift that is taking place. As language shift entails the endangerment of the original language, medicinal plant knowledge shift entails the endangerment of the original knowledge framework. Some elements are transferred into the new language and the new medicinal plant knowledge framework, while others are not. This is related to the focus of the discourses that differ between the original and the new language, reflecting changes in the social and physical environment.

The TEK conglomeration that constitutes medicinal plant knowledge consists of multiple knowledge frameworks and types simultaneously, that interact to form this very complex domain. The level of instantiation (the extent to which people have used the preparations) reported by the random sample participants is 73.6%. Because people can reproduce logically equivalent elements in different contexts, the actual level of instantiation could be much higher. In the case of medicinal plant knowledge in Tilantongo it does not appear that the different types of knowledge are easily separable and that there are different paths of transmission for them. However, there are different contexts and therefore there could be different paths of transmission for the different domains that interact and overlap within the TEK conglomeration of medicinal plant knowledge. This seems plausible considering the shift in medicinal plant knowledge associated with a change in focus which appears to be related to some of the domains, as described in section 5.2. 97% of transmission was reported to have been through kin and to have been vertical. This suggests that children of curandero families have more exposure and better opportunities to learn about medicinal plants than others. Personal choice and motivation determine whether people take advantage of this. Language shift means that the opportunity to transmit medicinal plant knowledge in Mixtec is reduced because there are fewer young people who speak Mixtec. This might also affect which domains are more accessible for transmission, interacting with the shift in medicinal plant knowledge which also affects the domains that are accessible for transmission because it entails a change in focus. More research is needed into transmission of the separate domains that constitute the TEK conglomeration of medicinal plant knowledge, especially in relation to language and medicinal plant shift. Life histories of domain specialists, such as offspring of curanderos, could be of special interest here. Section 5.5 shows that plant naming ability (theoretical knowledge) is an excellent predictor for plant preparation ability (practical knowledge). This means that plant naming ability can be used as a proxy for medicinal plant knowledge.

Testing for predictors of traditional environmental knowledge was done using six regression models. All six regression models have multiple assumptions that are not met, which means that the regression results only allow us to draw conclusions about the random sample of participants, and not the population of Tilantongo. For our random sample, age is only a significant predictor of Mixtec plant knowledge, not of plant knowledge in general or in Spanish. Mixtec language ability, in accordance with the literature, is a significant predictor of medicinal plant knowledge in Mixtec for the random sample. Interestingly, and not described in the literature, in the case of the random sample, it was also a negative predictor for medicinal plant knowledge in Spanish. Self-reported medicinal plant experience is a significant predictor of medicinal plant knowledge in general, in Mixtec and in Spanish for the random sample. Education is not a significant predictor of medicinal plant knowledge in general or in Spanish, while it is a significant negative predictor of medicinal plant knowledge in Mixtec. Evidenced in section 4.3.1 and section 5.6, there is a relationship between Mixtec language ability, the negative impact of education, age and medicinal plant knowledge in Mixtec. This is indicative of changes that the people of Tilantongo have undergone that have resulted in language shift and medicinal plant knowledge shift as described in section 5.2. The predictors of medicinal plant knowledge for the random sample (with the exception of self-reported medicinal plant experience) reflect these changes and subsequent differences as they interact differently with medicinal plant knowledge in general, in Mixtec and in Spanish. Self-reported medicinal plant experience appears to be the variable that most effectively represents exposure as a concept extracted from the literature for

the random sample. This means that the self-reported medicinal plant experience scores that people gave themselves corresponded well with their knowledge when tested, therefore respondents accurately assessed their own medicinal plant experience.

6. Plant classification, uses and illnesses in Mixtec

6.1. Introduction

The purpose of this chapter is to describe the ethnobotanical database, which unfortunately is too big to include in this chapter but can be found in Appendix 1, and to illustrate how people talk about illnesses, treatments and plants in Mixtec. This is important to understand what aspects of the medicinal plant knowledge TEK conglomeration shift into Spanish and which do not. While the ethnobotanical database provides an alphabetical list of Mixtec plant names with their associated uses in Spanish, their Spanish names and botanical identifications when available, this chapter provides an alphabetical list of illnesses in Mixtec with their Spanish and English equivalent(s) when available. For the list with illnesses and uses that were given in the Spanish interviews see Chapter seven. Some of the Mixtec illnesses do not have equivalents in the Spanish list such as '*dɨña'i*, *kwe'e i'ni*' etc. and some of the Spanish illnesses and uses have no equivalents in the Mixtec list such as '*alergias*, *dietético*' etc. The Mixtec illness and use list is supplemented by Mixtec sentences related to the illnesses in Appendix 7. First the illness or a particular treatment is given, followed by the plant or plants that were given in one of the follow up interviews on plant uses in Mixtec, followed by the associated Mixtec sentence.

6.2. Ethnobotanical database

The ethnobotanical database is a conglomeration of all the plant names that were collected, whether during the freelisting exercises or plant collections with experts. For each plant name entry, it shows whether the plant was freelisted (M in Mixtec, S in Spanish), whether a plant specimen was collected and the uses and preparations. A total of 309 plant specimens were collected. The 44 plant specimens that were collected during my Mphil and have been identified by the ethnobotanical garden of Oaxaca were added to the ethnobotanical database. If the botanical name entry is orange, then it was collected but not identified yet or partially identified. See Appendix 2 for photos of these plants with a short description. All the plant uses and preparations were checked with the expert focus group, if the use and preparation was unknown to them it is written in red, if a use or preparation was incorrect then it is not in Appendix 1. Uses and preparations mentioned by the experts during the focus group interview have also been added. The ethnobotanical database contains a total of 367 plant entries of which 280 have Mixtec plant name entries and 344 have Spanish plant names entries. There are 41 Mixtec plant name entries that refer to several plant species, although some plants were not collected, so some entries could refer to the same plant species. Overall, there are 22 Mixtec plant names (although some of these plants have multiple names, so here I only counted the name they have in common) that are shared by these 41 Mixtec plant names entries. There are at least 49 plant species represented by these names. See Appendix 3 for photos of plants that share at least one Mixtec name that refer to multiple plant species.

There are 16 Spanish plant name entries that refer to several plant species, of which one was not collected. Overall, there are eight Spanish plant names (although some of these plants have multiple names, so here I only counted the name they have in common) that are shared by these 16 Spanish plant name entries. There are at least 15 plant species represented by these names. See Appendix 4 for photos of plants that share at least one Spanish name that refers to several plant species. Of interest is also Appendix 5 which contains photos of plants with different Mixtec names identified as the same species. Ellen and Fischer write that there is a body of evidence suggesting that substantive knowledge declines faster than lexical knowledge and that this can account for the number of non-synonymous terms in circulation that cannot confidently be matched by subjects to firm folk taxonomic identifications (Ellen and Fischer, 2013: 26). In the case of the Mixtec names in Tilantongo, this is not quite what is observed; the Mixtec names that refer to several species are confidently matched albeit to multiple plant species. Some of them

have other Mixtec names to identify them by as well for further specification. The same is observed for the Spanish names. Berlin, Breedlove and Raven (1974: 57) describe that for the Tzeltal Maya there is a basic range of a plant which includes all of its genuine referents and an extended range which includes all those plants which habitually are seen as being more closely related to it than any other category. Basic ranges of plant taxa sharing the same immediately superordinate taxon are always mutually exclusive, that is, their ranges do not overlap. Extended ranges may however overlap in some instances, and in fact often do. It should be noted that a specimen falling within the extended range of a particular plant taxon may at the same time be within the basic range of that taxon's superordinate class.

Could there be something similar happening in Mixtec? More research is needed to find out why certain plant species are referred to by at least one shared name, while others are not. Is it because the name is descriptive, because the plant species share certain characteristics, or is it reflective of changes in knowledge? Because even though the ethnobotanical database contains more Spanish than Mixtec names, there are more Mixtec plant names that refer to several plant species than Spanish ones. There are multiple plant species that have multiple Mixtec and/or Spanish names. Berlin (1999: 13-16) wrote that lexical variation found in medicinal plant vocabulary appears to be governed by factors relating to the cultural significance of the species involved. For the Tzotzil and Tzeltal Maya plant species that are relatively restricted in their use to a few major health conditions are referred to by a small number of widely distributed names, while plant species that have large numbers of ethnomedical uses are generally referred to by several different names. More research is needed into why certain plant species are referred to by multiple names, while others are not in Mixtec.

In the ethnobotanical database, I cross-reference my data from Tilantongo with other works on Mixtec plants. The nearest work that I cross-reference is Kuiper's (2003) work on San Juan Diuxi; 'Ita, kuʾu, yau, yua, yuku, yutnu, xiʾ i: diccionario enciclopédico de plantas'. It is of special interest because Diuxi is a neighboring town and Tilantongo-Diuxi is considered one language. Kuiper's work mentions many of the same plant names that were mentioned in Tilantongo and it is interesting to compare the uses. The most comprehensive source that I started cross-referencing is De Ávila's PhD dissertation from 2010, although this is not yet completed. De Ávila brings together everything that had been done previously on Mixtec plant names in order to analyze the Mixtec plant classification system. When multiple cognates are given for a specific plant, I give the linguistically nearest to Tilantongo from the Eastern Alta Mixtec. If there are no cognates from this area, I reference the cognate most similar. When De Ávila gives a botanical identification that coincides with a plant identification from Tilantongo, this I note. When De Ávila mentions Spanish plant names that are present in Tilantongo but have a different Mixtec name I also reference this.

In the ethnobotanical database all the uses and preparations are in Spanish. In preparations when it says *se hierven* (they are boiled) and there is no specification then whatever is boiled is boiled in water. *Agua de tiempo* is a manner in which a liquid is drank, it specifies that the liquid in question is drunk as often as possible by the person, each time the person is thirsty instead of water. *Serenar* means to leave the picked plant outside during the night for dew to gather (after which the plant is ground in the morning). *En ayunas* means to take on an empty stomach before breakfast. *Hojear* means that the branch or multiple branches (depending on the size of the branches and whether a child or grown up is treated) are swept along the face, the head and the body to cleanse the person undergoing the treatment. *Bañarse* with an herb means rubbing the body with it. Interestingly *kuchi* in Mixtec means to bathe and to rub. *Vaporizar* means that the plant is boiled after which it is rolled into a little ball which then hot is put on the place that hurts.

6.3. Mixtec plant classification

Katz (1990: 192-193) writes that the Mixtec recognize more vegetative forms than are put into evidence by Berlin. New species or varieties of plants are constantly introduced, and people experiment with new medicinal plants. They give new names to plants to which new uses are attributed and to some newly introduced plants: the nomenclature of plants is as mobile and adaptive as those who use it. Figure 6.1 lists the universal principles of classification and nomenclature in ethnobiology coined by Berlin (1992). For example, Berlin, Breedlove and Raven (1974: 30-31) write that in the case of Tzeltal plant taxonomy the plant domain for the Tzeltal, though not named as such, is both on linguistic and botanical grounds, unambiguously bounded and distinctly defined. There are four major life form categories, which include at least 75 percent of all other plant taxa. Each of these four categories is labelled by a simple primary lexeme. They refer to the most obvious and widespread life forms that plants can assume: *te²*: trees; *²ak'*: vines; *²ak*: grasses and *wamal*: broad leaved, net-veined herbaceous plants. A total of 471 mutually exclusive generic taxa have been established. 356 are immediately included in one of the four life-form categories; 97 are unaffiliated. Plants considered unaffiliated are almost without exception cultivated and/or morphologically peculiar in some fashion. 18 generic taxa are ambiguous in that they exhibit characteristics of two (rarely) three life-form classes, they fall on the boundaries of the major classes.

Tables 6.1 and 6.2 give an overview of the Mixtec names in the ethnobotanical database in Appendix 1. Table 6.1 is an overview of unproductive Mixtec names of which six are loanwords from Spanish. Berlin, Breedlove, and Raven (1974: 37-39) describe the following types of unproductive plant names: analogic names (which use the name of a plant or animal they resemble which is post posed as an adjunct in Tzeltal); names that contain the constituent 'medicine' plus adjunctive nominal constituents in Tzeltal; compounds of which the heads are major lifeform names, however the categories referred to are not members of the major lifeforms indicated by the respective heads; and compounds of which the non-botanical referential meanings are obscure. Table 6.2 is an overview of Mixtec plant name groupings (only the shared group name is given, which is either the head in a compound name or the first name of several that denote the plant) that are either productive primary lexemes or secondary lexemes when the whole plant name is given. Berlin, Breedlove and Raven (1974: 39-40, 32) describe productive complex lexemes as compound names, the heads of which are obligatorily one of the four lifeforms in Tzeltal. They point out that productive lexemes are found as labels of generic classes more commonly in some lifeform taxa than others. They write that in Tzeltal 73 generic classes are partitioned into two or more smaller taxa to which they refer as specific taxa. The general nomenclatural rule in Tzeltal specific name formation is to modify the generic name involved with a single attributivizing expression. The resulting form is logically comparable to the Linnaean binomial. The names for specific taxa are linguistically analyzed as secondary lexemes except for several rare instances.

Berlin, Breedlove, and Raven (1974: 27-28) write that primary lexemes are for the most part unique single-form expressions that can be shown to be semantically unitary and linguistically distinct. Secondary lexemes consist of members of the first class in variously modified form. Productive primary lexemes are distinguishable in that one of the constituents in each expression indicates a category superordinate to that of the form in question. Unproductive primary lexemes are distinguishable in that no constituents mark a category superordinate to the form in question. Secondary lexemes, like productive primary lexemes, are distinguishable in that one of the constituents of such expressions indicates a category superordinate to the form in question. Secondary lexemes differ from productive primary lexemes in that the secondary lexemes occur only in contrast sets, all the members of which are labelled by secondary lexemes that share the same superordinate constituent.

How does Mixtec plant classification differ from Berlin's principles? The description of the largest groupings in Mixtec shows that the life-form categories that pertain to them are not uniform and that what constitutes the most obvious and most widespread lifeforms and forming categories that pertain to them is not universal. This is illustrated by De Ávila (2010: 135) through

the nominal category *tnu*, which he describes as simultaneously broader and narrower than groupings like Tzeltal *te'* which seems to correspond more closely to the concept of tree in English. Narrower because several arboreal species with edible leaves or salient flowers are labelled by other markers in Mixtec. Broader because it includes several shrubs, reeds, large succulents, and some stout herbs. Other named groups are similarly eclectic. De Ávila (2010: 2, 72) writes that Mixtec has a system of productive noun markers, in some cases matched by pronominal clitics, which are used to label various plant categories. Membership of these categories appears to be determined by use, edibility, symbolic significance as well as lifeform affiliations. All Mixtec languages documented have categories labelled by class terms and noun markers.

De Ávila (2010: 187) writes that Mixtec plant nomenclature includes a variable number of smaller categories, in terms of quantity of taxa that they encompass. Some of these appear to be absent in certain languages, where the generic term may be known but it does not seem to generate a nominal set. Every term in table 6.2 generates a nominal set. There are a total of 25 groupings in table 6.2, although I suspect that there are more that I have not documented for Tilantongo. Out of these 25 the following five are described separately as nominal markers by De Ávila: *tnu, yuku, ita, yuwa and nduwa*. Then under other labelled groupings he gives the following four that are also present in table 6.2: *iñu, ite, ñami* (tuberous roots, appears to be equivalent to Tilantongo *ña'u*) and *yau*. Under other labelled groupings he also describes the following which are not represented in table 6.2: *nduku* (brooms, switches, shrubs), *nama* (soap plants) and *yo'o* (vines)[69]. He also describes three main crops separately: corn, beans, and squash. *Te'e* is mentioned under squash by De Ávila. As for the rest of the groupings in table 6.2, *chɨ'ɨ, da'ya ndute* (De Ávila places *da'ya dau* from Kuiper which appears to be related under unaffiliated plants), *dinu, mino, ndewa, vi'inde, yudi* are grouped together under unaffiliated plants, taxa that do not include a generic label. *Ruta* and *tutitnu* or their cognates do not appear to be listed by De Ávila. While *kɨndɨ, silantru, tamorial, tayoo, tayuchi, titi, tnana, tnuta, tnutka'a* or their cognates are listed under one of the main nominal categories.

As far as I am aware no one has done any domain analysis where respondents were asked to perform exercises which would lead to a taxonomic diagram of the Mixtec plant names collected. See Martin (2007: 121-135) and Newing (2011: 155-165) on pile sorting as a technique for establishing local classification and other methods to test how people organize their taxonomic system. How do the Mixtec classify their plants? Which groups and unique plant names are placed under which lifeforms and which are unaffiliated? How do people organize and perceive their ethnobotanical classification system? Table 6.2 gives an overview of productive Mixtec plant name groupings. Which groupings are habitually segregated into culturally recognized conceptual classes or functional groupings? (Berlin, Breedlove, and Laughlin: 1974: 153-154). Considering the diversity in Mixtec plant names, it is likely that there will be variation

[69] I collected one Mixtec plant name that has the word *nduku* in it: *yuku nduku da'ya*, a plant with no Spanish name that could be given that is awaiting botanical identification. *Nduku* could however also refer to something else than the category described by De Ávila. The ethnobotanical database includes one Mixtec plant name with the term *nama* in it: *yuwa ngutu/yuku nama* or *jabonera* (soap plant), PHYTOLACCACEAE *Phytolacca icosandra* L. There is only one plant name that has the term *yo'o* in it: *tnu nde'a yo'o* or *hierba de chapulin* identified as FABACEAE Dalea sp. There are two entries in the ethnobotanical database that include the term *ndo'o: ita kando'o/ita ko'o, enredadera morada/quiebra de plato* identified as CONVOLVULACEAE Ipomoea sp. and *yuku ndo'o* with no Spanish name that could be given and no botanical specimen collected. Could *ndo'o* be a domesticated or owned version of *yo'o*? In Mixtec there is a set of matching semantically related terms, such as *yute* (river)-*ndute* (water) etc., y- marking the unpossesed form and nd- the possesed or useful form (De Ávila, 168, 233). More research into this is needed.

between the taxonomic systems of different communities[70]. Further research is needed in general and in Tilantongo specifically as well. The Mixtec plant inventory (medicinal and general) is not complete for Tilantongo and it is unclear at this moment how people perceive and organize their botanical classification system.

Berlin's (1992: 15-17) universal principles of classification and nomenclature in ethnobiology

1. In all languages it is possible to isolate linguistically recognized groupings of organisms of varying degrees of inclusiveness. These classes are referred to as taxa.
2. Taxa are further grouped into a small number of classes known as taxonomic ethnobiological categories. These ethnobiological categories, definable in terms of linguistic and taxonomic criteria, probably number no more than five. They may be named as follows: unique beginner, life form, generic, specific, and varietal. A sixth category, called intermediate, may also be required, but its validity is to be determined only by future research.
3. The five or six ethnobiological ranks are arranged hierarchically and taxa assigned to each rank are mutually exclusive. There is but a single taxon of the rank "unique beginner".
4. Taxa of the same ethnobiological rank characteristically, though not invariably, occur at the same taxonomic level in any particular taxonomy.
5. In any system of ethnobotanical or ethnozoological classification, the taxon that occurs as a member of the rank "unique beginner" (plant or animal) is not (normally) named with a single, habitual label.
6. There are usually but a handful of taxa that occur as members of the category 'life form,' ranging from five to ten, and among them they include the majority of all named taxa of lesser rank. These life-form taxa are named by linguistic expressions that are lexically analyzed as primary lexemes, for example, tree, vine, bird, grass, mammal.
7. The number of generic taxa ranges around 500 in typical folk taxonomies and most are usually included in one of the life-form taxa. A number of generic taxa may be aberrant, however, and are conceptually seen as unaffiliated (i.e., are not included in any of the life forms). Aberrancy may be due to morphological uniqueness and/or economic importance. Generic taxa are the basic building blocks of any folk taxonomy, are the most salient psychologically, and are likely to be among the first taxa learned by the child.
8. Specific and varietal taxa are less numerous than generic taxa and occur in small contrast sets typically of two to three members. Varietal taxa are rare in most folk biological taxonomies. Both specific and varietal forms are distinguished from one another in terms of a few often verbalizable characters. Finally, taxa of the specific and varietal ranks are commonly labelled by secondary (versus primary) lexemes, e.g., red-headed woodpecker, white pine.
9. Intermediate taxa occur as members of the category "intermediate", usually include taxa of generic rank, are rare in folk taxonomies, and are seldom named, leading Berlin, Breedlove and Raven (1968) to refer to them as "covert categories".

Figure 6.1: Berlin's (1992: 15-17) universal principles of classification and nomenclature in ethnobiology

Table 6.1: Mixtec plant names that are unproductive

[70] Like Berlin, Breedlove, and Raven (1974: 58) wrote when describing Tzeltal plant classification: it is impossible to speak literally of the Tenejapa Tzeltal classification of plants. In actuality there are many such classifications, some idiosyncratic, others microdialectical or ecological variants.

Alkamfor (alcanfor)	1	Loanword from Spanish. De Ávila (2010: 136) mentions *yuku alkanfor* for San Pedro Tidaá, *Achillea Millefolium* L. COMPOSITEAE, used for *mal aire* and wounds, considered to be hot. Placed under *yuku*.
Chate itu (cabello de elote)	1	De Ávila (2010: 212) gives the cognate *yate* (*cabellos de elote*) for Chinango, corn silk, used for *mal de orina*, the kidneys and pain in the belly, he also gives *chete itu* (*cabello de mazorca*) for San Miguel el Grande. Placed under maize, it describes a part of the corn plant.
Chiki dini (biznaga)	1	De Ávila (2010: 62, 93, 188) translates *chiki* as cactus fruit or opuntia. *Chiki Yuma*: name for the edible fruit of *yuwa kochi* for Jicayán de Tovar *Cynanchum* sp. APOCYNACEAE is the only instance of a name starting with *chiki*. For Chigmecatitlán he gives the name *tnudichi*, *biznaga*, cactus, *en general para el xoconostle, la pitaya*. He also gives the name *iñu dini, biznaga* for Xayacatlán, *dini* meaning head. *Iñuidini, bizniaga* for el Rosario Micaltepec has been identified as probably *Echinocactus platyacanthus* Link & Otto, CACTACEAE.
Chi'lindo (granadilla silvestre: PASSIFLORACEAE Passiflora sp.)	1	De Ávila (2010: 149) gives *yuku tioo yuku* for Coicoyán identified as *Passiflora* sp., PASSIFLORACEAE, the fruit is sometimes eaten, even though it is bitter.
Chit̶i̶ i̶ndi̶i̶ (flor de manteca: EUPHORBIACEAE Euphorbia)	1	*Chiti: semilla* or seed (De Ávila, 2010: 197).
Ch̶i̶y̶i̶ (cucharilla)	1	De Ávila (2010: 198-199) gives several cognates from different communities. Of interest is *ti'i* or *yavi tii* for San Juan Mixtepec which is identified as *Dasylirion acrotriche* (Schiedde) Zucc., NOLINACEAE. Placed under unaffiliated plants.
Dididó xi xanu (la suegra y la nuera: VERBENACEAE Lantana sp.)	1	Lit: the mother-in-law and daughter-in-law.
D̶i̶k̶i̶ nda'a da'ya (dedo de niño)	1	Lit: child's finger, it appears to be a succulent.
Du'a cabayu (cola de caballo: EQUISETACEAE Equisetum sp.)	1	De Ávila (2010: 202, 203) gives the following two names for cola de caballo: ndo idu (el Rosario Micaltepec) and ñuchi (Tidaá), both identified as probably *Equisetum sp.* EQUISETACEAE. For ñuchi he writes it is *fresca* or cold and it is used when people suffer from heat, to refresh the stomach, for rheumatism and *mal de orina*.
Eucalipto (eucalipto)	1	Loanword from Spanish.
K̶i̶'u/yuku alfaresia (hierba tinta/flor de tinta/berresija: ACANTHACEAE Justicia spicigera Schltdl.)	1	De Ávila (2010: 138, 155) gives *k̶i̶'w̶i̶ i*dentified as ACANTHACEAE Justicia spicigera Schltdl. for the Jamiltepec district, Oaxaca. He also gives *ita kivi* for Jicayán de Tovar for the same species.
Kutnu yuku/yuku kweyido (verdolaga de monte: AMARANTHACEAE *Gomphrena serrata* L.)	1	*Tkútnû: verdolaga (silvestre)* (Kuiper, 2003: 13). De Ávila (2010: 181) writes that *maestro* Ubaldo Lopez Garcia interprets the etymology of *tikutu* as that which is not cultivated. He gives *yuku tikutu* as *verdolaga* for Apoala.
Kwendi̶j̶i̶ (guayaba)	1	De Ávila (2010: 89, 120) gives *tukuayu: la guayaba* for San Juan Colorado and *tnutskuayu: árbol de guayaba* for Chigmecatitlán, *tuskuaa: guayabo* for El Rosario Micaltepec.
Mansaniya (manzanilla)	1	Loanword from Spanish. De Ávila (2010: 160) gives *ita nduvua ndu'u kastiya* among others for *manzanilla* for Tamazulapan.

Ndedu (tomatillo: SOLANACEAE *Jaltomata procumbens (*Cav.) J.L.Gentry)	1	De Ávila (2010: 148) gives *ndirastun: tindaso* for SOLANACEAE *Jaltomata procumbens (*Cav.) J.L.Gentry for Coicoyán, described as sweet fruit that is eaten raw. He also gives *tindasu'u na'un* for San Juan Mixtepec for the same species. He also gives *tileso* for Yosotato. Kuiper (2003: 13) lists *tndedo* and writes that its fruit is edible.
Do'o tɨtnɨnɨ yuku, do'o tnɨnɨ yuku, ita nuungandii (oreja del ratón silvestre, cara del sol: POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.)	1	Lit: ear of the mouse of the mountain.
Nduxa (coyul: OXALIDACEAE *Oxalis nelsonii* (Small) Knuth)	1	De Ávila (2010: 203) lists six *nduxa* from different areas for OXALIDACEAE *Oxalis sp.*
Nispero (níspero)	1	Loanword from Spanish.
Orejano (orégano)	1	Loanword from Spanish. De Ávila (2010: 136, 138, 139, 142, 145, 146, 150) gives various Mixtec names used in different regions to denote oregano.
Tanaña/tnuta naña (chayotal)	1	De Ávila (2010: 100, 175) lists cognates for *tanaña, chayotal* from Caballero. One of them; *vendunaña, chayotal* is identified as *Sechium edule* (Jacq.) Sw., CUCURBITACEAE.
Tiko (hinojo)	1	De Ávila (2010: 147, 207) gives *tnutɨdiko, yɨdɨ no'on, yuku tɨdiko, hinojo* for Tamazulapan.
Tkwiti (papa)	1	Potato, more research is needed to see if this term is productive.
Tndu'u (amole)	1	De Ávila (2010) lists many cognates for *tɨndu'u, amole* (this one is from Caballero), see p 204, 95, 110, 121 for others. He also gives the name *yiwa chi'na: amole/lava ropa* for Alcozauca identified as *Phytolacca icosandra* L. /*Phytolacca octandra* L. PHYTOLACCACEAE (De Ávila, 2010: 179). *Amole* derives from Nahuatl and means used for soap (De Ávila, 2010: 191).
Valeriana (valeriana)	1	Loanword from Spanish. De Ávila (2010: 145) gives the name *yuku tachi: valeriana* for Tidaá, but he writes the description does not fit the *valeriana* genus.
TOTAL	24/280	

Table 6.2: Mixtec plant name groupings

Chɨ'ɨ	5	*Chɨ'ɨ* refers to a group of plants that are eaten either by humans or their animals and they appear to be all in the ASTERACEAE family. De Ávila (2010: 198) mentions four types of *chɨ'ɨ*, referred to by five names, all of them are from Kuiper's Diuxi data. He places this group under unaffiliated plants, taxa that do not include a generic label.
Da'ya ndute	2	*Da'ya ndute* appears to refer to plants that grow near water. De Ávila (2010: 199) mentions *da'ya dau, plantas de la Lluvia* from Kuiper's Diuxi data. De Ávila writes it is unclear whether this poetic term designates a specific taxon, a group of species, or annual plants in general that germinate during the rainy season.

Dinu	2	De Ávila (2010: 207) places this group under unaffiliated plants, taxa that do not include a generic label. The names starting with *dinu* seem to refer to *Tillandsia* species. The Tilantongo data confirm this. See the ethnobotanical database in Appendix 1.
Iñu	9	De Ávila (2010: 187) writes that the term 'thorn' generates a sizeable and eclectic nominal grouping of plants. What all these plants seem to have in common is that they have thorns or spines.
Ita	36	De Ávila (2010: 153) writes that the class term *ita* refers to species which have salient blossoms, often associated with ritual and religious use.
Ite	5	De Ávila (2010: 189) writes that relatively few taxa are labelled grasses or *ite*, and that in some languages the term has become homophonous with the class term flower or *ita*. This is not the case in Tilantongo where *ite* refers to grasses only.
K~~ɨ~~ndɨ	5	De Ávila (2010: 115) writes that *kindi* designates *Salvia* spp. in several languages, while it is also a Mixtec term for chia in other language areas. While *k~~ɨ~~ndɨ* appears to be a class term on its own in Tilantongo, De Ávila (2010: 155) gives the form *tnutak~~ɨ~~ndɨ* for Diuxi and *ita kindi* for Coicoyán, identified as *Salvia stricta* Sesse & Mociño, LAMIACEAE, *kindi* for San Juan Mixtepec identified as *Salvia elegans* Vahl, LAMIACEAE, for more cognates see De Ávila (2010: 155). In Tilantongo *k~~ɨ~~ndɨ* denotes *Salvia* spp.
Mino	3	De Ávila (2010: 198, 200) places *minu* under unaffiliated plants but writes that *minu* forms a large enough grouping that it could be considered a lesser category in Mixtec plant nomenclature, however unlike other groupings the set seems to be clearly focused on a prototypic Linnean genus, *Dysphania.* Although *Mentha* species are also included, see De Ávila (2010, 200-201) and *Chenopodium graveolens* for Tilantongo (see the ethnobotanical database in Appendix 1).
Ña'u	2	De Ávila (2010: 192-193) lists the category tuberous roots, *ña'mi*, which includes edible tubers and medicinal roots in some languages. *ña'u* refers to edible and medicinal roots in Tilantongo.
Ndewa	5	De Ávila (2010: 202) lists several *ndewa* for Diuxi and Tidaá. Identifications include *Urtica sp.* URTICACEAE and *cnidoscolus* sp. EUPHORBIACEAE. De Ávila places this group under unaffiliated plants, taxa that do not include a generic label. In Tilantongo all *ndewas* are used to treat similar illnesses.
Nduwa	6	De Ávila (2010: 167) writes this category is composed of the greens that are eaten raw. In Tilantongo all *nduwas* appear to be edible (although some are eaten cooked), while some have medicinal uses as well.
Ruta	4	Three out of four of the *ruta* are called *marubio* with a specification in Spanish, the fourth *ruta* has no Spanish name that could be given. Only one *ruta* was identified: LAMIACEAE *Mentha suaveolens* Ehrh. More research is needed into which characteristics are used to establish membership in this group.

Silantru	4	De Ávila (2010: 151; 178) gives *yuwe silantro, cilantro* for Yosotato identified as *Coriandrum sativum* L. UMBELLIFERAE. Another *cilantro* for Coatzospan is given as *xku xte'en*. More research is needed to establish what characteristics are searched for in plants that are denoted by this term in Tilantongo.
Tamorial	2	De Ávila (2010: 193) gives *tamarrial* for San Juan Mixtepec, identified as *Odontotrichum paucicapitatum* (B. Robinson & Greenman) Rydb., COMPOSITAE. For Tilantongo only one identification came back: GERANIACEAE *Geranium carolinianum* L., while the other one is still pending.
Tayoo[71]	2	De Ávila (2010: 147, 171, 179, 183) lists many cognates, almost all of which belong to the category *yuwa* and denote MALVACEAE species. *Tayoo* in Tilantongo denotes MALVACEAE species.
Tayuchi[72]	2	De Ávila (2010: 167) mentions *tayuchi, chicazapote* from Kuiper probably identified as *Asclepias* sp., APOCYNACEAE. Both *tayuchi* are awaiting identification. What they appear to have in common is that their sap is edible. One of them is used by humans and the other by goats.
Te'e	2	De Ávila (2010: 217) writes that *te'e* is a distinct term for the tender leaves and stems of squashes and *chayotes*, which serve as food, that now has a broader denotation. Both *te'e* in the ethnobotanical database need to be collected before anything else can be said about them.
Titi	1	Even though I only have one entry for *titi* in the ethnobotanical database, Kuiper (2003: 28-29) has three. *Titi* refers to *quelites* or edible uncultivated plants.
Tnana	2	*Tnana* denotes plants from the SOLANACEAE family with edible fruit. De Ávila (2010: 121) has an entry for *tun tinana nduxi* for Yoloxóchitl described as an unidentified species in the SOLANACEAE family. He writes that four types were documented of which one bears edible fruit.
Tnu	65	De Ávila (2010: 90) writes that the plant names prefixed with the nominal marker *tnu* constitute the largest nominal category they have been able to document in Mixtec. *Tnu* mostly refers to trees and shrubs, but other life-forms such as reeds and bamboos, large succulents and even erect herbs are also included. Plants in this category are typified by rigidity of the stem, non-edibility of the leaves and inconspicuousness of the flowers.

[71] According to De Ávila (2010: 70), Diuxi is the only documented Mixtec language so far that marks the botanical category flower with a specific poststressed pronoun -*ta* as well as a prestressed form *tâ*. It is also the only Mixtec language recorded so far that shows a contracted noun marker derived from *ita* (Mixtec: flower), which becomes fused to couplets to designate specific plant species. De Ávila gives the following examples of this: *tavio* (a kind of flower), *tayɨdɨ̂* (a kind of flower), *tnúta'ú* (*colorín, pipal* [*Erythrina sp.,* LEGUMINOSAE]), *tnútavé'yu* (*dedalera* [probably *Penstemon sp.*, PLANTAGINACEAE]), *tnútayátu (tronadora* [*Tecoma stans* (L.) Juss. ex Kunth, BIGNONIACEAE]) and *tnútayúxî* (a type of tree literally 'the tree of the flower of the evil eye'). De Ávila thinks it is more likely to be a local innovation than an old classifier that used to be more widespread.

[72] idem

Tnuta[73]	7	De Ávila (2010: 70, 115, 116, 117, 134, 145, 155) lists many names that appear to combine the nominal marker *tnu* with the marker *ta* for flower, most of them from Kuiper. More research is needed to find out how people view this category.
Tnutka'a	2	De Ávila (2010: 118) gives two plant names starting with *tnutka'a* from Kuiper. One of the members of this group is a mistletoe species while the other is a tree probably in the LAURACEAE family. Kuiper mentions another *tnuka'a* which also appears to be within that family. More research is needed into this group.
Tutitnu	2	One of the members of this group has been identified as SOLANACEAE *Solanum lanceolatum* Cav., while the other needs to be collected.
Vi'inde	3	Denotes *nopal* species. De Ávila (2010: 206) gives many cognates, some are identified as *opuntia* spp. CACTACEAE. De Ávila places this group under unaffiliated plants, taxa that do not include a generic label.
Yau	5	De Ávila (2010: 194) writes that the Mixtec have an elaborate lexicon for agaves and plants that resemble them. He writes that it is probable that the Mixtec territory has the largest diversity of agavaceous plants in general and specifically of species in the genus Agave.
Yudi	2	De Ávila (2010: 208) lists several *yudi* and cognates from different Mixtec areas. Some are identified as *tillandsia* sp. BROMELIACEAE while one is identified as a *Cuscuta* sp. CONVOLVULACEAE. De Ávila places this group under unaffiliated plants, taxa that do not include a generic label. In Tilantongo one is identified as ONAGRACEAE *Lopezia racemosa* Cav. var. Racemosa while the other collected *yudi* member is identified as BROMELIACEAE *Tillandsia usneoides* L. More research is needed to establish whether there are other members and what characteristics are used to establish membership.
Yuku	69	De Ávila (2010: 135-136) writes that the specific taxa designated with the class term *yuku* are mostly herbs. Relatively small size, non-edibility of the leaves and inconspicuousness of the flowers seem to be primary traits in assigning plants to this group. Many are used medicinally. Semantically however the term can vary; in some variants it includes edible greens, in others it has been extended to include plants in general and even fruits may be labelled 'sweet *yuku*'.
Yuwa	4	De Ávila (2010: 167) writes that many life-forms are designated by the class term *yuva* and its cognates. These life-forms all have edible leaves, tender shoots, or flowers. Many of them are herbs, some are shrubs, vines, epiphytes, and a couple of trees. In Tilantongo three out of the four documented *yuwas* are edible while the fourth is used to make soap.
TOTAL	258[74]/280	

[73] idem

[74] As stated previously, some plants are referred to by multiple names. This means that some plants were placed in more than one category, which increased the total to 282.

6.4. Mixtec sentences related to plant use

This section presents the analysis of Mixtec sentences related to plant use, see figure 6.2, that were used to develop the questionnaire for the Freelisting and follow-up plant uses interview in Mixtec in Table 2.3. The sentences were recorded with Sr Marcial Cruz Cenobio. Sr Marcial either uses forms of speech that can be used both by men and women or he uses speech normally used when a woman is speaking, because the sentences were recorded to be used for the questionnaire that was going to be administrated by me. The abbreviation tx stands for (Mixtec) text, ge stands for gloss and ft for free translation. All the Mixtec sentences were analyzed using Toolbox.

The following abbreviations are used in the text analysis:

com: completive
con: continuative
fam: familiar
ms: man speaking
pot: potential
1p: first person (I, mine)
1p pl: first person plural (we, ours)
2p sg: second person singular (you, yours)
3p: third person (he, it, its)
res: respect
ws: woman speaking

```
\tx Nanda nani              yuku  ya'a?
\ge how   con: to be called plant this
\ft Cómo se llama esta planta?

\tx Nanda nani              yutnu ya'a?
\ge how   con: to be called tree  this
\ft Cómo se llama este árbol?

\tx Nanda nani              yuku ya'a?
\ge how   con: to be called herb this
\ft Cómo se llama esta hierba?

\tx Nanda nani              ita    ya'a?
\ge how   con: to be called flower this
\ft Cómo se llama esta flor?

\tx Kada                xamani ka'a           -un?
\ge pot: to make/to do please pot: to speak  -2p sg fam ws
\ft haz me el favor de repetirlo?

\tx Kada                xamani ka'a          -un           nanda
\ge pot: to make/to do please pot: to speak -2p sg fam ws how
\tx nani          yuku  kida            tatna    texini       -un
con: to be called plant con: to do/make medicine con: to know -2p sg
fam ws
\ft Por favor habla cómo se llaman las plantas que curan que
conoces?

\tx Kada                xamani chidotnuni    nanda nani
```

\ge pot: to make/to do please pot: to write how con: to be called
\tx yuku kida tatna texini -un?
\ge plant con: to do/make medicine con: to know -2p sg fam ws
\ft *Por favor escribe cómo se llaman las plantas que curan que conoces?*

\tx Nanda xetniu -ro yuku ya'a?
\ge how con: to use -1p pl plant this
\ft *Cómo se utiliza esta planta?*

\tx jwetniu -ro nda'a yuku?
\ge pot: to use -1p pl leaf plant
\ft *vamos a utilizar las hojas?*

\tx Jwetniu -ro yo'o yuku -de?
\ge pot: to use -1p pl root plant -of
\ft *Utilizamos la raíz de la planta?*

\tx kwa'a xa jwetniu -ro yutnu -de?
\ge pot: to be able cmp pot: to use -1p pl branch, stem -of
\ft *Se puede utilizar el tallo?*

\tx Nde yoo nake'e -ro yuku ya'a?
\ge which month pot: to collect-1p pl plant this
\ft *En qué mes recogemos esta planta?*

\tx Nanda kadava'a -r yuku ya'a?
\ge how pot: prepare -1p sg fam plant this
\ft *Cómo preparo esta planta?*

\tx Na daa kɨu kutatna -r?
\ge what time day pot: to cure -1p sg fam
\ft *En cuántos días me voy a curar? (Cuánto tiempo dura el tratamiento?)*

\tx Na daa yoo kutatna -r?
\ge what time month pot: to cure -1p sg fam
\ft *En cuántos meses me voy a curar?*

\tx Yundu dane'e ña'a?
\ge who com: to teach known object
\ft *Quién te enseño? (este uso)*

\tx Xetniu -n yuku ya'a?
\ge con: to use -2p res plant this
\ft *Utilizas esta planta?*

\tx koxiniu -n ñayiw xetniu -n
\ge com: to see -2p sg fam ws human being con: to use -2p res
\tx yuku ya'a?
\ge plant this
\ft *Has visto una persona utilizar esta planta?*

\tx teku -n nanda kada tatna -ro?
\ge com: to hear -2p res ms, ws how pot: to make/to do medicine-1p pl
\ft *Has oído cómo nos curamos? (Has escuchado sobre este*

tratamiento?)

\tx Nga'u -n nanda kada tatna
\ge com: to study -2p res ms, ws how pot: to make/to do medicine
\tx -ro?
\ge -1p pl
\ft Te preparaste sobre este tratamiento?

\tx Xido ndute xi yuku ya'a.
\ge con: to boil water at/with/and plant this
\ft Se hierve el agua con la hierba.

\tx Ki'naka na yichi dada dakee -n
\ge firstly hortatory pot: to dry then pot: put in -2p res ms, ws
\tx nuu ndute xido.
\ge if water con: to boil
\ft Primero lo secas y lo echas en agua hirviendo.

\tx Ki'naka ndiko yuku yichi
\ge firstly pot: to grind plant dry
\ft Primero remuele la planta seca.

\tx Dakee -un yuku -de nuu
\ge pot: put in -2p sg fam ws plant -of in, on, in front of
\tx ndɨdɨ
\ge pulque, alcohol
\ft Deposita la planta en el alcohol.

\tx Ki'naka teñu'u -n yuku -de
\ge firstly pot: to set on fire -2p res ms, ws plant -of
\tx kwa'a na jwetniu -ro ñu'a de
\ge pot: to be able cmp pot: to use -1p pl smoke that
\ft Primero quemas la planta para que puedes utilizar el humo.

\tx Io ɨnka yuku kunetna'a?
\ge con: to exist other plant pot: to combine
\ft Hay otra planta que se puede combinar con esta?

\tx Io ɨnka xa jwetniu -ro?
\ge con: to exist other cmp pot: to use -1p pl
\ft Hay otra cosa que utilizar?

\tx Io ka xa yuku jwetniu -ro?
\ge con: to exist add cmp plant pot: to use -1p pl
\ft Hay otra planta que utilizar?

\tx Xini -un nanda dachi'o -ro yuku -de?
\ge con: to know -2p sg fam ws how pot: to cook -1p pl plant -of
\ft Conoces cómo cocer esta planta?

\tx Nanda dakwido -r?
\ge how pot: to boil -1p sg fam
\ft Cómo lo hiervo?

\tx Jwetniu -ro ɨɨn kɨdɨ na kwido ndute xi
\ge pot: to use -1p pl one pot cmp pot: to boil water at/with/and
\tx yuku ɨɨn na na'a
\ge plant one cmp awhile

```
\ft Vamos a utilizar una olla para hervir agua con la hierba durante
un tiempo.

\tx ka'nde yuku  na  ku         kwechi.
\ge cut    plant cmp pot: to be small plural
\ft Corta la planta en trocitos.

\tx Ndiko         yuku
\ge pot: to grind plant
\ft Muele la planta.

\tx Ku'u       yuku  kwii.
\ge pot:to rub plant green
\ft Aplica la planta fresca.

\tx Ku'u       yuku.
\ge pot:to rub plant
\ft Unta la planta.

\tx Nanakwetu    -ro    nu   kidava'a      -ro    yuku.
\ge pot: to pray -1p pl when con:to do/make-1p pl plant
\ft Vamos a rezar cuando preparamos la hierba.

\tx Nanakwetu    -ro    nu   kida            tatna    -ro.
\ge pot: to pray -1p pl when con: to do/make medicine -1p pl
\ft Vamos a rezar durante el tratamiento.

\tx Ko'o          ndute yuku i'ni
\ge pot: to drink water herb hot
\ft Tomate el té.

\tx tnani                        ñu'a yuku
\ge con: to smell (sense odour) smoke plant
\ft se inhale el humo de la planta.

\tx Na          kɨu ñu'a   -ro
\ge affirmitive day smoke  -1p pl
\ft Está penetrando el humo a nosotros (nos estamos humeando).
```

Figure 6.2: Mixtec sentences related to plant use

6.5. Illnesses and uses mentioned in the Mixtec plant use interviews

Table 6.3 is a list of illnesses and uses which gives an overview of all the Mixtec names and phrases that were given in answer to the question *Nanda xetniuro yuku ya'a*? 'How do we use this plant?' during the random sample interviews. It shows that there are several ways to refer to the same illnesses and uses in Mixtec. These will be grouped together as much as possible in section 6.5.2 and Appendix 7, which contains Mixtec sentences related to illness and treatment. Illnesses that are related and/or are mentioned together in a treatment or use description are also grouped together, such as illnesses that are specifically described as cold or hot, as well as all afflictions related to childbirth. It is interesting to note that multiple etiologies coexist at the same time as can be seen in the case of epilepsy and all the related illnesses of what I call the *tristeza* illness group.

The coexistence of multiple etiologies isn't just evidenced by the myriad names of illnesses and treatments that are mentioned and their variety, but also by how people speak about illnesses both in Mixtec and in Spanish, combining traditional environmental knowledge with mainstream Mexican knowledge. Mainstream Mexican knowledge could be argued to

contain both biomedical knowledge, Spanish and Mesoamerican knowledge pertaining to health and illness. Mixtec traditional environmental knowledge lies within the framework of Mesoamerican knowledge while at the same time it lies within its own Mixtec framework containing elements that are unique to it.[75] In a study on Mixtec migrant health care and practices in California Bade (1994: 3) found that people supplement clinical health care with Indigenous treatments based on conceptually distinct definitions of illness classification, causation and diagnosis. She calls this transmedical healthcare because the boundaries of each medical system are crossed over to maximize health care treatment options. The situation Bade (1994: 70-84) describes is distinct from the situation in Tilantongo; the Mixtec migrants she worked with lived in very poor and marginalized circumstances with very limited access to biomedical healthcare due to chronic poverty, language restrictions (not being able to communicate and understand the US medical staff) and socio-political restrictions (being illegal immigrants). This situation caused people to heavily rely on their own resources or non-institutionalized health care. Nowadays in Tilantongo not just the methods of different health care systems are combined but also the knowledge from these distinct systems, as described above, is integrated in order to optimize health care, giving people the benefit of several distinct, complementary treatments. Often the clinic and biomedical health care are combined with traditional environmental treatments. The treatments and etiologies supplement one another.

The list of illnesses is by no means comprehensive. There are many more illnesses that exist and can be named in the Mixtec of Tilantongo. The most notable by its omission from this list is *kwe'e yu'u (espanto)*. For other illnesses that were previously described to me but not mentioned during the random sample interviews see my Mphil thesis (Piestrzynska 2010). *Kwe'e yu'u* or *kwexita (espanto)* is notable because considering how often *tachi u'u (mal aire)* and *yuxi (mal de ojo)* are mentioned I would expect at least one person to mention it in Mixtec considering treatment is very similar, consisting of a *limpia* or cleansing and involving *tnutayuxi (chamizo blanco*: ASTERACEAE *Barkleyanthus salicifolius* (Kunth) H. Robinson & Brettell) (Piestrzynska 2010), which was mentioned often and *limpias* are some of the uses mentioned for it. Coincidentally *espanto* is mentioned only once as a use in the Spanish random sample interviews. Descriptions of the culturally specific illnesses and uses listed in table 6.3, in addition to some that were not listed but are relevant such as *espanto*, are given in sections 6.5.1 and 6.5.2. In addition, section 6.5.1 illustrates the coexistence of multiple etiologies in how people conceptualize illnesses.

Table 6.3: List of illnesses and uses mentioned in the plant use interviews

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Alfaresia (sp)	Alferecía	Epilepsy	One person from the random sample described the illness as follows: *'Enfermedad caliente: un ataque repentino, se cae el cabello, parece cáncer'.* From

[75] Bade (1994: 25) writes that contemporary Mixtecs are heirs to both pre-Colombian and fifteenth century Spanish medicine, two distinctive world pre-modern medical systems. This is in accordance with Mak (1959: 126), who writes that Mixtec illness etiology is a syncretism of native and medieval Spanish concepts. I think that the reality is more complex and less isolationist, stressing the dynamic and continuous nature of traditional environmental knowledge of which ethnomedical knowledge is a subset. Supporting this point of view are the writings of Alfredo López Austin (1975: 15-16), who situates Mesoamerican medicine in a more global context, writing that certain cultural phenomena related to medicine are present in both the Americas and some also in Asia.

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
			other interviews it follows that *enojo, tristeza* and *alfaresia* are related and often mentioned together.
Chaku	La caspa	Dandruff	
Chi dakwi'a	Pudriendo	Gone bad, rotting	Refers to infected wounds.
Chi'iro ditniro kwe'e tna'aro	Sonamos la nariz cuando está enfermo	We blow our nose when it is ill	
Chi tn̈ɨ̈ xitir	Empacho	Indigestion	Lit: it got stuck in my stomach
Chitu xiti	Empacho	Indigestion, bloated stomach	Lit: full stomach
Dandutei n̈ɨñɨ xiti ñɨ̈ro	Golpe	Having taken a hit	Lit: blood flows inside our body
Dachi kajaro	Mal de orina	Problems urinating	Lit: we are hurting when urinating
Daxi	Disentería	Dysentery	Often in combination with *chi tn̈ɨ̈ xitir*.
Dɨña'i	Está tapado	Blockage	Related to *dachi kajaro.*
Dɨña'i xa dachiro	Está tapado cuando orinamos	Urinary tract blockage	Same. lit: blockage when we are urinating
Dolor (sp) de (sp) respiración (sp)	Dolor de respiración	Pain when breathing	
Enojo (sp)	Enojo	Anger	See text below
Fraktura (sp)	Fractura	Broken bone	
Golpe (sp)	Golpe	Bruise	
Infección (sp)	Infección	Infection	
I'ni xitiro	Estómago caliente	Hot stomach	
Ndɨ'i inir	Hernia	Hernia	Lit: granos al dentro. *ndɨ'i inir: 'la hernia que va al dentro, la hernia nace por dentro, es el estómago puesto, ya ve que la hernia es una debilidad, o la hernia es en diferentes partes de la parte del estómago diremos.'*
Iniro ka'ni	Fiebre al dentro	Fever inside	Described as *'temperatura del estómago, no va uno al baño'*
Io ñu'u kaxi xitiun	Frío del estómago	Cold in the stomach	Lit: there is cold in his/her stomach
June'i	Diarrea	Diarrhea	
Kaaro	Para comer	To eat	
Kaja nda'aro	Dolor del mano	Pain of the hand	

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Kaja nu'uro	Dolor de dientes	Pain of the teeth	
Kaku da’yaro	Nazca el bebe	To give birth	
Ka'ni	Fiebre	Fever	
Kaniro dɨkɨro	Pegar la cabeza con la planta, hojear	To hit the head (with the plant)	This refers to hitting the head with the plant often in combination with alcohol on the leaves.
Kaniro nda'aro	Pegar el mano con la planta, hojear	To hit the hand (with the plant)	Usually with rheumatoid pains, often in combination with alcohol.
Kaniro ñɨɨro	Pegar el cuerpo con la planta, hojear	To hit the body (with the plant)	Usually related to body ache.
Kaniro xe'ero	Pegar el pie con la planta, hojear	To hit the foot (with the plant)	Usually with rheumatoid pains, often in combination with alcohol.
Kaniro yɨkɨ xitiro	Pegar la rodilla, hojear	To hit the knee (with the plant)	Usually with rheumatoid pains, often in combination with alcohol.
Kata	Comezón	Itch	
Kawa ña'i	Calambre	Cramp	Often in combination with *ña ka'aro*, together they can be symptoms of *kwe'e yu'u* or *kwe'e yuxi.*
Kaxi kuchi, ngutu	(Lo) comen los puercos, los toros	Food for pigs and bulls	
Kaxi kuchiro, tkachi yawaro	(Lo) comen nuestros puercos, nuestros borregos delgados	Food for thin pigs and sheep	
Kayu xa xi'i	Cruda	Hangover[76]	Lit: it is burning because of drinking
Kayu xitiro	Cruda	Hangover	Lit: our stomach is burning
Kee ndeyu	Echar en la comida	To put in food	
Kida desinflamar(sp) i	Desinflamar	To reduce inflammation	
Kida falsear (sp) ku nda'aro, ku xe'ero	Torcedura	Sprain	‘*Falsedura es una torcedura, usted se pisó mal y se le fue a un lado el pie, claro no*

[76] Mak (1959: 137-138) writes that hangovers or illness after a drunken stupor is interpreted as the work of spirits to which one is particularly vulnerable when staggering home or falling by the way. No-one in Tilantongo mentioned this, only one of the mentioned plants; *tnu de'ñu, enebro* (CUPRESSACEAE *Juniperus flaccida* Schltdl.) is used to both treat *mal aire* and *cruda*, although it is used in different ways. Mostly *mal aire* and *cruda* are treated with different plants.

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
			es fractura, nada más se fue a un lado y le provoco dolor, esto es falsear'.
Kine'e ta kwe'e vixi	Sacar la enfermedad fría	Remove the cold illness	Lit: remove it-classifier cold illness
Kiti ini	Bilis, enojo	Bile, anger	
Kiti iniro	Tristeza	Sadness	
Kɨtɨ xitiro	Ruido del estómago	Rumbling stomach	
Kɨtla vichi	Parásitos	Parasites	
Kɨtla vichi nuu xitiro	Parásitos en el estómago	Parasites in the stomach	Lit: many harmful animals in our stomach
Kɨtla vichi ñu'u xitiro	Parásitos en el estómago	Parasites in the stomach	Lit: many harmful animals we have in our stomach
Kɨtla vichi xitiro	Parásitos en el estómago	Parasites in the stomach	Lit: many harmful animals our stomach
Kodoro	Barrer con la hierba	To sweep with plant	Different from *kaniro* because of the motion involved in using the plant, sweeping versus hitting.
Ko'yo iniro	Tristeza	Sadness	
Kontrolar (sp) axuka (sp)	Controlar diabetes	Control diabetes	
Ku tatnaro nduchi yataro	Medicina para los riñones	Medicine for the kidneys	
Kuchiro	Frotar	To rub	Often with the fresh plant ground into a pulp.
Kuchiro	Bañar	To bathe	Often with the water in which the plant has been boiled.
Kuna'i dolor (sp)	Que corte el dolor	That it may stop the pain	
Ku'u iniro	Dolor al dentro	To be hurt inside	
Ku'u june'i	Diarrea	Diarrhea	
Ku'u tachiro	Mal aire	Mal aire (sp)	See text below
Ku'u xitiro	Estómago enfermo	Ill stomach	
Ku'u yataro	Espalda enferma	Ill spine	
Ku'u yɨkɨ xitiro	Rodilla enferma	Ill knee	
Ku'u yoo	Menstruación	Menstruation	
Kwedayu	Gripe	Flu	
Kwedayu tnuu	Toz ferina	Whooping cough	
Kwe'e axuka Kwe'e axuka nu nɨñɨ	Diabetes	Diabetes	Lit: illness sugar in the blood
Kwe'e duju	Anginas	Tonsilitis	Lit: illness throat
Kwe'e idi iñu	Espinilla		See text below

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Kwe'e ndɨ'i	Varicela	Chickenpox	
Kwe’e ndu ini	Bilis	Bile	
Kwe’e nduchinuur	Cataratas, nubes en los ojos	Cataracts	
Kwe'e xa kuu	Diarrea	Diarrhea	
Kwe’e nyi'i yɨ'ɨ	Epilepsia	Epilepsy	
Kwe’e yɨkɨ	Reumatismo	Rheumatism	
Kwe'e yuxi	Mal de ojo	Mal de ojo (sp)	
Kwendu ini	Berrinche	Tantrum	*‘Enfermedad caliente: cuando empieza el niño llorar cualquier momento.’*
Kwe'nu idiro	Para crecer el cabello	Hairgrowth	
Kwiña	Hinchazón	Swelling	
Lavado (sp) ñadɨ'ɨ xa nguu ngɨu	Lavado de mujer con una manguera, cuando los ovarios se bajaron	When the ovaries come down it is a wash a woman can do with a tube	
Na kidiro	Para dormir	For sleeping problems	
Na ku xa falsear xe'ero	Torcedura de pie	Sprain of the foot	
Naku'a	Limpiar	To cleanse	See text below
Natna'a nu'uro	Apretar los dientes	To tighten the teeth	Lit: to close our teeth
Ndaa Ndaa tachi Ndaa xitiro	Empacho Empacho Empacho	Swollen be swollen with air swollen stomach	See text below
Ndiko xiti	Frío del estómago	Cold of the stomach	See text below
Ditai xa ka'ni	Quitar la fiebre	To remove fever	
Ndɨ'i	Granos	Pimples	
Ndɨ'i duju Ndɨ'i dujuro	Granos en la garganta	Pimples in the throat	Often mentioned with *ndɨ'i yu'u.*
Ndɨ'ɨ i	Granos	His/her pimples	
Ndɨ'ɨ i yaa	Sarampión	Measles	
Ndɨ'i te’yu	Viruela	Smallpox	
Ndɨ'i yaa	Sarampión	Measles	
Ndɨ'i yu'u Ndɨ'i yu'uro	Granos en la boca	Pimples in the mouth	Often mentioned with *ndɨ'i duju.*
Ndɨ'jɨ	Granos	Pimples	
Ndu kutu nu'uro	Amarrar los dientes	To fasten the teeth	Same as *Natna'a nu'uro.*
Ndu ni'i nu'uro	Apretar los dientes	Press teeth that have become loose together	Same as *Natna'a nu'uro.*
Ngokodo xe'ero	Torcedura	Sprain	
Ngukawa xe'ero	Torcedura	Sprain	
Ntaya nu'uro	Dientes aflojados	Loose teeth	
Nu ndita nɨñɨ	Hemorragia	Hemorrhage	
Nu nya'a ngaku da’yaro	Después que nació el bebe	After childbirth	

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Nuu ñani	Golpe		
Nuungani	Golpe		
Nyee nɨñɨ yooña	Menstruación	Menstruation	Lit: the blood of her month arrived
Nyuxi	Mal de ojo	Mal de ojo (sp)	n-: com
Ña ka'aro	No estamos hablando	We stop speaking	Often symptom of *kwe'e yu'u* or *kwe'e yuxi.*
Ña kwini da'yaro xa kakui	No quiere nacer la criatura	The baby has trouble being born	
Ña'a ñayiw xi'i	Cruda	Hangover	
Ñani ñɨɨro	Pegar el cuerpo	To hit the body	With the plant.
Ñayiw ndɨka	Herida	Wound	Lit: the human was opened (*'Se abrió la persona'*)
Ñayiw ña kidi	No duerme	Can't sleep	Problems with sleeping.
Ñɨ'ɨ	Temazcal	Steambath	See text below
Ñu'u kɨtɨ vichi nu xitiro	Parásitos en el estómago	Parasites in the stomach	Lit: we have many animals in our stomach
Ñu'u xitiro kɨtla vichi	Parásitos en el estómago	Parasites in the stomach	Lit: our stomach has many harmful animals
Ñu'uro koo yɨkɨ	Tenemos lombrices	When we have worms	
Peresia (sp)	Perecía, enojo, tristeza	To perish	Often mentioned in combination with *alfaresia.*
Presión (sp)	Presión	Blood pressure	One person from the random sample described the illness as follows: *'calentura con el perdimiento del conocimiento.'*
Purga (sp)	Purga	Purge	After being poisoned or when a cleansing is needed, a very radical and dangerous manner of getting the body rid of bad substances through diarrhea and vomit.
Quebrahueso (sp)	Quebradura	Broken bone	
Tachi Tachi u'u	Mal aire	Mal aire (sp)	See text below
Tauro	Caldear	Massage to heat up with warmed up plant	Often a bundle of the heated-up plant is used to massage the body part that has been affected.
Tauro nda'aro	Caldear el mano	Massage the hand	

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Tauro xe'ero	Caldear el pie	Massage the foot	
Tauro xitiro	Caldear el estómago	Massage the stomach	
Tna u'uro Tna u'uro ñɨɨro	Dolor del cuerpo	Pain of the body	
Tna u'uro xe'ero	Dolor del pie	Pain of the foot	
Tna u'uro yataro	Dolor de la espalda	Pain of the back	
Tna'aro daxi	Disentería	Dysentery	
Tna'aro golpe (sp)	Golpe		*Golpe* and *tnikwe'ero* and *hemorragia* are often mentioned together and treated using the same medicine.
Tna'aro june'i	Diarrea	Diarrhea	
Tna'aro ka'ni	Fiebre	Fever	
Tna'aro kaxi xe'ero o yɨkɨ xitiro	Tener frío en el pie o rodilla	Struggle with cold in the foot or knee	Related to rheumatism.
Tna'aro kwe'e i'ni	Tenemos una enfermedad caliente	To have a hot illness	See text below
Tna'aro ndɨ'ɨ i	Tenemos granos	To have pimples	
Tna'aro ora yodo iniro	Tenemos ansiedad	To have anxiety	
Tna'aro tnikwe'ero	Tenemos herida	To have a wound	
Tna'aro tuchi	Tenemos latido	To have throbbing	
Tna'aro xa vixi	Tenemos frío	To have coldness	See text below
Tna'nu yɨkɨ Tna'nu yɨkɨro	Quebradura	Broken bone	
Tna'nu yɨkɨ nda'aro	Quebradura del hueso del mano	Broken bone of the hand	
Tna'nu yɨkɨ xe'ero	Quebradura del hueso del pie	Broken bone of the foot	
Tnikwe'e Tnikwe'ero Tnukwe'e	Herida	Wound	
Tnikwe'e anuro	Golpe de corazón	Heart ache	A great sadness; belongs to the *tristeza* group. See text below
Tnikwe'ero xi chi dakwi'a	Herida podrida	Infected wound	
Tnɨ’i	Empacho	Indigestion	See text below
Tnɨɨ ña'a	Empacho	Indigestion	See text below
Tnɨɨ xitir	Se pegó, empacho	Indigestion	See text below
Tnukwe'e xitiro	Herida del estómago	Stomach wound	
Toz (sp) kroniko (sp)	Toz crónica	Chronic cough	
Tuchi Tuchi iniro	Latido, cuerdas	Throbbing	*‘Cuando se ha movido un ligamento en el estómago’.* See text below
Tuu ña'a ñuñu	Picadura de la abeja	Bee sting	

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
U'u xitiro	Dolor de estómago	Stomach ache	
U'uro ñɨɨro	Dolor del cuerpo	Body ache	
Vidi nɨñɨro	Azúcar en nuestra sangre, diabetes	Diabetes	
Vixi	Frío	Cold	
Vixi ini	Frío al dentro	Cold on the inside	See text below
Vixi ñɨɨro	Frialdad del cuerpo	Cold of the body	See text below
Xa kakui	Cuando nazca	When the baby is born	
Xa kuu	Diarrea	Diarrhea	
Xa'ni tndaku kɨtɨ te'yu	Matamos el gusanito en animales donde tienen podrido	To kill parasites in animal wounds that are infected	
Xaxi kuchiro	(Lo) están comiendo nuestros puercos	Pig feed	
Xaxia'an	Dolor	Pain	
Xaxia'an dɨkɨro	Dolor de cabeza	Headache	
Xaxia'an dujuro	Dolor de garganta	Throatache	
Xaxia'an ka'aro	Dolor de la cadera	Hip pain	
Xaxia'an nda'aro	Dolor de manos	Hand pain	
Xaxia'an nuunganiro	Dolor por golpe	Pain because of being hit	
Xaxia'an nu'uro	Dolor de dientes	Pain of the teeth	
Xaxia'an ñɨɨro	Dolor del cuerpo	Pain of the body	
Xaxia'an ora xa ku da'yaro	Dolor cuando va a dar a luz	Pain when giving birth	
Xaxia'an xa vixi	Dolor por el frío	Pain because of cold	See text below
Xaxia'an xe'ero	Dolor de los pies	Pain of the feet	
Xaxia'an xitiro	Dolor de estómago	Pain of the stomach	
Xaxia'an yataro	Dolor de espalda	Pain of the back	
Xaxia'an yɨkɨ xitiro	Dolor de rodilla	Pain of the knee	
Xaxia'an yɨkɨna'a	Dolor de costillas	Rib pain	
Xaxia'an yɨkɨro	Dolor de huesos	Pain of the bones	Rheumatism.
Xaxia'anro anuro	Dolor del corazón	Heart pain	Physical not related to the *tristeza* group.
Xaxia'anro nu'uro	Dolor de los dientes	Pain of the teeth	
Xaxia'anro ñɨɨro	Dolor del cuerpo	Body ache	
Nyi'i yɨ'ɨ	Ataques (epilépticos)	Epilepsy	Related to the *tristeza* group. See text below
Yɨkɨ	Hueso	Hueso (sp)	See text below. *'Cuando el niño tira su tortilla y lo come la gallina y le sale el hueso en la garganta y no puede comer más y se pone muy flaco y sale sangre de la garganta.'*
Yɨkɨ xitiro xa vixi	Frío de la rodilla	Cold of the knee	See text below

Mixtec illness or use	Spanish illness or use	English illness or use	Notes
Yodo ini Yodo iniro	Ansiedad	Anxiety	
Yoo ngu	Pasó la menstruación	Menopause	
Yuxi	Mal de ojo	Mal de ojo (sp)	See text below

6.5.1. Selected descriptions of illnesses illustrating multiple etiologies

Kwe'e nyi'i yɨ'ɨ 'epileptic attacks' and *kwe'e yɨkɨ* 'rheumatism' are good examples of the interaction of multiple etiologies in how people conceptualize illnesses. The description of epilepsy and epileptic attacks contains both a physical description as well as a variety of possible causes from genetic disposition and lifestyle to *mal aire* and *espanto*. This existence of multiple etiologies that supplement each other[77] can also be seen in the case of rheumatism which is referred to as *xaxia'an yɨkɨro (dolor de huesos), kwe'e yɨkɨ (enfermedad de huesos), tna'aro kaxi xe'ero o yɨkɨ xitiro (tenemos frío en nuestros pies o rodillas), tna'aro xa vixi (tengo frío), ku vixi ñɨɨro (tengo frío en el cuerpo), xaxia'an xa vixi (dolor por el frío)* and *yɨkɨ xitiro xa vixi (rodilla fría).* It is also referred to by its symptoms *xaxia'an xe'ero, nda'aro (dolor del pie, del mano)* and its treatments *kaniro xe'ero, nda'aro* 'to hit the foot, the hand with the plant' *tauro xe'ero, nda'aro* 'to massage the foot, the hand'. *Vixi, ndiko (frío, frialdad)* or 'cold' and 'coldness' are related to it, but also to other illnesses, see Chapter seven for more on the subject of cold and hot. Rheumatism is an inherently cold disease to such an extent that when people talk about it in Mixtec it is often referred to as I have cold, cold knee, we have cold in our body, in our feet etc. At the same time though it is also referred to as an illness of the bones.

This is how epilepsy was described by the curandero Señor Aron Montesino Santiago:

> *Kwe'e nyi'i yɨ'ɨ (epilepsia): Los síntomas son: de repente cae uno sin pensamiento y después no se acuerda; en el suelo está temblando uno, tiene convulsiones del cuerpo y sale espuma por la boca. La causa de la enfermedad varía mucho: algunos lo traen en la sangre; puede venir por hambre; por aire (cuando nos pega el aire); por espanto o también cuando una persona es muy nerviosa y enojona y sus nervios se alteran. La naturaleza de la enfermedad es caliente.*
> 'Epilepsy: The symptoms are: suddenly one falls without awareness and afterwards no memory of the event; on the ground one is shaking, one has convulsions of the body and froth comes from the mouth. The cause of the illness varies much: some carry it in their blood; it can come because of hunger; because of *aire* (when we are hit by *aire*); because of *espanto* or also when a person is very nervous and prone to anger and their nerves alter. The nature of the illness is hot.'
> **Señor Aron Montesino Santiago** (Piestrzynska 2010).

The following is a description of rheumatism by the curandero Señor Aron Montesino Santiago:

> *Kwe'e yɨkɨ (reumatismo): Los síntomas de la enfermedad son: hinchazón, mucho frío y dolor de los huesos. La gente grande sufre de esta enfermedad. La enfermedad no se quita sola y castiga mucho. La causa de la enfermedad: cuando está caliente nuestra piel, sacamos los zapatos y tocamos el suelo frío y por eso duelen los huesos. Es una enfermedad fría.*

[77] In 1959, Mak (1959: 127) wrote that identification of illness causation in the Mixteca is a mix of clinical observations and cultural beliefs. In 1969, Butterworth ((1969) 1990: 109) wrote that in Tilantongo, illnesses can have an infinity of causes, from the supernatural and animistic on one side to the natural on the other.

> ‘Rheumatism: The symptoms of the illness are: swelling, a lot of coldness[78] and pain of the bones. Elderly people suffer from this illness. The illness does not heal by itself and punishes a lot. The cuase of the illness: when our skin is hot, and we take off our shoes and touch the cold ground this causes pain of the bones. It is a cold illness.’
> **Señor Aron Montesino Santiago** (Piestrzynska 2010)

6.5.2. Further descriptions of illnesses and uses mentioned in the Mixtec random sample interviews by medicinal plant experts

6.5.2.1. The *tristeza* illness group

While conducting the random sample interviews I noticed that people often mentioned the illnesses from the *tristeza* group together or ascribed similar causes and treatments to them: *Alfaresia* (sp); *enojo* (sp)[79]; *kwe’e nyi'i yɨ'ɨ; peresia* (sp); *nyi'i yɨ'ɨ; tnikwe'e anuro; ku ko’yo iniro; ku ko’yo anuro; kwe'e ndu ini; kwe'e kiti ini; kiti iniro.* Alfaresia and peresia are names from Spanish that have been absorbed in Mixtec to talk about *kwe’e nyi'i yɨ'ɨ* or epilepsy. *Kwe'e* means *enfermedad* or illness while *nyi'i* means *murió* or died and *yɨ'ɨ* means *rápido o al instante* or fast or instantaneous: *murió al instante* or he/she died instantaneously. I asked Sra Adelina to explain to me what these illnesses are and how they are related, and this is what she told me:

> *Kwe'e nyi'i yɨ'ɨ es una enfermedad que ataca así al corazón o sea está usted bien y de un momento a otro se enojó, pues ya se le alteró el corazón por el enojo que hizo y ya ve como queda o se desmayen o se privan. Eso es kwe'e nyi yɨ'ɨ; las personas que se privan, porque hay personas que no más se alteran, gritan tal vez, ¿tuvo derramo no? pero hay otras personas que se desmayen y caen pues y a veces hasta que mueren. O sea, le da ataque al momento de coraje, por eso no pueden hacer coraje. A veces así va, ya se vuelve un padecimiento o crónico como se dice, ya no pueden hacer coraje o se desmayen. Nyi'i yɨ'ɨ murió al instante quiere decir o kuu yɨ'i está muriendo al instante. Mire si lo hacemos enojar se puede morir, le puede dar un ataque y se muere. Eso es lo que se refiere al con kuu yɨ'i. Vamos a suponer que yo digo no lo vamos a hacer enojar porque se puede morir al instante entonces yo digo maxku da kiti iniro chi vani kuu yɨ'i.*
>
> *Tnikwe'e anuro es tristeza, significa me lastimé el corazón. Porque hay sorpresas ve, alguien que está sufriendo y a poco no se conmueve, siempre tristeza, por eso dice usted; ay me lastimé el corazón.*
>
> *Ku ko’yo anuro significa está triste mi corazón. De alma me sale una tristeza por eso se dice aquí ku ko’yo inir; tengo tristeza. ko’yo es triste. Ma'i ku alfaresia por tristeza por lo que sea, son conectados. ku ko’yo pues es tristeza, vaya alfaresia también a veces está por coraje, por tristeza también ataca.*
>
> *Kiti iniro es bilis, por enojo. También está conectado a los demás. Kiti quiere decir que la sangre se altera. iniro al dentro, el corazón es lo que tenemos al dentro entonces cuando usted se altera, que le sube la presión esto quiere decir kiti ini. Kiti iniro nos enojamos. Kiti es alterarse, alterar entonces la sangre se altera diremos, se sube, kiti, es como una olla hirviendo diremos está muy en paz, pero si le mete mucho fuego pues hierve y hasta que se tira no? Esto es lo que quiere decir. Con la olla dicimos nyido ni'no. También se dice así*

[78] See Chapter seven for the concept of hot and cold.
[79] Bade (1994: 29) writes that 45 percent of the women she interviewed from the Madera study reported having suffered from *coraje. Coraje* is characterized by feelings of frustration, powerlessness and general restlessness. *Coraje* is another term for *enojo*.

cuando alguien muere de un infarto: nyido ni'no anui decimos. Esto es un infarto. Nyido ni'no: se derramó, nyido significa se hirvio, ni'no significa abajo.

A veces uno puede levantarse con la boca bien amarga entonces es cuando decimos que es latido, tuchi[80]*. Tuchi tna'ar. Dandita ña'ar tuchi, se me alteró el nervio. Por ejemplo, de repente amanece con la boca bien amarga y al rato ya le da dolor de estómago. Entonces allí ya se dice dandita ña'a tuchi. Sin dolor de estómago con la amargura sola si es bilis. Si, pero ya cuando es más ya empieza a provocar dolor de estómago. entonces es kiti iniro xi tuchi. porque luego decimos así por ejemplo hay personas que dicen kwe'e kiti ini nyi'i es que pues tuvo un coraje fuerte y hasta falleció pues. Muere, muere por un coraje, por un derrame de bilis diremos por eso dice kwe'e kiti ini o kwe'e ndu ini, persona que se apuró demasiado y se alteró y murió. Tiene dos formas: kwe'e ndu ini, kwe'e kiti ini.*

Tristeza, bilis todos son conectados porque kwe'e ko'yo ini tna'i o kiti ini o kwe'e ndu ini es lo mismo.

kwendu ini xini; sé que le dio un derrame de bilis. Se alteró pues, le subió mucho la presión y falleció ko kiti ini paso un coraje y paso lo mismo, se le altero el corazón y falleció, ¿no? Se hirvió la sangre, porque así dicen xido nɨñɨ. Dicen luego que la sangre empieza a trabajar con fuerza ¿no? Este es lo que dicen. **Sra Adelina**

The illnesses from this group are all related to sadness and anger which cause alterations of the blood that can lead to fainting, epileptic attacks, *bilis* (which can lead to *tuchi* or *latido*), heart attacks and death.

6.5.2.2. *Tuchi*, *tuchi iniro*

Tuchi es un dolor de sus nervios, un dolor de estómago, le lata mucho por los nervios. Tuchi xitiro significa que los nervios en el estómago le duelen o tiene latido. Tuchi ñɨɨro significa que los nervios del cuerpo le duelen. Tuchi o latido es un dolor del estómago, pero al momento que le duele le late muy fuerte el estómago, a causa del dolor le lata mucho pues, es por causa de los nervios. Lo puede tener en otros partes del cuerpo también. Ya ve que todo está conectado. **Sra Adelina**

6.5.2.3. *I'ni xitiro*

I'ni xitiro significa está caliente mi estómago. Es enfermedad caliente, siento caliente el estómago, cuando algo circula mala ya en el estómago pues empezamos a sentir caliente igual. **Sra Adelina**

6.5.2.4. *Ndiko xiti*

Ndiko xiti es frío del estómago; que se le abrió el estómago, por ejemplo, si lavo, vamos a suponer que yo lavé, ¿no? Pero como ya, ya es tarde entonces me tocó el agua y el aire que pega, pues que da, empieza a enfriarte el estómago, eso es ndiko xitiro, empieza a dar dolor del estómago con lo frío. Ñu'u kaxi xitiun significa tiene mucho frío en el estómago. Por ejemplo, si tiene mucho frío en el estómago es que comió, consumió cosas frías, por ejemplo, el quelite algo así, de esos que es frío pues, entonces se enfermó del estómago

[80] Mak (1959: 140) gives the name *tee jini tuchi*, 'man who knows pulse', to describe a *curandero* who diagnoses by feeling the patient's pulse. *Tuchi*, or *latido*, means throbbing or pulse, but as an illness it is much more complex, strongly associated with pain.

porque consumió de las plantas frías. Eso le provoca dolor del estómago. Puede ser también por aire, por ejemplo, si usted no cubre bien el estómago, vamos a suponer que yo tengo una playerita delgadita y me voy a la loma donde sopla mucho el aire, entonces este aire le provoca dolor y se empieza usted a inflar del estómago también por el aire, es malo.

Uno puede tener frío del estómago y empacho al mismo tiempo. **Sra Adelina**

6.5.2.5. *Tn~~ii~~ xitir, ndaa*

Tn~~ii~~ xitir es empacho, ndaa se inflo, se llenó de gas. Asiti xaxi: aceite de olivo es el aceite de comer, de guisar. Se da este aceite a la persona que tiene empacho. Una cucharita para un niño por la mañana y ayunas. Una cuchara grande para la persona adulta. Ya arroja lo que tiene allí pegado en el estómago porque ya ve que dicen que le se pega el alimento y no se escurre. Hay también empacho que da mucha diarrea. Es que hay diferentes formas de empacho, diferentes empachos. Porque a veces cuando se pega el alimento que dicen tn~~ii~~i, entonces es allí a donde provoca la diarrea, se pegó y cuando no arroja como dice usted es que están estreñidos y no pueden arrojar pues el excremento. Para los dos se usa el aceite. Se toma el aceite, si es mucha diarrea o cada que come el alimento, cada que consume un alimento se empacha pues es que se le pegó algo en el estómago y si está estreñido también el aceite es bueno porque ve que se endurece el excremento, no puede obrar la persona. Se combina esto con las plantas medicinales, por ejemplo, la malva. Si, la malva sirve para arrojarlo que, por ejemplo, si alguien esta estreñido le tiene que dar malva, una tacita de té de malva y ya arroja lo que se endureció allá al dentro, pero para la diarrea pues no, solamente sé que para la diarrea la hierba buena, la manzanilla. La manzanilla es buena para el estómago también. Las hierbas de borrachito son muy efectivos para el estómago, sobre todo cuando es diarrea. También cuando una da a luz, la planta medicinal mejor para la persona que va a dar a luz es esta la té de borracho, pero en la ciudad la conocen como té de menta (en d.f.). **Sra Adelina**

6.5.2.6. *Tachi u'u*

Yo varias veces me enfermé de fiebre que puro mareo tenía yo, ay de tanta fiebre tenía yo que ya no veía claro, dice mi papa mal aire te dio. Esto de tachi que dice uno, tachi ini. Te dio mal aire y luego iba a cortar la planta tutitnu, hierba loca. La cortaba, pero hay una hierba loca que tiene flores blancas tutitnu kwixi decía él. Hay una sola parte donde creció. tutitnu kwixi, de esta me frotaba, pero en todos los nervios, así como estamos diciendo todo lo que se dobla y mire con alcohol y al otro da ya bien sana me levanté una vez, me acuerdo muy bien que me enfermé de este.

También bien con alcohol es la ruda, sobre todo en las plantas de los pies, aka donde se dobla. Da'ndaro que decimos. Da'ndaro aka atrás de la rodilla ve que se dobla la rodilla es que en estos nervios hay que pasarlo, pero así frotado pues con el alcohol y la ruda. **Sra Adelina**

The following descriptions of *tachi u'u* were given to me by the *curandero* Sr Aron Montesino Santiago and the *curandero* Octavio during my Mphil research:

Los síntomas de la enfermedad: mareo (en la cabeza); vómito; escalofríos; la vista se empaña, dolor de corazón; calambre de las manos. Todos los que tienen mareo y vómito, desde niños hasta viejos, sufren de mal aire. Dura hasta que se cura uno. Pega de repente a la persona; no sabemos si es el clima o la hora, hay diferentes formas de mal aire.

Los síntomas de la enfermedad son: escalofríos, después viene dolor de cabeza y dolor del cuerpo, calentura y fiebre. Si no se cura mueren de la fiebre, pero se cura con el camote de la hierba de conejo. Aquí decimos el mal aire cuando muere una persona[81]; así se matan entre ellos –hay mal aire en este lugar–, si pasa una persona débil toca a esta persona y se enferma. La enfermedad dura hasta que se cura, no pasa sola. La causa de la enfermedad es que de repente se encuentra uno con el aire y por eso se enferma.

Hay diferentes formas de mal aire o de aire. El mal aire se produce cuando una persona muere violentamente en un lugar. El tipo y la fuerza del aire que se produce dependen del grado de violencia y del grado de energía de la persona que muere. El aire es más fuerte si el grado de violencia es más alto y si la persona que murió tenía una energía o espíritu más fuerte. Si alguna persona es fuerte de energía y pasa por un lugar donde hay aire no le pasa nada. Si una persona es débil de energía o el aire es muy fuerte la toca y la persona se enferma. La enfermedad tiene una naturaleza caliente. **Señor Aron Montesino Santiago**

Hay diferentes formas de mal aire, depende si el espíritu humano es fuerte o débil. A veces por el mal aire alguien tiene ataques epilépticos y cae en tierra. Se hacen varias limpias (al menos 10) con un blanquillo y se saca todo lo malo dentro del blanquillo. Hay que quebrar el blanquillo para ver qué tiene la persona. **Señor Octavio** (Piestrzynska 2010).

6.5.2.7. *Naku'aro xi ndɨu*[82]

Durante una limpia se sopla con un huevo la cabeza y todo el cuerpo del paciente. Después de la limpia se quiebra el huevo en agua para ver qué tiene el paciente. Cuando sale espuma sabemos que es el ojo de lo que sufre el paciente, cuando sale la clara sobre la yema como humo sabemos que el paciente sufre del mal aire[83]. **Señor Aron Montesino Santiago** (Piestrzynska 2010).

6.5.2.8. *Kwe'e yu'u, kwexita*[84]

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[81] Mak (1959: 140) writes that to render one immune to the possible influence of a corpse, holy water is used. Could this possible influence be related to *mal aire* as described by the *curandero* Sr Aron Montesino Santiago?

[82] Bade (1994: 28) refers to Beltran (1947: 125); a person is rubbed with a chicken egg, it is believed that the illness enters the egg and can be destroyed or buried near the house of an enemy with the intent to pass the illness on to him. The objects represent the "spirit of the illness" materialized in the object. Mak (1959: 133) writes that sorcery induced illness is treated by rubbing the patient with a hen's egg wrapped in *nuyuji, toloache* or *floripondio* leaves. The disease is believed to enter the eggs and leaves which are then either thrown into fire, or near the house of one's enemy with intent to pass the sickness on to him.

[83] Mak (1959: 137) writes that rubbing with an egg, used in other regions to diagnose, seems to be used here [southwest of Tlaxiaco] only to expel the spirit or disease. As can be seen in the text, curanderos in Tilantongo can use the egg to diagnose.

[84] One of the experts interviewed during my MPhil used the pronunciation *kweyita* interchangeably with *kwexita*. *Xita* means 'singing', *kwe* comes from *kwe'e* 'illness', hence the translation by Kuiper and Oram. Bade (1994: 26) refers to Anne Dyk (1959: 87, 243) who describes soul loss as an illness in which the soul is separated or taken from its body. It can be caused by offending the spirits, for example the spirits of the ground, the cornfield or the sweatbath. When a person stumbles and falls, "beating" and offending a spirit in the ground or in stones or rocks, the angered spirit or *tachi,* snatches the soul of the victim. It is interesting to note the reference to *tachi*. In Tilantongo it is primarily the *ñu'u* that are associated with *kwe'e yu'u* or *kwexita*, although *aire* is also mentioned. Bade (1994: 29) gives the name *ni yivi* meaning fright for *espanto* or *susto*. Symptoms include general fatigue, loss of appetite, listlessness and often diarrhea and vomiting. The effects of *espanto* can be delayed, appearing later in life. Monaghan (1987: 402)

Kuiper and Oram (1991: 197) call *kweshita* 'singing sickness' caused by the earth people. Their 'sh' represents a [ʃ] which I write as 'x'. I documented the following descriptions of kwexita during my Mphil research:

> *Los síntomas son: temblar; cuando duerme uno salta de la cama, brinca y se espanta; no toma agua; no está contento; siempre está triste; siempre está enojado; cuando está en la cama de repente se recuerda que tiene espanto. Cualquiera la sufre; los niños y gente grande con la excepción de la gente con mucho valor; a ellos no les pega el espanto. Si no se cura se complica, aparece la fiebre, toz, calentura, escalofríos, y si el espanto es muy fuerte el enfermo puede morir. La causa del espanto es el miedo y el aire. Cuando por ejemplo se cae uno, el río lo lleva, un coyote lo ataca, etc.* **Señor Aron Montesino Santiago**
>
> *El espanto pasa cuando vamos a lugares vírgenes (sagrados) y nos caemos en la tierra y decimos una maldición contra la tierra, que es inocente, porque no es su falta que nos hayamos caído. En algunos días nos empieza a doler la cabeza y sentimos cansancio en todo el cuerpo. Algunos mueren de espanto.* **Señor Octavio**
>
> *La tierra está viva; cada lugar tiene su nombre igual que nosotros, por un descuido nos caemos o nos espantamos y nos agarra la tierra y nos enfermamos. Se mueren o se quedan chuecos por el espanto. Es necesario hacer limpias para que suelte la tierra el espíritu del enfermo. Es necesario conocer el nombre del lugar para componer el espanto[85]. La tierra tiene muchas vidas, muchos espíritus. La naturaleza de la enfermedad es fría.* **Señora Seferina García Santiago** (Piestrzynska 2010).
>
> *El espanto es una enfermedad relacionada con nuestro espíritu. Tn̈ ña'a ñu'u kwexita[86]. La tierra tiene vida como nosotros; espanto significa que uno de los espíritus de la tierra agarró el espíritu del enfermo, que se espantó.*
>
> *Durante el tratamiento del espanto se usa pulque y copal para curar, se reza el padrenuestro y se pide un permiso a la tierra. El curandero o la curandera quema copal y tiene una taza con pulque enfrente en la que pone copales uno tras otro y observa lo que pasa con ellos mientras reza. Si es muy delicado el lugar los copales se van hasta el asiento de la taza, y si no es delicado salen los copales[87] – esto quiere decir que no es muy grave el espanto–. Si no quiere salir el copal se sigue rezando y se tira pulque, aguardiente, mezcal y refresco en la tierra (el lugar del espanto), donde se hacen tres cruces. Si esto no funciona y no salen los copales se sigue rezando y se da una comida; carne de pollo, dulce, refresco, en un agujero que se tapa con una piedra en el lugar del espanto. Se ponen flores*

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writes that when someone loses their *anima*, their heart will begin to flutter immediately and later they may have chills, shakes and diarrhea. Over time they will lose appetite and become thin and weak. Sleepwalking and thinking out loud are other symptoms. Pulsing might be used to diagnose it.

[85] Monaghan (1987: 403) writes that it is necessary to know the exact place where the *anima* loss took place. When the patient does not know, the seeds of *ita ka'nu* or Morning glory are consumed. The hallucinations of the patient point to the place where *anima* loss took place as dreams are believed to be the experiences of the *anima*, so they show where the *anima* is.

[86] He was taken by the *ñu'u* of the singing disease.

[87] Mak (1959: 139) describes different information which can be obtained when *copal* is used to diagnose *espanto*: *copal* may be rubbed all over the patient and then burned. If it melts and trickles in a stream, the water spirits are thought to have caused the sickness. If it simply burns down, leaving a charcoal-like residue, the sweat bath spirits are involved. If it explodes as it burns, then spirits from several places are implicated. In Tilantongo, the *curandero* uses *copal* at the place of *espanto* to establish the strength of *espanto*.

y el curandero reza cuando el lugar no quiere saltar el espíritu. El curandero pega la tierra con una barra y la familia grita "vamos [nombre de la persona con espanto] de aquí, vamos a la casa"; el curandero grita "suelta su espíritu, vámonos [nombre de la persona]". Una vez que suelta el espíritu salen los copales[88]. **Señor Aron Montesino Santiago** (Piestrzynska 2010).

Oración para que la tierra suelte el espíritu de una niña que se espantó

En el nombre de dios padre, dios hijo y dios espíritu santo. Señor santo patrón, santo apóstol, tú que tienes tanto poder en los cielos y la tierra. Te suplico que con tus santísimas manos bendigas este lugar donde voy a hacer el espanto de la niña que se espantó. Pido que ordenes al santo Cristóbal, al santo ñu'u de este lugar que suelte el espíritu de la niña porque se encuentra enferma. Señor santo patrón te pedimos que bendigas este lugar. Creo en Dios padre todopoderoso, creador del cielo y de la tierra y en Jesucristo, su único hijo, señor nuestro que fue concebido por obra y gracia del espíritu santo, nació de la santa María virgen y padeció debajo del poder de Poncio Pilatos, fue crucificado muerto y sepultado, resucitó entre los muertos, subió a los cielos, está sentado a la derecha del dios padre todopoderoso, desde allí ha de venir a juzgar a los vivos y los muertos. Creo en el espíritu santo, la santa iglesia católica, la comunión de los santos. Rogamos que bendigan este lugar donde se espantó la niña porque ella desea estar buena y sana como cuando Jesús la mandó a este valle de lágrimas. Ofrecemos el padre nuestro, que estás en los cielos, santificado sea tu nombre. Venga a nosotros tu reino, hágase tu voluntad en la tierra como en el cielo. Danos hoy nuestro pan de cada día. Perdona nuestras ofensas, así como nosotros perdonamos a los que nos ofenden. No nos dejes caer

[88] Monaghan (1987: 405-407) writes that a *nake'e ñu'un* 'recollector of earth' or *tee ka'a shini nu ñu'un* 'the man who speaks the name of the earth' goes to the place where the *anima* was lost and offers food to it consisting of sweet smoke of incense and something to drink (*pulque* preferably) which is poured into the ground. The *curandero* asks forgiveness for the offence the patient may have commited or stresses the patient's innocence of any fault. He must speak the name of the *nu ñu'un* or the *nu ñu'un* will not listen. When unsure of which *nu ñu'un* should be addressed, all the *nu ñu'un* are invoked. Once remorse has been expressed and the offering made the *curandero* tries to raise the *anima* from the earth. The *curandero* mixes the offered liquid with the earth, scoops it up and paints a cross on the patient's forehead, chest, elbow joints and wrists. It is said the patient is bathed (*sikuchi*) with the mixture. If the *curandero* is successful, the patient will feel his head heat up (*nu vishi shini*) and vapor may rise from his face and hair (*na kue'nu yoko shini*). The *curandero* will also spray a mouthful of holy water or alcohol on the patient while this is taking place. Now attention is paid to the patient's dreams, if the *anima* has been returned, the patient will see someone give them an object. See footnote 95 for the ritual called '*levantar la tierra'*. Hitting the ground where *anima* loss might have taken place is mentioned as a preventative measure by Monaghan (1987: 401). Mak (1959: 128-129) gives an account of the ritual which is believed to restore soul loss in the Mixteca near Tlaxiaco. She writes that he mother of a boy diagnosed with soul loss went to the place where it took place with a bowl of *pulque* and with a stick she marked a cross on the floor where it happened, poured some of the *pulque* on the cross and stirred with the stock to make mud. She then scooped up the mud, placing some of it on a piece of paper for a later ritual at home, and some in the *pulque* in the bowl. Next she laid the boy's shirt on the cross on the ground, twice filled her mouth with the muddied *pulque*, and sprayed it twice vigorously on to the shirt, while saying to the boy's soul 'Arise, enter in your chest [shirt]'. Then she shook the shirt, laid it on the ground, and again sprayed on it, shook it once more and moved it over all places on the floor where the boy might have been, saying 'Arise, lets return to our house [boy's name], don't stay here'. Upon returning home, the mother put the shirt on her son, rubbed the mud from the paper on his forehead, arms and chest, and sprayed more of the muddied *pulque* from her mouth on his face, chest, back, hands and feet. She then passed the *pulque* bowl near his head, chest and back, tapping it with a stick to cause the soul, now believed to be in the *pulque*, to re-enter the body. Not infrequently, in addition to this, *copal* incense is burned and more rarely, a small piece of meat, an egg or cooked beans are left as an offering.

en la tentación, líbranos del mal. Amén. Te ruegan cálidamente que con tus santísimas manos bendigas este lugar para que el santo Cristóbal de esta tierra suelte el espíritu de la niña que se espantó en este lugar. En el nombre de dios padre, dios hijo, dios espíritu santo voy a echar este copal en el pulque. Si este copal sale no está muy delicado este lugar, si el copal se fue hasta el asiento de la taza del pulque es que está muy delicado el lugar. Esta oración luego al dios padre, dios hijo, dios espíritu santo para que bendigan este santo lugar y sane la niña que se espantó en este lugar, para que la suelte el espíritu del san Cristóbal de esta tierra. Amen Jesús. **Señor Aron Montesino Santiago** (Piestrzynska 2010).

6.5.2.9. *Yuxi, nyuxi*[89]

El ojo es de mala fe, cuando alguien no quiere a la persona y la ve con odio es aquí donde ataca el ojo. Si es posible que una persona echa ojo sin dar se cuenta. Pero porque estoy molesto por dentro, ya como los niños ya ve que tienen pocas defensas, por eso lo recibe la criatura más que nada. Ojo es caliente. **Sra Adelina**

Síntomas: no quiere comer; duele la cabeza; se siente triste; quiere vomitar; cuando uno quiere dormir vienen muchas cosas –las cosas pequeñas se hacen grandes, se ven caras, etc.–. Los niños tienen calentura hasta fiebre. Los niños pequeños lloran, están inquietos, vomitan, tienen excremento verde y líquido[90]. La mayoría de los que sufren de esta enfermedad son niños pequeños y bebés, en ocasiones también los adultos. Dura hasta que se cura o se muere. Hay diferentes causas: la persona que echó el ojo viene sudando y no habla al niño y con eso echa el ojo, o una persona mezquina entra. La persona que echa el ojo tiene mala sangre, mal genio. Las personas que echan ojo no se dan cuenta. Es una enfermedad caliente. **Señora Isabela Cruz García** (Piestrzynska 2010).

6.5.2.10. *Kwe'e idi iñu*

Kwe'e idi iñu es la espinilla[91]: es una enfermedad que ataca cuando consume mucha salsa o le gusta la sal o el frijol asado de allí proviene la esta de idi iñu, es algo que también es falta de vitamina, como ya ve que la sal vitamina, consumir mucha sal o mucha salsa o

[89] Bade (1994: 30) writes that it is jealousy that causes *mal de ojo* or 'the evil eye', particularly in young children. It can be caused intentionally or unintentionally by an admiring look from an adult, whose spirit is believed to be stronger and more willful posing a danger to the child's weaker, less experienced spirit. Mak (1959: 133) describes evil eye, or '*mal de ojo'*, as follows: if a person looks at a baby with admiration or envy, usually without conscious intent to harm, it will cry and cry and have sore eyes and get sick. Then the mother may ask the person thought to be responsible to rub some of his saliva on the baby's eyes and cheeks, or an admirer may do this to prevent the illness. To effect a cure, a hen's egg is wrapped with *nuyuji* and rubbed on the eyes of the baby. Then the egg is broken into a saucer, seven sharp thorns are pierced into the egg, which represents the eyes of the guilty person, the egg and thorns are then thrown into the fire, the baby recovers and the guilty person may become blind. Monaghan (1987: 612) writes that snakes can give you the evil eye.

[90] Mak (1959: 138) writes that diarrhea in the case of children is often caused by the evil eye.

[91] Bade (1994: 40) describes *espinilla* as a childhood disease characterized by fever, vomiting or diarrhea. She observed a *curandero* spitting on his hand and rubbing it over the back of child, if the fine back hairs of the child rolled into tiny clumps, this would be indicative of *espinilla*. Mak (1959: 139-140) writes there is a great fear of what are called thorn hairs, probably a short stubble thought to be a harbinger of further illness. If a man cuts his hair too soon after an illness, or if a woman assumes her duties of grinding too soon, the thorn hairs will appear, and a relapse will occur. They often appear on babies' heads. The milky sap of *venenillo* is applied to make them fall out. The name for *espinilla* in Mixtec, *idi iñu*, translates as 'thorn hairs'.

también cuando se sienta uno, se pone uno mucho al calor del sol, también luego dicen: mada xi ña'a kwe'e idi iñu, porque allí está no se vaya darle espinilla, así luego nos decían mis papas, parase de allí cuando yo me iba por ejemplo al campo y siempre estaba yo allí en el sol haciendo mi lodo, haciendo mis tortillas de lodo, mi papa llegaba y dice párate de allí hija pero en Mixteco mada diya nukoon mada te ña'a kwe'e idi iñu. Te va a agarrar espinilla por estar en el sol él me decía y ya rápido me metía yo a la sombra, pero que cree que una de mis hermanas le dio esto de kwe'e idi iñu, es falta de vitamina digo yo, yo digo por consumir otras cosas. Porque a mi hermana la curaron sabe usted cómo? Hay una el calabazar que decimos, la guía de la calabaza, o sea la planta, pero no de la calabaza pero del chilacayote, pues de la planta del chilacayote, este, mi abuelita, a levantarse mi hermanita, mi hermana es mayor que yo, a levantarse ella como estaba así toda pálida toda y no comía no más buscaba la sal y se sentaba comer sal o buscaba el frijol y agarraba unos cuatro o cinco frijolitos y lo iba azar en la lumbre y de eso le llamaba atención comer y decía mi abuelita esta niña tiene espinilla pero decía dichi luchi idi iñu ta'i-me la mandas porque yo la curaré le dijo a mi mama, así se la mandó. Entonces yo iba con mi hermana, amaneciendo ya nos íbamos a la casa de mi abuelita, ya mi abuelita ya tenía lista esta planta que le dijo, te'e, ya tenía lista esta planta y le frotaba todo lo que están los nervios, donde se doblan pues, donde se dobla del mano y pie, aka en la cien al lado de los oídos, todo allí le frotaba con esta planta, con esta guía hasta que ya eso se hiciera polvo digamos, pero como le salía un líquido, agüita. Mira ya está sacando toda la enfermedad dice mi abuelita, este es el idi iñu. Sudan mucho las personas que tienen esta enfermedad kwe'e idi iñu cuando le dan tratamiento y luego le dio de tomar, sabe lo que le dio? Para que le curará o lavará el estómago, mi abuelita le preparó agua de cal de lo que sale del nixtamal del maíz cuando lo hervimos. Del agua de cal le sacaba todo del nixtamal y lo dejaba allí a reposar hasta que se asentará esta agua de cal y le daba a mi hermanita solo lo clarito del encima, una taza de esta redonda le daba. Le acababa de dar su masaje con esta hierba y le decía órale tomate esto, ya le daba su agua de cal clarita clarita oh se lo tenía que tomar mi hermana, tres mañanas seguiditas. No se quitó con el primer tratamiento, de veras le volvió hacer, como nueve veces la curó y entonces se le quitó a mi hermana, pero le daba diarrea, no comía, se puso pálida, bueno la cosa es los de antes conocían mucho también, mi abuelita se daba cuenta pues. El nombre significa cabellos de espina, los cabellos son parados y se caen también, se caen todo pelones. **Sra Adelina**

6.5.2.11. *Yɨkɨ*

Yɨkɨ es hueso. El hueso es, esto da en la garganta, dicen que cuando no comen se les acumula una flema en la garganta, en las glándulas salivales, allí se le acumula una flema a una persona que no come, no come hoy, no come mañana, no come pasado, y ya después ya se vuelve hueso por eso dicen ta'i yɨkɨ. Realmente no es hueso, ha de ser un nervio que se inflama digo yo, ¿no? Ta'a es un absceso que sale así superficialmente, les sale a los animales o dicen que hasta los seros humanos también. Da a los niños que no quieren comer, tiene hueso dicen, pero realmente no es hueso, bueno decía la abuelita de mis esposo, porque ella fue curandera también pues ella decía tiene hueso este niñito lo vamos a curar, la curación que ella hacía asaba un tomate de esos verdes y le quitaba lo que es la cascarita, así calientito lo despegaba y lo envolvía en sus dedos y se lo pasaba al niño órale a limpiarle todo esto y como arrojaba el niño esta flema. Metía su mano al dentro de su gargantita del chiquito pues ya le daba una vuelta y los niños están basteando porque están sacando todo. Pero nada más sale lo de su garganta no arroja lo del estómago y ya después esto se le hace como tres veces también lo hacía la abuelita de mi esposo. Y ya comían bien, normal. Porque esta flema, esto decía ella, eso les estorba a los pequeños. Aunque sea uno de grande también luego a veces dicen yɨkɨ ta'ine. Dicen

que cuando se deja sin tratarlo si se inflama la garganta y es adonde le empieza a supurar dicen y es cuando ya viene hasta la operación diremos para que se lo quite. Lo que yo vi la flema era como baboso nada más, como cristalino pero baboso. La causa es por no comer se va acumulando eso allí porque como no consume alimento entonces esta flema se va acumulando y después empieza a estorbar y ya no puede uno comer o se ya no dan ganas dicen pues (no escurre de la nariz al mismo tiempo es solamente en la garganta, la pura garganta). Al otro día los niños ya comían bien, estaban contentos. **Sra Adelina**

6.5.3. Ñɨ'ɨ 'temazcal'

Ñɨ'ɨ is the Mixtec name of the Mesoamerican steambath. It is called *temazcal* in Spanish, from Nahuatl *tema* 'v. take a steambath' and *calli* 'n. house' (Herrera, 2004: 58, 151). It is intrinsically linked to the Xitna ñɨ'ɨ*, la abuela del temazcal* or 'the grandmother or deity of the *temazcal*'. It is used to treat many illnesses, to help with recovery after childbirth and to relax the body and spirit. It is depicted in codex Nuttall. López García (2007: 29-30) writes that there are two types of *temazcal*; a permanent one in the shape of a cube whose walls are made of adobe or stones and earth with a small chamber off to the side from where it is heated (called *ñe'e*) and a temporary one that can be constructed wherever is convenient made out of flexible branches covered with *petates*, the source of heat is made in the ground where brick or stones that retain heat are placed before the construction covers them (called *ñe'e i'ni* or hot *temazcal* or *baño de torito*).

Katz (1993: 175-178) writes that the *temazcal* is associated with the Mesoamerican ballgame (the players purified themselves before the game) and has been described by Sahagun and Duran. Archaeological remains have been found of stone *temazcals* but it is assumed that adobe or *varas* ones also existed as they do today. There are two types of *temazcal*; the permanent and temporary. Before entering the *temazcal* you can wash yourself with cold water, but after the *temazcal* this is prohibited for three days. Also, it is prohibited to drink cold water. Beer and boiled water are most adequate during and after the bath. To enter the *temazcal* you have to wait until the heat of the day dissipates. Around four in the afternoon until nightfall. You enter approximately three times for 15 minutes.

La Xitna ñɨ'ɨ también es ñu'u porque es de la tierra, es dueña de la tierra o por la lumbre también. También gobierna en el temazcal. Puede mandar aire cuando se enoja con alguien. Según si alguien se enojó al dentro del baño, a salir del baño se empieza a llenarse de aire su estómago, ay qué vamos a hacer porque la abuelita se enojó y le echó aire. Los ñu'u pueden mandar aires para castigar a las personas. Por ejemplo, mi esposo tenía una abuelita que era partera y curaba mucho, iba a hojear a las personas que dieron a luz. Me asistió una vez con uno de mis hijos. A prender el baño, al echar le fuego al temazcal, ve que tiene una hoyita donde se echa lumbre, ella tenía que pedir permiso, hablaba en Mixteco, le decía madre tierra, abuelita de este temazcal le voy a pedir permiso para prender este fuego que va a curar esta enferma que dio luz a este niño, un niño que va a gobernar en este pueblo. Bueno decía malanderias y después echaba fuego, de allí tenía que entrar tres veces. Cada vez que prendía el fuego tres veces al baño y completando las nueve veces. Porque cada vez que prendía el temazcal tenemos que entrar 3 veces con ella, cada día tres veces nos hojeaba. Entonces al nueve veces tenía que traer el pulque, tortillas, [...] de huevo y tortillas del maíz, y con un pollo también y le metía carne; comida, pero tenía que decir sus frases pues para [...] decimos nosotros como si la tierra tuviera vida. Le dejaba allí todo esto alimento y ya cerraba el baño unos 8, 15 días tenía que clausurar el baño de temazcal. Tapando la puerta pues del baño para que la persona que dio a luz no se llenara de aire del estómago. Dicen que estando abierto la puerta del temazcal el aire se mete y hace que lo recibe la persona que dio a luz por eso quedan muy destrudas decía la abuelita eso es el tachi [...] ya saliendo todo se apaga la lumbre y se cerraba la puerta con petate o cobija, la cosa es que estuviera bien tapada

para que no entre aire a la persona que dio a luz y ya de allí se esperaba 8 o 15 días y de prender de vuelta fuego para volver entrar y de allí se quitaba de una vez la tapa, la cerradura pues se quitaba. **Sra Adelina**

Para el parto se ocupa hierbas calientes: chamizo del río es caliente y si se usa en el temazcal. se echa en el agua, se hierve con hierba loca, con escobilla, chamizo del río, la hierba de la estrella, la hierba huele de tierra (tnani ñu'u), la ruda de todo esta se hace una mezcla en una cubeta grande y esta agua se ocupa en el temazcal **Sra Adelina**

Se usa leña chiquita de modroño, somaque y pinguicas para prender el fuego con carbón del comal. Cuando empieza a arder se pone pedazos de leña grande de capulincillo. Cuando ya es pura brasa se tapa el hornillo con piedras y tierra. Hornillo es ndaka ñɨ'ɨ. Para el asma se ocupa hierbas calientes: hierba de ángel (tnu kawa), romerillo (romeru), tepozán (tnu yuku ñama). Se pone leña dos veces para que arde hasta brasa. Cuando la segunda vez se quede solamente brasa se pone piedras en la brasa y alla se echa agua cuando uno ya está al dentro. Es mejor entrar con otra persona para que nos hojea bien. **Sra Seferina**

The branches of the plants with leaves are fastened into a bunch with palm. This bunch is used to hit the body within the *temazcal*. When the body is hit in this hot steamy atmosphere, the bunch of plants moves more vapor towards the body making the body feel even hotter. When it is very hot people say *'Nana juliana no se enoja! Disculpa nos!'*. When someone is capable of making it through the hotness people say *'Comió bien, ya se comió todo'*. Figures 6.3 to 6.9 illustrate the preparation of the *temazcal* in Tilantongo.

I was told the following about the *temazcal* during my Mphil research:

El temazcal sirve para muchas enfermedades: dolor del cuerpo, diarrea, dolores musculares, dolor de los huesos. El paciente tiene que entrar al temazcal para no sufrir una recaída. Cuando una mujer se alivió antes también entraba al temazcal.[92] *El temazcal cierra los huesos de la cadera que se abren durante el parto. Las cuerdas están calientes después de dar a luz. Se espera 3 días después del alivio para que se enfríen las cuerdas y se entra el baño para que el vapor apriete las cuerdas. Entran cada tercer día, dos o tres veces después de aliviarse.*[93] **Señor Aron Montesino Santiago**

[92] Katz (1993: 177) writes that in the Mixteca the *temazcal* is used to treat the following diseases: measles, malaria, swellings or skin ailments (especially when they cause itching) and tiredness. It is also used postpartum to help with the healing process. Because of its high temperature the *temazcal* appears to have the power to disinfect and cicatrize. There are fewer postpartum fevers in zones where it is used.

[93] López García (2007: 30-31) writes that in Apoala he was told by various midwives that three days after giving birth the new mother enters the *temazcal* for three consecutive days. These first baths are called *ñe'e ndo niñi* (*temazcal* to clean blood). During these baths the midwife washes the chest of the new mother with *fomentos de agua caliente de ciertas hierbas medicinales* (....) so that *la leche del pecho madure bien y no le haga daño al niño* (the milk of the breast matures well and doesn't harm the child). The most well-known herb is *yuku vidi hierba tibia (caliente).* For a duration of twenty days, the new mother enters the *temazcal* for a total of ten baths. On the twentieth day which is the last day of bathing the godparents bring offerings and gather the wood and branches for the *temazcal*. Gifts are given to the midwife as well. During these twenty days the new mother should not do any heavy work, not step on wet soil because *se le enfría el vientre* (her uterus will get cold), not eat raw vegetables to avoid *al niño o niña se le suelte el estómago* (....), she should not sweep nor eat pigeon meat for that will dry up her milk forever more. Medicinal plant baths after giving birth to stimulate the mother's milk have also been mentioned in Tilantongo. See Appendix 1; the ethnobotanical database, for the specific plants that are used for this.

Antes de entrar al temazcal es necesario pedir permiso a la Xitna ñi'i[94] (la reina/abuela del temazcal). Si no pedimos permiso nos puede hacer daño. Es que la tierra tiene vida como nosotros. A veces también se adorna el temazcal (cuando una mujer entra después de aliviarse) y las mujeres cantan canciones adentro. El baño es un lugar delicado. Cuando uno destapa la puerta para poner la leña se pide permiso para prender la lumbre. Si no pedimos permiso nos puede hacer daño. Esto diremos cuando entramos y echamos agua: Xitna tan ɨɨn yoko vi ɨɨn yoko adɨ (Que nos dé un vapor bueno y rico) La reina de la tierra está dentro de la lumbre del temazcal. Se repiten palabras para que se sienta a gusto la reina. Así viene fundada al lugar, para que este baño pertenezca para siempre a la reina, y es necesario pedirle permiso a ella. Con cualquier persona que tenga una enfermedad y entre al temazcal volveremos a decir que nos disculpe, porque vinimos a molestarla de nuevo. No podemos estar enojados cuando entramos al temazcal. Bañarse como dios manda porque es un lugar delicado. Si hacemos cosas que no son adecuados, nos hace daño, nos castiga. No luego pero después de 15 días o un mes nos enfermamos. No podemos hablar sin respeto dentro del temazcal. Cuando nos enfermamos para sanar necesitamos pedir perdón al temazcal, a la reina; se lleva pulque, se hace un ojito y se echa pulque. Pedimos perdón a la tierra, la tierra está viva. Entra un aire del baño cuando estamos mal con ella. Se hincha uno, se inflama uno. Eso pasa cuando no se entra con fe.[95]
Señor Vicente Luz López (Piestrzynska, 2010).

Mak (1959: 142-143) writes that the mother takes a sweat bath on the day the baby is born and each day thereafter for seven days if the baby is a boy, and for four days if it is a girl. The ninth day after birth is the finishing day when the mother and baby again take a sweat bath for the final time. An offering to the water spirit must also be made. The mother goes to the nearest spring or river and burns *copal* to the spirit. If the spirit later causes diarrhea or some other ailments in the baby, the medical expert is called who performs the soil ritual at the spring, and then brings the mud to the sweat bath spirit during a ceremonial bath. The soil ritual is also performed at the sweat bath, and the mud from both spring and sweat bath is applied in the form of a cross to the forehead, hands, chest and stomach of the baby, then the sweat bath mud is taken to the water spirit. At each site where the mud is exchanged, the mother says, 'give back the spirit of my child'.

[94] Monaghan (1987: 389) writes that the *nu ñu'un* are seated in the earth (see *temazcal* prayer), a position which implies permanent residence and proper place (being seated in the codices is symbolic of ruling). The site each *nu ñu'un* occupies is its *ve'i* (household) and permission must be asked to approach it.

[95] Katz (1993: 181) writes that in pre-Hispanic times the Nahuas called the deity of the *temazcal*, Temazcalteci (the grandmother protector of steambaths). Amongst the Mayas she is called Ix Chel (the goddess of the moon, water, earth, birth and medicine). Both deities are related to the Earthmother. The reunion of the elements earth, fire and water make the *temazcal* a very delicate place where one can get espanto. Because of this you have to know how to bathe (*saber bañarse*). Avoid ingesting cold water, don't bathe when it is hot, don't step on the *hornillo* of the *temazcal* and don't get angry in the *temazcal* because it can hurt you. The deity of the *temazcal* gets angry. *Espanto* (of the *temazcal* or another place) is cured with a ritual called *levantar la tierra* (lifting of the earth). A cross is drawn in the earth and a little bit of earth with water is drawn in the shape of a cross on the body of the patient. The patient receives a *limpia* with an egg. A prayer is offered to the place and *copal* (in other places than Yosotato food and drink are also offered by burying them) is offered to San Cristóbal and Santa Cristina. *Enojo* or anger is hot, and it doesn't go together with the hotness of the *temazcal*, just like the sun. Mak (1959: 129) and Bade (1994: 27) write that sweat bath spirits are dangerous and easily offended, and often cause soul loss illness. Experiencing the emotions of anger or jealousy, particularly while bathing, failing properly to perform the sweat bath childbirth ceremony, or failing to placate the spirit of a disused sweat bath with the soil ritual, exposes one to these spirits. Stubborn skin ailments, severe rheumatism, neuralgic pains and paralysis of both thumbs are some symptoms of sweat bath spirit soul loss. Mak (1959: 129-130) describes that suspected sweat bath soul loss can be diagnosed only by a medicine specialist through feeling the patient's pulse. To appease the spirits, the specialist throws ten small tortillas and a small bowl of cooked green beans or cooked horse beans in the sweat bath fire. Then he pours half a pitcher of *pulque* on the ground outside the fire chamber, drinks the other half, and crosses himself. He invokes the spirits and then

Figure 6.3: A *temazcal* in Carmen, Tilantongo, made from adobe and stone.

performs the soil ritual. The patient takes a sweat bath using small branches of peach, *capulín*, custard fruit, *floripondio*, *nuyuji* or *munii* trees and she says to rub himself and sprinkle on water. After this, everyone shares a meal, which includes *pulque*. The Xitna ñɨˈɨ is the deity of the *temazcal* linked to every *temazcal*, when one is disrespectful, *aire* that comes from the *temazcal* is what causes hurt.

Figure 6.4: The preparation of the *temazcal* in Buena Vista, Tilantongo

Figure 6.5: This is the back of the *temazcal* with the *ndaka ñɨ'ɨ* or *hornillo* opened up on the right.

Figure 6.6: *Carbón del comal* is readied to be put on the *ndaka ñɨ'ɨ* or *hornillo.*

Figure 6.7: The aforementioned wood is put on the *carbón del comal* in the *ndaka ñɨ'ɨ* or *hornillo*. To the side in the *tenate* are the larger pieces of wood which will be put on when it is burning.

Figure 6.8: All pieces of wood have been used and the fire is burning well

Figure 6.9: The aforementioned plants are brought to boil in a metal *cubeta* near the *ndaka ñɨ'ɨ* or *hornillo*. Once only embers are left, these embers will be covered with stones and the herb water will be poured upon them to create steam.

6.6. Speaking about illness and treatment in Mixtec

Sra Adelina described how there are different names for different kinds of pain in Mixtec.

> *Kaja es como dolor de hueso diremos. Ese de kaja es un dolor profundu entre los huesos. Xaxia'an es que duele superficialmente. U'u hubo que se haya pegado con algo hasta encima por ejemplo en los musclos diremos o un golpe repente. Ku'u estoy enfermo, kwe'e enfermedad. Xatu es arde.* **Sra Adelina.**

Kaja appears to be a slow and chronic pain, something with a long onset, it is a profound pain. *Xaxia'an* means it hurts and it appears to signify a sudden pain like colic, it is a strong but superficial pain. *U'u* means bad and when *tna u'uro* is used it seems to signify a muscular pain. *Ku'u* means to be ill or to be hurt. *Kwe'e* means illness. *Xatu* means it burns.

There are many ways in which a plant can be used. *Kodoro* means *regar/verter/rocear* or to use to sprinkle water or alcohol on the patient. *Kodor ndute dɨkɨr* means *me voy a lavar la cabeza* or 'I will wash my head'. *Yojoro* means *barrer o hacer una limpia* or 'to sweep or cleanse the patient with the plant'. *Kaniro* means *hojear o pegar* which means 'to hit with the plant'. *Naku'aro* means *limpiar* or 'cleanse'. It is the only word that can be used to combine with other things than plants for cleansing such as an egg or *ndɨu* for example. *Kuchiro* means *frotar* or *bañar*, 'to rub' or 'to bathe'. *Tauro* means *caldear* or 'to heat up' it refers to massaging often with a warm bundle of the plant.

Nanda xetniuro yuku ya'a? 'How do we use this plant?' There are many ways in which something can be heated or boiled. *Dandwidi* means *calentar* or 'to heat up'. *Dateter* means *calentar* or *entibiar* which means 'to heat it up until it is tepid'. *Ndu'a* means *se hirvió* or 'it boiled'. *Ndandu'a* means *usted lo hirvió* or 'you made it boil'. *Ndu'a* refers to *atole* or *mole*, complex liquid food items that need to boil for a long time. *Nakwido* means *cuando hierva* or 'when it boils'. *Dakwido* means *pon hervir lo* or 'you personally put it on to boil'. *Chi'o* means *cocido* or *se coció* (tortilla, *atole*) or it was cooked. *Da* is a causative marker (Oram and Kuiper, 1991).

Agua de tiempo is a manner in which liquid is drunk, it means that each time a person is thirsty she or he drinks that particular liquid. In Mixtec it is called *ndute xi'iro* or *agua que tomamos* or 'water that we drink'. It is also called *ndute xi'iro ndantuu ora, dandaa ora* or 'water we are drinking all the time'. *Ndute daa ndaa ora, ndute ndaa ora* or 'water of all times.' Also, it is called *ndute va'a ndaa ora* or 'water that is good at all times'.

One of the questions that was asked the random sample participants is *'Na daa kɨu kutatnaro*?' or 'how many days does the treatment last'. The Spanish translation to almost all of the phrases that followed was *'hasta que se corte', 'hasta que se calme', 'hasta que se quita' or 'hasta que quiero'* but after discussing the Mixtec words with Sra Adelina these are the nuances of the answers. *Nukani* means *calmar* or *parar* which is 'to calm' or 'to stop'. It is also used when you want a person to stop somewhere or to rest from work. *Dita* means *quitar* or 'to remove'. *Ngokwii* means *quitarse, haz te a un lado* or 'remove yourself' or 'move yourself aside'. *Nde na kuna'i* means *hasta que se calme, está usted segura que se va quitar* which means 'until it calms' and that when this answer is used the person speaking is certain that the illness will be healed. *Nde na kwinir* means *hasta que quiero* or 'until I want (to use it)'. *Nde na kwini xa kaja* means *hasta que deje de doler* or 'until it doesn't want to hurt anymore'. *Ndandoo* means *dejalo que se quede* or 'leave it let it stay'. *Nde na ndva'a* means *hasta que se componga* or 'until it gets better'.

6.6.1. Mixtec sentences related to illness and treatment

The sentences in Appendix 7 were obtained during the follow up interviews after the Mixtec plant freelisting with the participants from the random sample. These interviews dealt with how the plants that were previously freelisted in Mixtec are used. The interviews were conducted in Mixtec using the questionnaire above. They were not recorded but transcribed on the spot by me.

All mistakes in the transcriptions are mine alone. The uses that are in red could not be verified as they were unknown to the experts.

6.7. Summary

This chapter began with a description of the ethnobotanical database or Appendix 1, which contains an alphabetical list with the names and uses of the medicinal plants mentioned in this thesis, as well as voucher specimen numbers when applicable. Section 6.3 demonstrates how Mixtec plant classification differs from Berlin's principles. The description of the largest groupings in Mixtec shows that the life-form categories that pertain to them are not uniform and that what constitutes the most obvious and most widespread lifeforms and forming categories that pertain to them is not universal. However, more research is needed because the organization of the plant taxonomic system in Mixtec has not been sufficiently studied: it is unclear which groups and unique plant names are placed under which lifeforms, and which are unaffiliated; and which groupings are habitually segregated into culturally recognized conceptual classes or functional groupings. Section 6.4 contains Mixtec sentences related to plant use that were used to develop the questionnaire for the Freelisting and follow-up plant uses interview in Mixtec in Table 2.3. When people are asked about plant uses in Mixtec, they give very precise and concise answers. This can be seen in section 6.6 and Appendix 7. The words they use contain information regarding how a plant is boiled or in what way it interacts with the body. The answers also contain information about what other substances are combined with the plant, alcohol or an egg. The answers do not contain information regarding prayer and other more ritualistic aspects of healing that can also be applied. Plants are used to treat a very large and varied collection of illnesses and in most cases it is sufficient to just use the plant. In the case of more complicated illnesses (prolonged illnesses that are difficult to cure) plant use, biomedical care and ritual and religious treatments may all be combined. It appears that plant use, cognitively for most respondents, is separated from the ritualistic and religious aspect of healing, although the respective TEK domains are interwoven to form the TEK conglomeration that constitutes medicinal plant knowledge. This could be related to the shift in medicinal plant knowledge; medicinal plant knowledge is shifting into Spanish which entails a change in focus, away from the religious domain. In some cases, as when the *temazcal* is entered these aspects are inseparable because of the sacredness involved. Yet when people are asked about the plant they mentioned, their answers are about the plant and its use and not about the other aspects of healing that might be involved, whether biomedical or religious/ritualistic. When experts are asked about an illness, however, these other aspects are mentioned because they situate the illness and explain its nature and all the different healing aspects that are involved, as can be seen in section 6.5.

7. The hot cold classification system

7.1. Introduction

The previous chapter showed how people talk about illnesses and plant uses in Mixtec, while also describing culturally specific illnesses and uses. This chapter introduces the most important cultural framework behind the concepts described in Chapter six: the Mixtec medicinal framework. The Mixtec medicinal framework consists of nature, the sacred and spiritual world and their interactions with the human body and spirit. It is contained in the conglomeration of TEK domains that constitute medicinal plant knowledge. After a description of the elements that make up the Mixtec medicinal framework, I propose that disturbance of equilibrium lies at the center of Mixtec etiology and I introduce the hot cold system. This is followed by an overview of the guiding principles of the Mesoamerican hot cold system extracted from the literature. This is compared to the hot cold system in Tilantongo. Then the hypothesis: hot cold classification is governed by rules; it is not random, is tested.

7.2. The Mixtec medicinal framework

The conglomeration of TEK domains that constitutes medicinal plant knowledge contains the Mixtec medicinal framework. This framework is based on nature, the sacred and spiritual world and their interactions with the human body and spirit. The earth and its sacred lives or its *ñu'u* can cause and cure illnesses. San Cristóbal is the patron saint of the Mixteca. San Cristobal is invoked during healing prayers or prayers used to ask permission, as well as in the *temazcal* prayer. The Xitna ñɨ'ɨ is the deity of the *temazcal*, linked to this place, capable of healing and inflicting illness. Santa Isabel and Santa Juliana are also invoked in the *temazcal* prayer[96]. As one of the *curanderas* of Tilantongo (Sra Seferina) said *'la tierra tiene muchas vidas, muchas ñu'u, cada una tiene su nombre y lugar'* (the earth has many lives, many *ñu'u*, every single one has its name and place).
Alvarado's dictionary from 1593 has three entries for *ñu'u* (spelled *ñuhu* there): *dios, fuego; lumbre* and *tierra; terruño* (god, fire; light and earth; native soil). Another entry of interest is *ñuhu ndevui*[97]*: duende*[98]*; fantasma* (magic creature; ghost) (Jansen, 2009: 84). According to Jansen and Pérez (2017: 124) another translation nowadays for the ancient word for deity or *ñuhu* is 'Owner of the Land' or 'Spirit of the Earth'[99]. Monaghan (1987: 384-386) writes that for the people of Nuyoo *ñu'un* is the highest expression of divinity. For *ñu'un* to be used a physical aspect of the earth needs to be referred. The *ñu'un* was there long before people and will be there long after. It

[96]Katz (1993: 181) writes that San Cristóbal and Santa Cristina are the owners of the earth and the mountain (owners of the *temazcal*), together with according to some San Marcos (owner of the rain). Santa Isabel and Santa Juliana appear to be other names for the Xitna ñɨ'ɨ in Tilantongo. Monaghan (1987: 388) writes that in Nuyoo it is the Virgin de la Luz who is the *nu ñu'un* of the sweat bath, San Cristóbal is the *nu ñu'un* of the dry land, San Marcos is the *nu ñu'un* of the swamps and San Eusaquio is the *nu ñu'un* of the *yuku* (mountain, forest). Mak (1959: 129) writes that the spirits related to soul loss are addressed as Santa Cristina, San Cristobal and San Juan, and perhaps other names are used as well. She also writes that the chief of the sweat bath spirits is Santa Magdalena.

[97] *Ndevui*, perhaps from *andevui*? Meaning *cielo* (sky)?

[98] Kuiper (2003: 6) writes that in Diuxi people put offerings of the plant called *ita tndúû* in holes in the ground for the *chaneques* or *duendes*.

[99] Mak (1959: 127) writes spirits are everywhere: they reside on and in the ground, and in sweat baths, stones, forests, rivers, springs, and cornfields. From the context, Mak must be referring to *ñu'u*; calling them spirits is interesting in light of Jansen and Pérez writing that some people translate *ñu'u* as 'spirit of the earth'.

is alive, spoken of in human body metaphors and it grants life to everything else on it. It is sacred on a general level and on a direct level through the *nu ñu'un* or deities literally in the earth[100].

López García (López García 2007: 241) recounts a story from Apoala in which a traveling couple separate when the wife in her tiredness asks the *señor* who lives in the cave of the serpent for lodging. When the husband on returning for his wife is told that she is no longer there, he consults the *ñu'u* of the mountain, who advise him to return with many gifts so his wife is returned. He brings people with him as well who dig down from the top of the cliff towards the cave of the serpent where the wife was. When day breaks the spell is broken and the gifts turn to stones. The story of the traveling couple sounds like a story about *kwe'e yu'u/kwexita* or *espanto. Espanto* is an illness in which the spirit of the patient is taken by a *ñu'u* of a specific place[101]. Of interest is that the help of other *ñu'u* is invoked to return the wife captured by the *ñu'u* of the cave of the serpent.

Nowadays the saints, who are equated with the *ñu'u*[102] are often invoked to help when someone has *kwe'e yu'u/kwexita* or *espanto*. Monaghan (1987: 397-398) writes that the *nu ñu'un* are never felt to be unjustified when they make someone ill. Sickness is strongly associated with blame and fault. One becomes ill because one has given offence or failed in some duty. Animals may also fall ill for offending the *nu ñu'un*. In Tilantongo, as we saw in the previous chapter, it is necessary when someone gets ill with *espanto* to know the name of the *ñu'u* related to the specific case of *espanto*. They say that the *ñu'u nu tilu* gets angry when someone hurts the earth, such as digging or sowing without asking the earth's permission. In the past, rites took place to ask permission to construct a house, plant trees or sow crops (Sra Adelina). Mak (1959: 127) wrote about this: in San Miguel, a turkey is buried in the field in addition to the offering of *pulque* at ploughing. She also writes that one is liable to the displeasure of the spirits of the cornfield if he becomes angry when sheep and goats eat the growing corn. Mountain streams and springs also have their spirits and the places where women customarily draw water are considered to be particularly dangerous.

Tachi u'u or *aire* or *mal aire* is another important element in the Mixteca. Of interest are the following entries in Alvarado's dictionary from 1593: *sa si tehui ndodzo tachi ñaha* and *sa si tehui tachi* both are translated as *espíritu o soplo* or 'spirit or gust of air' (Jansen, 2009: 114). Monaghan (1987: 571) describes the *tachi* as a "demon" (in addition to this meaning it means breath, breeze and wind), who people encounter on an almost daily basis, passing it on trails at night, meeting it in their dreams and suffering from the illness it causes. In Nuyoo people refer to it often as *ya'vi* or *ya u'vi* (*yaa* being the prefix for sacredness and *u'vi* a synonym for *yatuni* (*yatuni* is described as a burning pain in one's heart and translated as 'envy'). Monaghan (1987: 597-599) writes that the *tachi* "demon" is closely associated with the wind, the wind is seen as a desiccating force opposed to the fertility associated with rain. He goes on to say that many of the attributes of the *tachi* are no doubt of European origin, such as its horns, but that the myth of its

[100] For the importance of *ñu'u* and place for the origin of the Mixtecs in the codices see Jansen 1982b. For oral traditions related to *ñu'u* and place see Ubaldo López García 2007: Chapter seven: los codices.

[101] According to Monaghan (1987: 391) the *nu ñu'un* work together when someone has slighted them; one tripping the person up, while another grabs his *anima*. They are the respected, older people who live in the earth. Some are easily offended while others are not, just like humans. The most serious offence one can commit against them is fouling their *ve'i* (household) (Monaghan, 1987: 392, 395-396). The *anima* is located in the heart and blood and is the center of a person's life force or *yi̱i̱*. It is what powers the brain, enables a person to think and work. Without it people lose their appetite and ability to think and work. They may survive without it for a while but if its absence is prolonged, they will gradually waste away and ultimately die (Monaghan, 1987: 398-399).

[102] Monaghan (1987: 388) writes that there is considerable variation amongst informants over which *nu ñu'un* goes with which Saint's name. The four given in footnote 96 are most consistently paired. This seems related to what Mak (1959: 127) writes about church or household images being identified with good and evil spirits which cure as well as cause disease.

origin has clear Mesoamerican roots. It appears that these elements of European origin of the *tachi* are localized and have not been adapted everywhere[103].

Mak (1959: 127-128) writes that the word *tachi* is used for both winds and spirits, but that whirlwinds[104] seem to be the only winds identified as evil spirits. She goes on to say that spirits can snatch the soul of their victims. The Mixtec always remembers where he had the slightest scare, or was startled or stumbled, so that if illness overtakes him, sometimes months or years later, he can come back to that spot for the appropriate ceremonies of propitiation. This is a description of *espanto* which is usually associated with the *ñu'u*, but from interviews with experts it is apparent that *ñu'u* can send *tachi* to interact with people. However, in this context, because Mak seems to refer to both *tachi* and *ñu'u* as spirits, we cannot know for sure what is meant. In Tilantongo *mal aire* is related to the human spirit and it is the energy that stays behind after a person's violent death[105]. *Aire* refers to spirits in general. See the previous chapter for examples wherein *ñu'u* send *aires* to interact with humans when disrespected. The strength of the *aire* encountered in relation to the strength of our own spirit determines whether it can touch us and make us ill.

The condition of our spirit is related to the condition of our body and it can produce illnesses in oneself or in others[106]. Children in general are perceived to have weaker spirits, hence their vulnerability to illnesses such as *mal de ojo*. It is interesting that the state of a person's spirit also determines the outcome in interactions with *ñu'u* and *tachi*[107]. This relationship between the body and the spirit is illustrated very well in *nahualism*[108]. While during my MPhil fieldwork *nahualism* and illness of the *nahual* were both mentioned[109], none of the random sample

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[103] Mak (1959: 126) writes that medical beliefs and practices in the Mixteca differ from town to town.

[104] Mak (1959: 139) writes that pregnant women and small children are especially vulnerable to the small whirlwinds that are common in this area, which are referred to as 'spirits who dance'. If sickness ensues, one returns to the spot and performs the ritual for soul loss.

[105] Monaghan (1987: 600, 607-609, 616) writes that Nuyootecos distinguish several different kinds of *tachi. Tachi u'u* or *mal aire* is very similar to what they call *tachi nɨvɨ* or "*tachi* of the cadaver" and it is said to arise out of someone who died in a bad way. They are also called *tachi yuku* (*yuku* designating wild, untamed places) and *tachi kini* (referring to dying in a *kini* manner, being polluted with evil. People who die before it is their time to do so, and for this reason stay rooted to the spot where they were killed. The *tachi nɨvɨ* is described as being especially pernicious. It may filter into the bodies of those who pass by and cause them to gradually waste away and die or it may try to scare people so they lose their *anima*. Some people say that if you die from an illness caused by the *tachi nɨvɨ* you will become one as well. *Kue'i kini* 'evil polluting sickness' is a life-threatening illness which always connotes the *tachi*.

[106] Mak (1959: 139) describes that sickness can be caused by anger or quarrelling and that nursing infants often become sick when their mothers indulge in anger. Bade (1994: 28) writes that a key element of Mixtec illness causation philosophy is the belief that illness results from strong emotions. Fear, anger and jealousy can cause one to absorb or transmit illness depending on the circumstances.

[107] Monaghan (1987: 399) writes that in the case of *espanto* the *anima* is most susceptible to being taken when it is in certain emotional states; principally frightened (*yu'u ni*), angry (*kitɨ ni*) and remorseful (*kukueka ni*). Of interest is footnote 104, wherein Mak describes that children and pregnant women are especially vulnerable to small whirlwinds taking their souls. Children are perceived to be weaker (colder) and therefore especially vulnerable, however pregnant women are perceived to be hot. Why are pregnant women especially vulnerable? Because they are not in equilibrium? I feel more research is needed on this subject.

[108] The *nahual* is a person's alter ego. Often encountered in dreams, the *nahual* can be an animal or a lightning bolt amongst others. The *nahual* is linked to its person and anything that happens to it, happens to its person.

[109] *Kwe'e ndu (cuando se lastima el nahual)*: *Cuando se lastima el nahual de una persona se hace una limpia con 7 ramitas del chamizo blanco. Se hace una misma limpia que con espanto. Se combina con duxa (copal) y se reza. Estamos conscientes de nuestro nahual y de lo que pasó a nuestro nahual – cuando lo matan muere la persona, pero cuando está herido el nahual se hace una limpia en el lugar donde duele a la persona* (Señora Margarita Cruz García) (Piestrzynska, 2010: 72). This is similar to what Mak (1959: 131)

participants talked about it, and this is why I did not discuss it with experts, who also did not themselves bring it up. This could be related with the shift of medicinal plant knowledge to Spanish that entails a shift in focus, away from the religious domain and away from some of the aspects of the Mixtec medicinal framework. Another thing of particular interest when it comes to the relationship of the spirit to the condition of the body is what I have named the *tristeza* illness group. This group consists of illnesses that are often mentioned together, that arise from negative emotions and events and that appear to cause other, more serious illnesses from the same group if left untreated; see section 6.5.2.1.

In section 6.7 I pointed out that plant use, cognitively for most respondents, appears to be separated from the ritualistic and religious aspect of healing, although the respective TEK domains are interwoven to form the TEK conglomeration that constitutes medicinal plant knowledge. This could be related to the shift in medicinal plant knowledge; medicinal plant knowledge is shifting into Spanish which entails a change in focus, away from the religious domain. The *temazcal* prayer does not appear to have a Spanish equivalent. I was also told there was only one elderly person in Tilantongo who still knew how to sing to the *temazcal*. *Espanto* prayers on the other hand do have Spanish equivalents with Mixtec referents in them. Many of the prayers related to the *ñu'u* also do not take place anymore. In the discourses of endangerment language was put forward as the organic link between culture and nature. Time wise, language shift and changes in culture, specifically communication with the earth deities, must have started happening more or less in the same period, because it is the older generation that still speaks Mixtec that remembers these rituals. It appears that the changes are specifically related to the *ñu'u* and they might be related to changes in how people perceive the earth and her deities.

Florey (1993: 304) wrote that previous studies of language shift have shown that the domains of language use wherein the threatened language persist longest are home and religion. Although this is not the case for the Alune, where in Lohiatala it is the domain of Indigenous religion, which due to restrictions on transmission and the reinterpretation of previously secular knowledge into this category, is hastening the demise of the Alune language. This also isn't the case for the Itza' in the Petén region, for whom since the death of the last Maya ritual master in 2004, the *Arux* or forest guardians are no longer acknowledged and the agroforestry ritual practices that were important at the end of the twentieth century have now completely disappeared. The loss of the Itza' language is correlated with decline of knowledge and practice of long standing cultural forms, loss of ritual and a marked degradation of the ecological balance owing to massive immigration, deforestation, and the closing off of land by clandestine ranchers and drug traffickers. The older Itza' conception of the *Arux* as a concrete entity is being replaced by a more abstract notion that resembles the Ladino *Duende*. One key factor driving the change in *Arux* rankings is that both younger and older Itza' believe the *Arux* have changed. Itza' adults say that the *Arux* are bothered by all the noise associated with the development and have retreated further into the forest no longer acting as its guardians (Le Guen *et al.*, 2013).

The *Arux* are similar to the *ñu'u,* Le Guen *et al.* (2013) write that the Maya landscape is inhabited *by yu-mil* or 'masters of space', their duty is to protect a particular place and the beings that inhabit it. To exploit a particular place or its resources a duty has to be paid; *b'o'-t-ik* 'to pay'. This has to happen when plant collecting, hunting, seasonal agriculture or constructing a house. Payment is made through ritualized food offerings. When the masters of space are disrespected punishment follows. Usually the guardian spirits send an illness whose cure requires a ritual payment to the right entity. The *Arux* are the most important guardian spirits of the forest. Contrary to previous literature, these more recent studies, including this thesis, show that the domain of religion is not one of the domains of language use wherein the threatened language persists longest. In the case of Tilantongo and the Itza' the changes are specifically related to the earth deities and they appear to be related to changes in how people perceive their environment,

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describes; if a person's counterpart (*nahual*) falls ill, is injured or dies, the human will exhibit the same illness or injury. For more on *nahualism* see also Mak (1959: 131-132).

including the earth and her deities, and changes in their relationship to their environment. This suggests that culture, language and environment are eroded and changed by the same drivers and threats and that changes in one diversity have profound effects on the other diversities in an affected ecosystem. The religious domain is part of the TEK conglomeration that constitutes medicinal plant knowledge in Tilantongo, changes to it affect the entire TEK conglomeration and subsequently people's relationships with their environment. This confirms findings from previous studies (Florey 1998; Florey and Wolff 1998) that TEK and language are endangered by the same processes of socio-cultural change.

7.2.1. Equilibrium disturbance as the center of Mixtec etiology and the hot cold system

Bade (1994: 26) writes that previously scholars have written that malevolent actions of outside agents, supernatural, human and non-human, are at the center of Mixtec illness etiology and that the causes of many illnesses are attributed to evil spirits, the evil eye, sorcery, the dead and the violation of taboos. For example, Mak (1959: 127) writes that basic to the Mixtec concept of life is the idea that hostile forces lurk everywhere ready at the slightest provocation to cause illness or death. While, according to Butterworth (1990: 111), when someone feels bad, many times he suspects that someone has used sorcery on him. I feel that it is not malevolence but disturbance of equilibrium that lies at the center of Mixtec etiology. Bade (1994: 26-34) writes that powerful desires of others can negatively affect one's wellbeing and that illness results when the equilibrium between hot and cold in the body is disturbed. The principle of equilibrium also orders social and spiritual relations for the Mixtec. Illness is therefore more than an impersonal physical attack, it is also an event in which debt, spiritual and psychological, must be paid. According to Katz (1993: 175) traditional medicine can't be studied outside of the environmental, cultural and religious context of its society[110]. This context is very deep and complex in the case of the Mixteca. At the center of it seem to be the Mixteca itself, its many ñu'u and spirits, the cold and heat contained in places and in the things that sprout from them, the human spirit and the energies it leaves behind. Mixtec illness etiology is even more complex because it references this Mixtec cultural framework, while it also references the Mexican cultural framework, which contains elements of biomedical as well as Mesoamerican and Spanish medicine.

López García (2007: 29) writes that in Apoala after giving birth the woman has to take complete rest for 20 days and bind her head with a red scarf. The red scarf is so her head does not hurt *por el frío, el sereno o el aire malo* 'because of the cold, the night dew or the bad air', but primarily *para que no les hagan mal de ojo las visitas* 'so that the visitors don't cause *mal de ojo*'. This is because the new mother is weakened through giving birth and she can easily be hurt by the energy of others. This is a very good example of the principle of equilibrium disturbance being at the center of Mixtec etiology in a complex context where cold and hot things, spirits and energy of others are all possible threats to the health of the person whose balance is off. It is cold things in this case specifically because as we will see further in this chapter, a woman after giving birth is considered to be cold.

The Mesoamerican hot cold system has been a popular research topic in anthropology from the 1940s to the 1980s, but due to the inconsistencies in identifications between informants as well as by the informant themselves on different occasions[111], the topic lost popularity. For example, in an overview of ethnobotanical work done in Oaxaca by Caballero *et al.* (2004: 541-

[110] This supports the reinterpretation of medicinal plant knowledge as a conglomeration of several TEK domains.

[111] Many scholars wrote about how the classification of items does not only differ in different geographical areas, but also between individuals of the same community (Currier, 1966: 253; López Austin, 1975: 18; Madsen, 1955: 125; Cosminsky 1975; Brown 1976; Mazes 1968 cited in Foster 1979: 180). While Foster (1979: 181) wrote about the widespread discrepancy in the answers the same individual would give regarding the hot-cold qualities of an item.

564), the hot cold classification is not mentioned. However, ethnobotanical researchers such as Hunn (2008: xv, xi, 33, 53-54), Breedlove and Laughlin (2000: 1-9, 43, 115) and Katz (1997), do include it in their works. The main issue with the hot cold system is that it seems to have been poorly understood from the beginnings of its anthropological descriptions and associated with the European humoral pathology system, therefore depriving it of its place and importance in the Mesoamerican worldview. As we can see in Appendix 6.1, the more recent authorities on the hot cold system (Lõpez Austin and Katz) believe it is native to Mesoamerica while the older authorities (most notably Foster and Currier) believe it to be derived from humoral pathology. There are also some who believe it to be a product of syncretism of two distinct systems. I believe that the key to understanding the hot cold system is the study of medicinal plants and their classification as well as the study of illness classification and the relationship between both. As these studies deal with traditional environmental knowledge, they are situated in a very complex context within a specific environment and culture, as well as worldview. In this chapter, I hope to present additional evidence for the Mesoamerican provenance of the hot cold system, as I don't think its understanding can be separated from the Mesoamerican worldview.

When it comes to the Mesoamerican hot cold classification system, the particular mechanics that guide classification events have not been well understood. Matthews (1983: 827-840) argues that the Latin American humoral system is not composed of classifications themselves but rather consists of the shared judgements and concerns that people use to generate such classifications. This means that there are no overall definitive hot/cold classifications. Rather, definitive classifications will change in accordance with the task being performed. Messer (1981: 139-141) argues that even though people may classify items differently, they still share a basic set of rules for classification and faith in a common system. She also points out that medicinal plants and the most common illnesses are classified more consistently than common foods.

Tedlock (1987: 1069-1083) argues that the inconsistencies in the hot-cold systems can be explained through the difference of knowledge between specialist healers and lay-persons. Her data on hot-cold qualities of medicinal plants support the argument that hot-cold classifications are context dependent. A medicinal plant can possess several qualities at the same time and depending on the combination with other remedies the quality needed is brought out. The healing practices of specialist healers are based on empirical knowledge of the medicinal plants in combination with ritual knowledge of the forces that influence the wellbeing of people. She writes that hot-cold isn't a simple dichotomy, but an adaptive system based on different degrees of hotness and coldness and although it undeniably is present in the worldview of the Quiche Maya, the role it plays in determining the treatment or the cause of a disease is only minor. Boster and Weller (1990) write that intracultural variability can be explained by cognitive variation (difference in knowledge and belief) or contextual variation. If disagreement is attributed to cognitive variation, then high cognitive variation indicates a weak cultural system. Matthews and Messer both write that the hot cold classification system is context dependent, while Tedlock writes that it is both context dependent and cognitive dependent.

Ellen (2006: 28) has written that the classifying process is a matter of degree, depending on the knowledgeability of the classifier, the variability of the contexts and the entities being classified. Classification is not only an act but a process. Matthews, Messer's and Tedlock's arguments support this theory in relation to the hot-cold system. As cognitive variation does not offer any solutions to understand the mechanics that guide hot cold classifications, I feel that establishing guiding principles for particular classification contexts is necessary to understand hot cold classification. For my MSc thesis I did a cultural cross-comparison of hot cold ascription for a set of Mexican medicinal plants. The set of plants was small, yet remarkably, the results pointed to the existence of a pan-Mesoamerican hot cold system. I have used the methods from my MSc thesis on the much larger dataset gathered during my PhD fieldwork.

7.3. Guiding principles of the Mesoamerican hot cold system

This section contains an overview of the guiding principles of the Mesoamerican hot cold system extracted from Appendix 1 combined with some insights learned during my fieldwork in Tilantongo. Appendix 6.1 comprises a comparison of ten works of research on the hot cold system in Mexico and two on the hot-cold system of the Quiche Maya of Guatemala. Appendix 6.2 presents a concise overview of the principles of hot cold illness classification, which have been extracted from Appendix 6.1. Appendix 6.1 and 6.2 were taken from my MSc thesis (Piestrzynska, 2011). Lack of a reference in a cell, means there was no information on the subject in the source.

7.3.1. Hot and cold as qualities (not merely temperature related)

Hot and cold are qualities which are not merely temperature related. López Austin (1975: 18) writes that some peoples in Mexico do possess other qualities within this system, such as temperate (fresco o medio). Hot and cold exist both as a dichotomy and a spectrum of qualities. In opposition to the humoral pathology system, wet and dry are not mentioned. The exception to this is the Mixteca where Katz (1992: 101) writes that wet is cold and dry is hot and the Quiche Maya for whom Neuenswander and Souder (1977: 96) mention that illnesses are classified as hot or cold, and wet or dry, while body states, environmental factors, foods and herbs are just hot or cold. This means that wet and dry do not appear to exist as separate qualities in Mesoamerica, but they are instead subsets of hot and cold.

7.3.2. Adherence to the principle of opposites

Perhaps the most important characteristic of the hot and cold system is the principle of opposites, which means that illnesses are treated with remedies of opposite hot/cold quality. Many researchers do point out that there are exceptions[112]. I would like to argue that this is due to the nature of the hot/cold system which is a classification system. All classification systems deal with mental concepts and are therefore inherently dynamic based on shared perception and knowledge yet context dependent. Therefore, the outcome of classification events can vary while still being consistent within the system itself[113].

7.3.3. Empiricism plays an important part in establishing the quality of illnesses and treatments

All four researchers who have written on this topic agree that treatment is based on efficacy. As we will see in section 7.4, empiricism plays an important part in establishing the quality of illnesses and treatments. One can only find out if a remedy is effective through experimentation and experience. This is directly linked to the principles of quality determination. The quality of an

[112] Mak (1959: 145) writes that the principle of opposites usually holds when it comes to remedies. López Austin (1975: 17) writes that the principle of opposites is not simple, as there are exceptions and sometimes use of herbs is prescribed that seem to be contra-indicated.

[113] I wrote in my Msc thesis that classification is a highly complex cognitive, physical and cultural phenomenon; embodied and experienced through our bodily interaction with the world, it is at the same time a construct related to cultural input and social context as well as an inherently human cognitive faculty. In the last four decades our understanding of classification systems, the interrelationship between language, categories, culture, and social behavior, has undergone very significant changes. There has been a shift away from distinctive features, emphasis on core-periphery models and cognitive prototypes and growth in the use of psychological approaches. We now know that people vary in the consistency in which they label and use categories, in the degree to which they share both labels and categories within a given population and deploy names and categories flexibly in response to particular cues and contexts; classification systems are dynamic lived realities in a constant state of change (Ellen, 2006: 1-37 in Piestrzynska 2011).

item is determined by looking at the effect an item has on the body as well as looking at the nature of the item itself, where and when it is obtained.

7.3.4. Hot and cold are distinguished as qualities linguistically in the Indigenous language

Only three of the researchers reviewed wrote about hot and cold being distinguished as qualities linguistically in the Indigenous language, explaining the nuances of meaning in the terms. This is done for the Zapotecs and two different groups of Quiche Maya.

7.3.5. The dual opposition of contrary elements divides and explains the universe or parts of it

Almost all researchers reviewed agree that the dual opposition of contrary elements divides and explains the universe or parts of it. Four of the researchers reviewed wrote that the hot/cold metaphor extends to the land. López Austin (1975: 22) writes that humid land is considered cold, lowlands are hot. Madsen (1955: 126) also writes that lowlands are hot. In accordance with this, Messer (1978: 93) writes that the Tehuantepec coast is considered hot, while the Valley of Oaxaca is considered cold. Water and air are associated with cold.

7.3.6. Personification of earth, water and air

Six researchers write that water, air and earth are personified. The personification and sacredness of nature was described for the Mixteca in section 7.2.

7.3.7. Disturbance of equilibrium leaves a person susceptible to illness

All researchers agree that illness is caused by an imbalance related to hot and cold. Seven researchers write about illness being caused by supernatural agents. I think it is more accurate to say that as a result of loss of equilibrium a person becomes susceptible to illness. Loss of equilibrium could be due to any of the elements described above that form the Mesoamerican worldview. Because it is all interconnected, the specific context has to be known in order to understand cause and effect. For example, anger, which is a hot state, can throw a person out of equilibrium leaving them susceptible to illnesses such as *bilis* or other illnesses from the *tristeza* group, if equilibrium is not restored. Another good example comes from Sra Adelina (see below) where she describes that when a person overexposes their body to either hot or cold circumstances, it leaves the body weakened, therefore leaving it susceptible to *aire*, either hot or cold[114], which causes illness.

7.3.8. Things that affect the hot cold qualities of an item

Four researchers write that preparation affects the quality of the item, while one researcher, notably for the Mixteca, writes that different plant parts and different growth stages of a plant have different qualities.

7.3.9. Origins of the hot cold system

Five researchers believe that hot/cold is an Indigenous system, while four believe it derives from humoral pathology, and three believe it is a product of syncretism of the two[115].

[114] Hot would be *mal aire*, cold would be *aire* in general.

[115] Chevalier and Sánchez Bain (2003: xiv) wrote 'The question whether the hot-cold syndrome is an adaptation of the Hippocratic humoral doctrine or a native phenomenon in Latin America isn't trivial. The recognition or denial of an Indigenous mindset informing the treatment and prevention of disease is at

7.3.10. A state of idealized yet dynamic balance in the human body is recognized

A state of idealized balance in the human body is recognized while at the same time the human body is perceived to be constantly in flux. Hot and cold are never truly balanced because of the dynamic nature of the body in its environment.

7.3.11. Vitality, illness and hot and cold

Overall, hotness is associated with vitality while coldness is associated with blood loss and debilitating illnesses. Three researchers write that twins are cold (Lopez Austin, 1980: 256; Ortiz de Montellano, 1990: 60; Madsen, 1955: 128). People gain heat with age and office. There are exceptions: Matthews (1983: 833) writes that old age is seen as a cooler period. Messer (1981: 137) writes that children are generally classified as cool, adults are warmer, old people are either judged cold or hot depending on their occupation. Traditional occupations produced predominantly hot bodies. Neuenswander and Souder (1977: 107, 116) write that certain items gain heat with age, but old people are considered to be cold. This divergence in classification could be related to how vitality is seen. If a person's vitality is related to their accomplishments, the accumulation of these would be largest in old age, but as one nears death and loses vitality, one becomes cooler. Four researchers write about the use of metaphors to connect the human body to the universe.

7.3.11.1. The heat from blood

Three of the researchers write that death is a cold state, while one pair of authors writes that it is hot. Overall, blood is considered to be hot, while menstrual blood is believed to be very hot. Birth and blood loss conditions are considered to be cold. For the exceptions see Chevalier and Sanchez Bain (2003: 26, 56). Since blood itself is hot, when leaving the body, the body becomes colder. Some of the variation in illness classification might have to do with how people think about this. In the example of wounds, a fresh wound is considered hot, but after a while it becomes cold. Menstrual blood is hot, but menstruation leaves the body colder. Pregnancy is hot, but again childbirth leaves the body colder.

7.3.11.2. Gastrointestinal diseases

Gastrointestinal diseases are generally cold. For an exception see Chevalier and Sanchez Bain (2003: 70, 71, 77 and 73). The most consistently classified exceptions are constipation, *bilis* and afflictions with blood in them, which are all hot. I am wondering whether there is regional variation related to the environment in classifying diarrhea and worm infestation. Both are considered to be cold in general and in the Mixteca; yet worm infestation is hot according to Neuenswander and Souder (1977: 122) for the Quiche Maya, and diarrhea may be either hot or cold (Neuenswander and Souder, 1977: 122).

7.3.11.3. Skin afflictions

Skin afflictions are generally hot. For the Nahuas Madsen (1955: 131-137) writes measles and swellings or lumps are cold, while burns, cuts and wounds are hot. For Tlayocapan, Ingham (1970: 80) writes that smallpox and measles are hot, while for the Quiche Maya, Neuenswander and Souder (1977: 100) write that measles are cold and wet.

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stake'. I would like to extrapolate this statement; what is at stake is the recognition or denial of multiple Indigenous worldviews pertaining to the domains of traditional environmental knowledge.

7.3.11.4. Rheumatism and other incapacitating ailments

Rheumatism and other incapacitating ailments, such as bone fractures and sprains, are cold. Four researchers have written that a cough is cold, while three have written that it can be either hot or cold. In Tilantongo, a cough has been described as either hot or cold depending on the illness it is associated with. Chronic cough, for example, is perceived to be cold, while whooping cough is hot. Fever is considered to be hot.

7.3.11.5. *Mal de ojo, espanto* and *mal aire*

Mal de ojo is considered to be hot with the exception of Tedlock (1987: 1074). Three researchers describe *espanto* as being cold while Messer (1981: 137) writes that it is hot. Two researchers write that *chaneque* is cold. *Chaneque* are spirits of the earth also associated with *espanto*, or soul loss (Chevalier and Sanchez Bain, 2003: 110-111, 117-118, 121). It is hard to come to a conclusion on *mal aire* based on the literature. Chevalier and Sanchez Bain (2003: 100-101) refer to it as 'heat of the dead'. Madsen (1955: 136) writes that *aire de noche*, one of the three souls left after death, and *aire de cuervas* are cold. Messer (1981: 137) writes that *congrena*, infection from a corpse, is hot. Ingham (1970: 80) writes *aires* are cold, but that they generate in anthills and caves inhabited by the devil, the devil and ants being hot. In Tilantongo, *aires* are considered to be cold, while *mal aire*, the illness, is hot. This could explain the inconsistency in description.

7.4. The hot cold system in Tilantongo

In Tilantongo, the hot-cold classification of plants depends on the climate and soil where they grow and the climate of the place in which they are used. A plant which is hot in Tilantongo may not be hot in Oaxaca and therefore it may not have the same properties. This means that the *curandera* would need to combine the plant with other plants to draw out the desired properties. Classification of plants is learned from grandparents and parents, together with the knowledge of which plants are medicinal. Different plant parts can have different qualities. There are illnesses where parts of the body are hot and parts of the body are cold: to treat these, different plant classes have to be combined[116]. Temperate is not cold or hot; it is a regular thing that can be treated with both cold and hot plants. Hot illnesses are treated with cold plants, while cold illnesses are treated with hot plants. When somebody is ill, observations are made concerning the reaction of the body to plants that are known to be hot or cold, helping to diagnose the illness as hot or cold and therefore establishing the necessary treatment. The opposite also works: if the quality of the illness is known, the quality of a plant can be determined based on its efficacy. Another guideline to establish the quality of an illness is through looking at the reactions of the body to heat and cold from the environment. When the body hurts more in cold environments, the illness is more likely to be cold. When the body hurts more in hot environments, the illness is more likely to be hot.

Cold or heat from the environment, when overexposed to, weaken the body, leaving it vulnerable to illness or agents that cause illness, such as *aire*. There are types of illnesses that are very strongly associated with cold, such as *frialdad*, or 'coldness', which exists in different forms, and can affect different body parts[117]. When people speak or used to speak about illnesses, they

[116] This might be a reference to illnesses and plants that are classified as temperate. More research is needed on this subject. The reason I think this is a reference to illnesses classified as temperate is that when other experts classified illnesses, they could either be temperate, hot or cold, or temperate, hot and cold, but never temperate and hot, or temperate and cold. When illnesses were both hot and cold, it referred to different forms of the illness, it was not simultaneously hot and cold.

[117] For more on this, see the previous chapter.

think about environmental effects coming from hot or cold that might have left their body weakened and therefore vulnerable. The terms used in Tilantongo to refer to coldness are either *vixi* or *ndiko* (*vixi* seems more related to the environment, and *ndiko* to items, for example people say *vichi vixi* when they feel cold, while they use *ndiko* when referring to a cold glass of water). The only term used for hot is *i'ni*. The hot cold system in Tilantongo is a traditional environmental knowledge framework that organizes a huge wealth of knowledge relating to its environment: climate, soil, lifeforms (plant, animal, human). This knowledge is accumulated and dynamic as people continue experimenting and enriching this knowledge framework. It is one of the knowledge frameworks that interacts to form the TEK conglomeration that constitutes medicinal plant knowledge.

I was told the following information pertaining to the hot cold system in Tilantongo, some of which has been incorporated in the text above, by several medicinal plant experts:

> *La clasificación de una planta depende del clima, donde crece y donde se aplica la planta. Depende del contexto, pero es consistente. Por ejemplo, una planta que es caliente aquí en Tilantongo como la escobilla, no lo es en otro clima como en Oaxaca, entonces no tiene las mismas propiedades allá y como aquí estoy segura de que va a servir la planta, allá necesito combinarla con otras plantas para que salen sus propiedades curativas* (Abigail).
>
> *Si uno tiene calentura y toma algo caliente se empeora, pero cuando toma algo frío se mejora. Es conocimiento que pasaron los abuelos, lo aprendí de mi abuela. Poniendo atención en qué clase de hierba es medicamento, qué es fría, qué es caliente. Entonces la clase de hierba depende de la persona como se siente. Si duele cuando hace frío, le pegó el frío y se usa medicamento caliente. Si duele cuando hace calor, le pegó el calor y se usa medicamento frío. La hoja de aguacate es caliente. El que sufra de calor, tiene ansia debe tomar espule (fría). Si uno tiene coraje no puede comer huevo o aguacate porque son caliente. Hay enfermedades donde una parte de cuerpo tiene calor y otra parte tiene frío y hay que combinar diferentes clases de planta. Hierba tinta, chica chola son frías. Frijol es caliente, no se puede comer cuando uno tiene una enfermedad caliente porque se empeora, debe uno tomar cosas frías para que se calma* (Sra Seferina).
>
> *Aprendió lo de frío y caliente de los abuelos y la mama. Las calidades frío y caliente dependen del uso y de la reacción del cuerpo. Diferentes partes de la planta pueden tener diferentes calidades. También depende del clima como está la calidad de la planta. El suelo también tiene efecto en la calidad, el de campo, orgánico, da una calidad más fuerte que el químico* (María Concepción Pedro López).
>
> *Uno se da cuenta que fue lo que pasó, a lo mejor estuvo mucho tiempo parada en algo frío, por eso provino el mal que tiene, entonces dice uno me dio eso porque estuve mucho tiempo en el frío o mucho tiempo en el calor, entonces así es como uno busca el tratamiento. Ya sea que sea de calor o de frío entonces ya se empieza a combatir pues, con hierbas calientes o hierbas frías diremos. Como se debilita el cuerpo aquí es donde se apodera el aire, el aire frío, puede dar de las dos maneras frío o caliente. Templado, lo puede controlar con algo frío o con algo caliente. Templado ni es frío ni es caliente, pues una cosa regular. La frialdad en el ombligo es del frío. La frialdad es la enfermedad fría, le dio el dolor porque le dio un aire fuerte frío o lo pego un aire fuerte frío, o estuvo mucho tiempo de pie en algo mojado. Es la frialdad se le subió la frialdad. Síntomas dolor de hueso en los pies o dolor de hueso en las manos. Si tomo agua muy fría empieza dar dolor en los huesos en las manos y esto es por el frío es como reumatismo creo. La frialdad en el ombligo es otra cosa, porque si dice dolor de los huesos es que le dio frío en los huesos si da dolor del estómago es que le dio frío en el ombligo. Entonces frialdad del ombligo significa que hay dolor del estómago y a veces por el frío orinan mucho. Se cura con*

plantas calientes. Se desinflama también. Dolor de oído depende si le dio mucho calor o también el frío da dolor de oído. Por ejemplo, cuando hacía muchas tortillas también me pasaba tiempo haciendo las tortillas y al otro día tenía dolor del oído y me decía la abuelita es que moliste mucho te dio calor en el oído por la lumbre. Mal de oído es dolor del oído (Sra Adelina).

The information pertaining to the hot cold system in Tilantongo given by the medicinal plant experts supports the guiding principles of the Mesoamerican hot cold system, while it also adds data that contribute to the understanding of it. When it comes to the Mixteca, the amount of literature that includes writings on hot cold is restricted. Katz' writings on hot cold are by the far the most extensive and in-depth. Mak (1959: 126, 135-150) follows Foster in the belief that hot and cold stems from humoral pathology and was imported. She gives a useful list of illnesses and plants with their hot cold classification, but she does not describe the system. She writes that when it comes to treating illnesses, causes and treatments do not fall into logical and clear-cut categories. Treatments applying to one illness may apply to others as well. Adults and infants are treated with the same remedy. Because of these reasons, I have not included Mak in Appendix 6.1, which gives an overview of possible guiding principles of the hot cold system. I have included her classifications in footnotes to the illness classification table in Appendix 6.3.

There is not enough information in the sources to include a category on eye, throat, and head afflictions in Appendix 6.2, although cough is generally classified as cold. Blood is considered to be hot and most afflictions related to blood loss appear to be classified as cold. Air and water are considered to be cold and diseases related or caused by them appear to be generally classified as cold. Appendix 6.3 contains all the uses (illnesses and treatments) that were given as answers to the question 'what is this plant used for?' in the random sample interviews. There already is a table in Chapter six, which contains all the answers to this question in Mixtec (see table 6.3). Therefore Appendix 6.3 contains all the Spanish answers. The Mixtec answers were only included if there was no translation to Spanish. I discussed the list in Appendix 6.3 and whether the uses (treatments and illnesses) are hot, cold, or temperate with Sra Adelina and Sr Noe. Not all uses can be put into categories that have been described in the literature. Some of the categories in Appendix 6.3 are not present in Appendix 6.2.

7.5. Analysis of medicinal plant hot cold classification obtained during the random sample interviews

While conducting the medicinal plant freelisting interviews, both in Spanish and in Mixtec, each respondent was asked whether the plant mentioned was hot or cold. There were 1193 hot cold identification events for 264 plants by the 34 random sample respondents[118]. These 1193 hot cold identification events include the response *caliente* or 'hot' (c), *frío* or 'cold' (f), *caliente*? or 'hot'? (c?), *frío*? or 'cold'? (f?), *muy caliente* or 'very hot' (mc), *templado* or 'temperate' (t), *templado*? or 'temperate'?(t?), *amargo* or 'bitter' (a), *amargo caliente* or 'bitter hot' (ac), *amargo frío* or 'bitter cold' (af) and - or don't know the answer (-). Appendix 6.4 shows all the answers that were given. In order to analyze the data, the names of plants were standardized using the expert focus interviews in which all plant names and uses had been discussed. The tables in Appendix 6.4, 6.5, 6.6, 6.7 and 6.8 are arranged alphabetically by Mixtec name. There are some Mixtec names that are loanwords from Spanish, such as *alkamfor, dalia, eucalipto, ita bombil, ita roxa kwixi, tnu drasnu* etc. The plants for which only Spanish names were given in the Spanish freelisting interviews have sp: (for Spanish) before them. See the ethnobotanical database in Appendix 1, for more information on all the plants, including synonyms and uses.

[118] This means that in separate interviews, the same plant may be listed and classified twice by the same respondent, once in Spanish and once in Mixtec. This is treated as two classification events.

Appendix 6.5 shows standardization of the data. *Cal* is an amalgation of c, c?, mc and ac and accounts for a total of 679 answers. *Frío* is an amalgation of f, f? and af and accounts for 262 answers. *Temp* combines t and t? and accounts for 126 answers. *Nada* stands for - and accounts for 126 answers. Agree stands for agreement or the most common hot or cold responses for that plant listing. Don't agree stands for disagreement or the hot or cold responses not in accordance with the most common hot cold responses. Ambivalent stands for the don't know, *templado* and *templado*? response or the *temp* and *nada* cells combined. Appendix 6.6 uses the dataset from Appendix 6.5 in combination with probability calculations that I have previously used to analyze hot cold data for my MSc thesis. Probability calculations were used to calculate the chances of occurrence for the patterns of agreement. In order to calculate the probability of a given number of classification events returning the same classification at random, the following formula was used:

$P(n, r) = (1/2)^n \times nCr$

where P is the probability, n is the number of classification events recording a classification, and r is the number of matches. Essentially, this formula multiplies the probability of any one permutation of results [$(1/2)^n$] by the number of permutations giving the observed combination [*nCr*]. The combination function, *nCr*, is further defined as follows:

$$\binom{n}{r} \; or \quad {}_nC_r = \frac{n!}{r!\,(n-r)!} = \frac{n(n-1)(n-2)\dots(n-r+1)}{r!}$$

(Wisniewski, 2009: 150-169).

In the calculations in Appendix 6.6, n is the number of positive responses (ie. either hot or cold), and r is the number of responses that agree with the most common hot or cold response. Since a low number of positive responses for any individual plant would not give useful probability data, calculations are made for only those plants with at least 3 positive responses. Additionally, those plants for which positive responses are outnumbered by ambivalent or don't know responses are also not calculated, as these are likely to be subject to disagreement, and thus skew the data.

For each plant, a probability density function is calculated. The calculated probability represents the chance that the given number of responses or more are in agreement by random chance. Thus, a lower probability for a given plant means that it is less likely to be by random chance. In order to simplify the calculation, I have used Excel with help of my partner Roger Gamble to calculate the probabilities in stages. By way of example, in the case of *alkamfor* (row 1), n is calculated to be 5, and r is 3. In order to calculate the probability density function that 3 or more out of 5 are in agreement by random chance, it is necessary to calculate the probability of 3 out of 5, 4 out of 5 and 5 out of 5, and then sum the results, and double this total (since this is a two-tail probability density function - I am calculating the probability of either 3 out of 5 hot, or 3 out of 5 cold, and so on).

Thus, P[n.n] is P[5.5], P[n.(n-1)] is P[5.4] and P[n.(n-2)] is P[5.3]. Each of these is calculated in accordance with the formula above, which in Excel is written as follows:

```
=IF($AA4<AB$2;0;(0,5^$Y4)*FACT($Y4)/(FACT(AB$2)*FACT($Y4-AB$2)))
```

The first section [IF($AA4<AB$2] is checking to see whether to calculate the term. $AA4 is the calculated value of n-r, and AB$2 is a constant dependent on the term being calculated (equivalent to the value of n-r for that term). In this case, we are calculating P[n.n] and the constant is zero. Thus, the remainder of the formula will be calculated. This section, [(0,5^$Y4)*FACT($Y4)/(FACT(AB$2)*FACT($Y4-AB$2))], can be seen to be identical to $(1/2)^n \times nCr$, or $(1/2)^n \times n! /(r! \times (n-r)!)$. Above, $Y4 is n, and AB$2 is r. FACT is the Excel function that returns

the factorial of an integer. This is repeated for each term as necessary, and then summed, and doubled. This gives a probability density function of 100% i.e. 3 or more results out of 5 being in agreement encompasses all possible results and is therefore no better than random chance. Conversely, *eucalipto* has n=9 and r=9, and the probability density function is calculated to be 0% (actually 0.2%), which is extremely unlikely to be by random chance.

Appendix 6.7 shows the same data, but only for those 89 plants for which useful probabilities can be calculated, as described above. These 89 plants account for 789 classification events or 66 % of the recorded classification events. I have formed several hypotheses pertaining to the hot cold system that are tested below. The main hypothesis is: hot and cold classification is governed by rules, it is not random. In order to test the main hypothesis, several null hypotheses are tested:

1. Null hypothesis: hot and cold classification of those 89 plants for which useful probabilities can be calculated will have a random probability mean of 50 percent or higher, p >0.5.

2. Null hypothesis: using expert hot cold classification of the uses that were mentioned by the respondents for each plant, the principle of opposites will apply in less than 50% of cases.

3. Null hypothesis: the principle of opposites will not apply more consistently with higher agreement among respondents on hot cold classification of the plant itself.

7.5.1. Testing of the first null hypothesis

In order to test the first null hypothesis: hot and cold classification of those 89 plants for which useful probabilities can be calculated will have a random probability mean of 50 percent or higher, p >0.5, I used a one sample t-test on the 89 plants for which useful probabilities could be calculated (Appendix 6.7) using SPSS. I also ran a test of normality on the data using SPSS. The hot and cold classification of those 89 plants for which useful probabilities can be calculated, $D(89) = .243$, $p < .0001$, is significantly not normal. However, the t-test is a robust test: it will work with a non-normally distributed sample if it is large enough. The hot and cold classification of those 89 plants for which useful probabilities can be calculated has a random probability mean of 26 percent (M = .2596, SE = .03495), $t(88) = 7.428$, p < .0001. The effect size r =0.62078.

Calculating the effect size: $r = \sqrt{\frac{t^2}{t^2 + df}}$ (Field, 2011: 332). So, in this case $r = \sqrt{\frac{7.428^2}{7.428^2 + 88}}$

This effect size, being above Cohen's criteria of 0.5, represents a large effect size. These results disprove the first null hypothesis, which means we can accept the alternative hypothesis: hot and cold classification of those 89 plants for which useful probabilities can be calculated has a random probability mean of 50 percent or lower, p <0.5; more specifically it has a random probability mean of 26 percent at p <0.0001.

7.5.2. Testing of the second null hypothesis

To test the second null hypothesis: using expert hot cold classification of the uses that were mentioned by the respondents for each plant, the principle of opposites will apply in less than or equal to 50% of clear classification events, I calculated the percentage using the following criterion; clear classification events are defined as those where a plant is given a classification of hot or cold, and the usage given by the respondent for that plant is classified as hot or cold or hot

and cold by the experts.[119] Table 7.1 gives an overview of what constitutes clear classification events, and informs the results of the principle of opposites application given in table 7.2.

As can be seen in Appendices 6.3 and 6.4, people classify both plants and illnesses as not only hot or cold, but also as temperate. Additionally, some plants were classified as bitter. Interestingly, illnesses were sometimes classified as simultaneously hot and cold, or even hot, cold and temperate. In the analysis of the application of opposites, items that have been classified just as temperate or not classified at all are excluded, while items classified as simultaneously hot and cold or hot, cold and temperate, have been first treated as confirmation, and then subsequently excluded, providing two datasets. When respondents gave multiple usages for a single plant, this was split into individual classification events[120]. This brought the total of classification events from 1193 to 1547. I used the same standardized hot cold plant classifications previously used for random chance hot cold plant analysis. I used Spanish abbreviations for the principle of opposites analysis (see Tables 7.1 and 7.2), so that hot is abbreviated as 'c' (*caliente*), cold is abbreviated as 'f' (*frío*) and temperate is abbreviated as 't' (*templado*). The hot cold plant classification and the plant usages used for the analysis comes from the random sample respondents. The usage classification, consisting of either illness classification or treatment classification, comes from interviews with two of the experts, Sr Noe and Sra Adelina. The outcome of this analysis further supports the existence of a shared and consistent classification system. It would be interesting to compare the outcome of this analysis to an analysis comparing expert plant classification with expert usage classification in the context of the application of the principle of opposites. Although I have the data to do this, it is outside the scope of this thesis.

From 1547 classification events, there are 1176 (including FC) or 1062 (excluding FC) clear classification events (i.e. excluding 't' and '-' from either plant classification or usage classification). Overall, the principle of opposites applies to 78.5% of clear classification events (including FC) or 76.2% of clear classification events (excluding FC). This means that the principle of opposites does not apply to less than or equal to 50% of clear classification events, disproving the second null hypothesis. This means we can accept the alternative hypothesis: using expert hot cold classification of the uses that were mentioned by the respondents for each plant, the principle of opposites applies in more than 50% of clear classification events; more specifically, it applies in 78.5% of clear classification events (including FC) or 76.2% of clear classification events (excluding FC).

Table 7.1: Overview of what constitutes clear classification events

	Usage Classification					
Plant Classification	c	f	t	fc	fct	-
c	No	Yes	N/a	Both	Both	N/a
f	Yes	No	N/a	Both	Both	N/a
t	N/a	N/a	N/a	N/a	N/a	N/a
-	N/a	N/a	N/a	N/a	N/a	N/a

[119] Clearly, lack of identification cannot be included in the analysis, while temperate, based on expert descriptions of the quality, could be argued to either support the principle or undermine the principle of opposites, skewing the results in either direction, and thus should be excluded.

[120] Hoffman and Gallaher (2007: 201) write that Phillips and Gentry (1993a, 1993b) evaluated variation among informants based upon use-citation frequencies considering each as a statistical 'event'.

Table 7.2: Summary results of the application of the principle of opposites

Plant classifi-cation	Usage classification							Opposites?				Including FC		Excluding FC	
	c	f	fc	fct	t	-	**Total**	Yes	No	Both	N/a	Yes%	No%	Yes%	No%
f	205	79	14	12	1	12	**323**	205	79	26	13	74.5%	25.5%	72.2%	27.8%
c	174	604	63	25	11	12	**889**	604	174	88	23	79.9%	20.1%	77.6%	22.4%
t	75	79	11	12	6	1	**184**	0	0	0	184	-	-	-	-
-	63	59	9	2	6	12	**151**	0	0	0	151	-	-	-	-
Total	**517**	**821**	**97**	**51**	**24**	**37**	**1547**	**809**	**253**	**114**	**371**	**78.5%**	**21.5%**	**76.2%**	**23.8%**

7.5.3. Testing of the third null hypothesis

In order to test the third null hypothesis: the principle of opposites will not apply more consistently with higher agreement among respondents on hot cold classification of the plant itself, I used Appendix 6.7, which contains plants for which a meaningful random chance probability of hot cold classification could be calculated. Higher agreement on hot cold classification of the plant itself is defined as a lower random chance percentage. I have chosen to consider firstly all the plants in Appendix 6.7, then only those plants with a random chance percentage (P%) less than or equal to 50%, then only those with a P% less than or equal to 25%, then only those with a P% less than or equal to 0.5%.

Appendix 6.8 shows the results of the principle of opposites application for the 89 plants for which a meaningful random chance probability could be calculated. Appendix 6.8 contains 1215 usage classification events compared to 789 hot cold plant classification events in Appendix 6.7. The increase in classification events is due to multiple usages for individual plants. For each plant, the random chance probability of the observed usage classifications following the principle of opposites is calculated in the same way as that for plant classifications in Appendix 6.6, as described in section 7.5. Table 7.3 shows the combined results of all 89 plants, along with equivalent results for only those plants with a random chance probability of agreement in hot cold classification of 50% or less, 25% or less, and 0.5% or less.

As can be seen from Table 7.3 for all plants, the principle of opposites applies in 79.6% of usages (including FC) or 77.4% of usages (excluding FC). For those plants with a random chance probability of agreement in hot cold classification of 50% or lower, the principle of opposites applies in 80.6% of usages (including FC) or 78.7% of usages (excluding FC). For those plants with a random chance probability of agreement in hot cold classification of 25% or less, the principle of opposites applies in 83.2% of usages (including FC) or 81.6% of usages (excluding FC). For those plants with a random chance probability of agreement in hot cold classification of 0.5% or less, the principle of opposites applies in 83.8% of usages (including FC) or 82.7% of usages (excluding FC). In conclusion, whether FC results are included or excluded, the higher the plant classification consistency (the lower the random chance probability of agreement in hot cold classification), the higher the principle of opposites agreement, thus disproving the third null hypothesis. This means we can accept the alternative hypothesis: the principle of opposites applies more consistently with higher agreement among respondents on hot cold classification of the plant itself.

Table 7.3: Principle of opposites summary results

		Plant Classification				Opposites?				Including FC		Excluding FC	
Mixtec Name (Standardized)	**Count**	**c**	**f**	**t**	**-**	**Yes**	**No**	**Both**	**N/a**	**Yes%**	**No%**	**Yes%**	**No%**
All plants	**1215**	**772**	**246**	**96**	**101**	**698**	**204**	**96**	**217**	**79.6%**	**20.4%**	**77.4%**	**22.6%**
Less than 50%	**1059**	**706**	**187**	**81**	**85**	**632**	**171**	**77**	**179**	**80.6%**	**19.4%**	**78.7%**	**21.3%**
Less than 25%	**938**	**643**	**156**	**66**	**73**	**587**	**132**	**67**	**152**	**83.2%**	**16.8%**	**81.6%**	**18.4%**
Less than 0.5%	**591**	**428**	**98**	**32**	**33**	**401**	**84**	**34**	**72**	**83.8%**	**16.2%**	**82.7%**	**17.3%**

7.5.3.1. Discussion of interesting results

There are several interesting results in Appendices 6.7 and 6.8. *Eucalipto* is classified as hot by all eight respondents who mention it (of whom one respondent lists three uses). All uses that are mentioned are either cough, flu or the common cold, all of which can either be hot or cold, with therefore an 'FC' classification by the experts. The unanimous classification of *eucalipto* as a hot plant has less than 0.5% chance of being random. Cough, flu and the common cold are consistently classified as FC. This means that it is likely that when people are thinking of *eucalipto*, they are thinking of the cold types of cough, flu and the common cold[121]. Yet when they think of cough, flu and the common cold in general, they think of both hot and cold types. This illustrates two things: how classification events are context-dependent and therefore hard to judge for outside observers; and that it is probably more accurate to count the FC classification events as agreement with the principle of opposites. The same applies for *ita bombil*, except that it was mentioned by 6 respondents, of whom one thought it was temperate (and thus it had a 6% chance of being random). It is also a hot plant being used to treat cough, flu and the common cold. Both plants were also classified by the experts as hot.

Another interesting entry is *nduxa*, which is mentioned by four respondents, corresponding to five classification events, of which four are cold (which agrees with the expert classification). The one respondent who classified it as hot said it was used to treat diarrhea, a cold illness. The other four respondents mention that it treats dysentery, which exists in two forms, either cold or hot, depending on whether blood is involved. Because the experts differentiated between normal and bloody dysentery, dysentery is classified as cold (which gives an outcome of 4 out of 5 against the principle of opposites for this plant). The plant classification has a 38% chance of being random, and coincidentally, there is a 38% chance that the usage being against the principle of opposites is due to random chance. This again illustrates how context-dependent yet consistent classification events are, while at the same time it is remarkable how high the agreement with the principle of opposites is, given cases such as these, where the classification context is likely different for experts and respondents.

Ruda is another interesting case. There are 31 classification events of which 27 classify it as hot, and 4 do not know. This has an almost zero chance of being random. Within these 31 events, there are 49 separate illnesses mentioned. Of these, 8 support the principle of opposites, 30 are against the principle of opposites, 6 are in respect of illnesses that are either hot or cold, and the remaining 5 are not known. There is less than 0.5% chance this is random. Of the 8 in support, 2 relate to body pain and the other 6 relate to stomach conditions, all of which are consistently cold. Of the 6 FC entries, 3 deal with vomiting, 2 with earache and 1 with cough. Of the 30 usages mentioned that are against the principle of opposites, 17 relate to *mal aire*, 3 *mal do ojo*, 1 *calambre*, 2 l*atidos*, 2 *nervios*, 1 *dolor de cabeza*, and 4 *limpias*. The 30 usages have in common that they are in either the *tristeza* illness group, or the Mesoamerican illness group. These groups have overlap. *Dolor de cabeza* is the exception to this, however, it is often mentioned in relation to the other two groups. It is possible that these groups constitute an exception to the principle of opposites.

Tnu ndoko has been classified as a hot plant in six out of eight classification events, with a 29% chance that this is random. However, the plant is classified as cold by experts. Within these eight events, there are nine usages identified, of which seven are classified as hot by experts. Only two of the nine usage events support the principle of opposites, and the other seven are against the principle of opposites. There is an 18% chance that this is due to random chance. I suspect this is a plant that is regularly misclassified as a hot plant by non-experts. If this plant is classified as cold, as it is by experts, this would instead support the principle of opposites. A related species,

[121] Obviously, I cannot know what people think, but I have found that when people associated a plant very strongly with either hot or cold, they are very likely to use the principle of opposites when they think of what it treats.

tnu ndoko lingu, is also classified as cold by experts. This plant is classified as hot in four out of six classification events by respondents, with a 69% random chance. Within these six events, there are nine usages identified, of which 5 support the principle of opposites and four are against the principle, with a 100% random chance. What this suggests is that respondents are very unsure of the classification of this plant. Again, if this plant followed the classification by the experts as cold, it would support the principle of opposites. Cases that have a greater than 50% chance of being random have not been included in this of interest section as it is unclear what is happening, with the exception of *tnu ndoko lingu*, which was mentioned due to its relationship with *tnu ndoko*.

7.6. Further research

Useful probability calculations could only be calculated for 89 of the 264 plants that were mentioned, constituting 1193 hot cold identification events. For future research, it would be interesting to develop a method to allow testing with a random sample of respondents to obtain useful probability calculations for more plants. Another element that needs to be looked into in the future is the treatment of illnesses pertaining to the *tristeza* and Mesoamerican illness groups and explore the possibility that they are an exception to the principle of opposites, and, if this is the case, to what extent and why. This type of research could further our understanding of the guiding principle pertaining to these illness groups. The guiding principles of the hot cold system have not been researched consistently and would benefit from more data gathered in Mesoamerica, especially guiding principles for which there is not much information, or information is unclear. Given that experts have said that hot cold classification differs between regions (as can be seen in other writings on the hot cold system) and the guiding principles show inconsistencies in hot cold classification of certain illness groups, it would be interesting to see the results of similar research using the principle of opposites as the classification context for a particular classification event in culturally different regions. Further research into the quality *templado* or temperate is also needed to establish its connection to the concept of an item or illness possessing the qualities hot and cold simultaneously.

7.7. Summary

In section 6.7 I pointed out that plant use, cognitively for most respondents, appears to be separated from the ritualistic and religious aspect of healing, although the respective TEK domains are interwoven to form the TEK conglomeration that constitutes medicinal plant knowledge. This could be related to the shift in medicinal plant knowledge: medicinal plant knowledge is shifting into Spanish which entails a change in focus, away from the religious domain. The shifted form of medicinal plant knowledge is more prevalent in the community as shown in Chapter five. Many of the prayers related to the *ñu'u* do not take place anymore. In the discourses of endangerment language was put forward as the organic link between culture and nature. Time wise, language shift and changes in culture, specifically communication with the *ñu'u* or earth deities, must have started happening more or less in the same period, because it is the older generation that still speaks Mixtec that remembers these rituals. The changes are specifically related to the earth deities and they appear to be related to changes in how people perceive their environment, including the earth and her deities, and changes in their relationship to their environment. This suggests that culture, language and environment are eroded and changed by the same drivers and threats and that changes in one diversity have profound effects on the other diversities in an affected ecosystem. The religious domain is part of the TEK conglomeration that constitutes medicinal plant knowledge in Tilantongo, changes to it affect the entire TEK conglomeration and subsequently people's relationships with their environment. This confirms findings from previous studies (Florey 1998; Florey and Wolff 1998) that TEK and language are endangered by the same processes of socio-cultural change.

The results of the analysis of the Tilantongo hot cold data, obtained from a random sample of 34 respondents relating to plant classification and from two experts relating to illness classification, have shown that hot cold classification is governed by rules and it is not random, forming a dynamic yet coherent classification system. Only 25% of the 89 plants for which useful probabilities could be calculated are more likely to be random than not, which means that 75% are more likely to be not random. Overall, the principle of opposites applies in 78.5% of clear classification events (including FC classification) or 76.2% of clear classification events (excluding FC classification). For those plants with a more consistent hot cold classification, the principle of opposites applies in a higher percentage of clear classification events (whether including or excluding FC classification). This means that hot cold classification is governed by rules and it is not random, forming a dynamic yet coherent classification system. Understanding of this system comes from understanding the particular classification context for each classification event. The principle of opposites provides classification context and as the results show, it provides a high measure of consistency for different classification events. It provides an explanation for the mechanics that guide classification events and therefore allows for a deeper understanding of the Mesoamerican hot cold classification system. Implementation of the principle of opposites requires in-depth knowledge of medicinal plants and illness etiology and their classifications, demonstrating how these TEK systems intertwine to form the TEK conglomeration that constitutes medicinal plant knowledge. These findings further support the reinterpretation of the hot cold system as an Indigenous TEK system. The hot cold system seems to be a very resilient system, perhaps because of its dynamic nature and its capacity to incorporate changes and new elements through experimentation and observing the effects both on the body and in the environment. It could also be more resilient, because it has been integrated into Spanish for a long time and because there has been a similar system in existence in Spanish, humoral pathology, since first contact between the cultures and languages. Because the hot cold system is part of the conglomeration of TEK domains that constitutes medicinal plant knowledge, this also means that changes in the other TEK domains have consequences for this domain. How this will affect the continued resilience of the hot cold system will become apparent in the future.

8. Conclusion

The primary aim of this thesis has been to examine the relationship between traditional environmental knowledge (TEK) and language shift in the Mixtec community of Tilantongo in Oaxaca Mexico and to answer the research question 'What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community?' TEK recognizes the link between biological and cultural diversity, while in the discourses of endangerment, language has been put forward as the organic link between culture and environment. Studying what happens to TEK when a community experiences language shift will enhance our understanding of how the diversities (biological, cultural and linguistic) that make up life interact, potentially advancing the biocultural diversity theory. A better understanding of the mechanics of the biocultural diversity theory could help to develop this theory in an overarching theoretical framework within the discipline of ethnobiology and to help popularize it with the larger public. This thesis focuses on medicinal plant knowledge as a conglomeration of several TEK domains. Medicinal plant knowledge is intrinsically linked to other domains of TEK related to cosmovision, illness etiology, religion and the hot cold system. The hot cold classification system is an integral part of how people think about their environment and the interactions it has with the human body, including medicinal plants and their use. The secondary goal of this thesis has been to contribute to our understanding of the hot cold classification system, to provide evidence for its Mesoamerican origins and to demonstrate that it is not random but governed by rules forming a dynamic yet coherent classification system. I argue that both the hot cold system and medicinal plant knowledge cannot be studied and understood without studying the conglomeration of TEK domains that they are part of.

Tilantongo Mixtec and language shift constitute one part of the primary research topic of this thesis. Mixtec languages are tonal languages and Chapter three provides a preliminary analysis of the tonal system of Tilantongo Mixtec. Chapter four explains how the Linguistic Vitality Test (LVT) developed by Margaret Florey calculates language proficiency and how I adapted the LVT for Tilantongo Mixtec. On first glance the results from the LVT appear binary; there is one group that speaks Mixtec fluently and scores mostly 100 on all components of the LVT and there is a second group that understands Mixtec to varying degrees but cannot speak it, their scores drastically drop for the second component, translation sentences, and they are unable to do the third component, discourse, of the LVT. Overall, 65 percent of the 34 random sample respondents are fluent Mixtec speakers. The preliminary speech and tonal analysis of the LVT data, however, suggests that this group of fluent Mixtec speakers is divided into two subgroups based on sound and tonal differences in speech. The first subgroup consists of mostly elderly speakers, while the second consists of young people who have taken active measures to learn to speak the Mixtec language. Overall, the second subgroup of speakers appear to no longer use the sound /ɨ/ replacing it with /u/, some of them also don't appear to use contour tones, where the first subgroup of speakers does. This suggests three groups of speakers based on the LVT results: near-passive bilinguals, younger fluent speakers and older fluent speakers. More research into the extent and consequences of the differences in speech between the two groups of fluent speakers is required. Testing for predictors of Mixtec language ability showed that age and time living in the community are strong positive predictors of Mixtec language ability, while education is a strong negative predictor. Age and time living in the community have a high significant positive correlation, while they both have a high significant negative correlation with education.

Chapter five addressed the main research question 'What happens to knowledge of medicinal plants (and related ethnomedical concepts) when language shift takes place in an Indigenous community?' To test the main hypothesis that was extracted from the literature review, that language shift is often accompanied by cultural erosion, I tested whether there is no difference between the traditional environmental knowledge expressed in Mixtec and Spanish. The traditional environmental knowledge tested pertains to the TEK conglomeration that

constitutes medicinal plant knowledge. Section 5.2 demonstrated that there is a significant difference between the medicinal plant knowledge expressed in Mixtec and in Spanish in Tilantongo (the salience of the plant mentioned in the Mixtec freelisting interviews is significantly lower than the salience of the plant mentioned in the Spanish freelisting interviews, respondents mentioned significantly more plants in Spanish than in Mixtec, and there is no significant correlation between the number of Mixtec and Spanish plants that respondents mentioned). The most salient plants in Mixtec are associated with *limpias*, while the most salient plants in Spanish are introduced species. 70% of Spanish plant names in the ethnobotanical database in Appendix 1 were freelisted by the random sample participants, versus 46% of Mixtec plant names. This could be related to the Mixtec speech domains that are most used, suggesting that it was harder for the Mixtec speaking participants to remember plant names in Mixtec because they did not often have the opportunity to use them. However, Section 5.2 also showed that there is a core of medicinal plants that is best known and that this core is shared, to an extent (57% of variability in salience is shared), in Mixtec and in Spanish. So, while the medicinal plant knowledge in Spanish constitutes TEK, it is a shifted form of the Mixtec TEK; its focus, and therefore parts of its content, has changed. Even though overall 65 percent of the 34 random sample respondents are fluent Mixtec speakers, the medicinal plant knowledge in Spanish was more prevalent than the medicinal plant knowledge in Mixtec, indicating a shift in medicinal plant knowledge; medicinal plant knowledge is shifting into Spanish and while doing this it is changing.

The TEK conglomeration that constitutes medicinal plant knowledge consists of multiple knowledge frameworks and types simultaneously, that interact to form this very complex domain. The level of instantiation (the extent to which people have used the preparations) reported by the random sample participants is 73.6%. Because people can reproduce logically equivalent elements in different contexts, the actual level of instantiation could be much higher. In the case of medicinal plant knowledge in Tilantongo it does not appear that the different types of knowledge are easily separable and that there are different paths of transmission for them. However, there are different contexts and therefore there could be different paths of transmission for the different domains that interact and overlap within the TEK conglomeration of medicinal plant knowledge. This seems plausible considering the shift in medicinal plant knowledge associated with a change in focus which appears to be related to some of the domains, as described in section 5.2. 97% of transmission was reported to have been through kin and to have been vertical. This suggests that children of *curandero* families have more exposure and better opportunities to learn about medicinal plants than others. The medicinal plant knowledge outliers in the random sample data support this. Personal choice and motivation determine whether people take advantage of this.

Language shift means that the opportunity to transmit medicinal plant knowledge in Mixtec is reduced because there are fewer young people who speak Mixtec. This might also affect which domains are more accessible for transmission, interacting with the shift in medicinal plant knowledge which also affects the domains that are accessible for transmission because it entails a change in focus. More research is needed into transmission of the separate domains that constitute the TEK conglomeration of medicinal plant knowledge, especially in relation to language and medicinal plant shift. Life histories of domain specialists, such as offspring of curanderos, could be of special interest here. Section 5.5 shows that plant naming ability (theoretical knowledge) is an excellent predictor for plant preparation ability (practical knowledge). This means that plant naming ability can be used as a proxy for medicinal plant knowledge.

Testing for predictors of traditional environmental knowledge was done using six regression models. All six regression models have multiple assumptions that are not met, which means that the regression results only allow us to draw conclusions about the random sample of participants, and not the population of Tilantongo. For our random sample, age is only a significant predictor of Mixtec plant knowledge, not of plant knowledge in general or in Spanish. Mixtec language ability, in accordance with the literature, is a significant predictor of medicinal

plant knowledge in Mixtec for the random sample. Interestingly, and not described in the literature, in the case of the random sample, it was also a negative predictor for medicinal plant knowledge in Spanish. Self-reported medicinal plant experience is a significant predictor of medicinal plant knowledge in general, in Mixtec and in Spanish for the random sample. Education is not a significant predictor of medicinal plant knowledge in general or in Spanish, while it is a significant negative predictor of medicinal plant knowledge in Mixtec for the random sample. Evidenced in section 4.3.1 and section 5.6, there is a relationship between Mixtec language ability, the negative impact of education, age and medicinal plant knowledge in Mixtec. This is indicative of changes that the people of Tilantongo have undergone that have resulted in language shift and medicinal plant knowledge shift as described in section 5.2. The predictors of medicinal plant knowledge for the random sample (with the exception of self-reported medicinal plant experience) reflect these changes and subsequent differences as they interact differently with medicinal plant knowledge in general, in Mixtec and in Spanish. Self-reported medicinal plant experience appears to be the variable that most effectively represents exposure as a concept extracted from the literature for the random sample. This means that the self-reported medicinal plant experience scores that people gave themselves corresponded well with their knowledge when tested, therefore respondents accurately assessed their own medicinal plant experience.

Harrison (2007: 14-20) suggested that when people are abandoning their language in favor of the dominant one an enormous interruption of traditional environmental knowledge takes place. The findings in Chapter five confirm Harrison's suggestion that interruption of traditional environmental knowledge takes place in situations of language shift, while they also show that knowledge related to some of the most salient species, which are part of the core of medicinal plants, does shift into the dominant language. When language shifts, medicinal plant knowledge shifts as well and while doing this it changes. The medicinal plant knowledge in Spanish is a shifted form of the Mixtec TEK; its focus, and therefore parts of its content, has changed. The shift in medicinal plant knowledge is linked to the language shift that is taking place. As language shift entails the endangerment of the original language, medicinal plant knowledge shift entails the endangerment of the original knowledge framework. Some elements are transferred into the new language and the new medicinal plant knowledge framework, while others are not. This is related to the focus of the discourses that differ between the original and the new language, reflecting changes in the social and physical environment

There is another aspect of Mixtec plant knowledge that does not shift into Spanish; the taxonomic wealth that the Mixtec folk biological classification system contains. In Chapter six I gave a brief overview of the Mixtec names from the ethnobotanical database in Appendix 1. I divided the unique names from the name groupings, and I compared these to Berlin's principles of classification and De Ávila's work on Mixtec plant nomenclature and classification. It appears no one has done any domain analysis where respondents were asked to perform exercises which would lead to a taxonomic diagram of the Mixtec plant names collected. How do the Mixtec classify their plants? Which groups and unique plant names are placed under which lifeforms and which are unaffiliated? Considering the diversity in Mixtec plant names, it is likely that there will be variation between the taxonomic systems of different communities. Further research is needed in general and in Tilantongo specifically as well. The Mixtec plant inventory (medicinal and general) is not complete for Tilantongo and it is unclear at this moment how people perceive and organize their botanical classification system. Considering the situation of language shift and the shift in medicinal plant knowledge it seems that research is urgently needed. It is likely that a similar situation of core and periphery knowledge exists for the plant domain in general and that it is also affected by the situation of language and medicinal plant knowledge shift.

Another TEK domain that is part of the TEK conglomeration of medicinal plant knowledge that does not shift into Spanish completely is the religious one. The *temazcal* prayer does not appear to have a Spanish equivalent. I was also told there was only one elderly person in Tilantongo who still knew how to sing to the *temazcal*. *Espanto* prayers on the other hand do have Spanish equivalents with Mixtec referents in them. Many of the prayers related to the *ñu'u*

(see Chapters six and seven) also do not take place anymore. In the discourses of endangerment language was put forward as the organic link between culture and nature. Time wise, language shift and changes in culture, specifically communication with the earth deities, must have started happening more or less in the same period, because it is the older generation that still speaks Mixtec that remembers these rituals. It appears that the changes are specifically related to the *ñu'u* and they might be related to changes in how people perceive the earth and her deities[122].

The hot cold system on the other hand seems to be a very resilient system, perhaps because of its dynamic nature and its capacity to incorporate changes and new elements through experimentation and observing the effects both on the body and in the environment. It could also be more resilient, because it has been integrated into Spanish for a long time and because there has been a similar system in existence in Spanish, humoral pathology, since first contact between the cultures and languages. Chapters six and seven give a glimpse of the Mixtec medicinal framework, including the hot cold system. The hot cold classification system links the human body with the environment; it is integral to the understanding of Mesoamerican medicine. Chapter six shows how understanding of the hot cold system is inseparable from understanding other TEK domains with which it is intertwined within the TEK conglomeration that constitutes medicinal plant knowledge. The reinterpretation of the hot cold system as a TEK system that is part of the TEK conglomeration that constitutes medicinal plant knowledge provides strong evidence for its Mesoamerican origins. The key to understanding the hot cold classification system is through the other TEK domains with which it is interconnected, specifically medicinal plant use and illness etiology, their classifications and the relationship between them.

The results of the analysis of the Tilantongo hot cold data, obtained from a random sample of 34 respondents relating to plant classification and from two experts relating to illness classification, have shown that hot cold classification is governed by rules and it is not random, forming a dynamic yet coherent classification system. Only 25% of the 89 plants for which useful probabilities could be calculated are more likely to be random than not, which means that 75% are more likely to be not random. Overall, the principle of opposites applies in 78.5% of clear classification events (including FC classification) or 76.2% of clear classification events (excluding FC classification). For those plants with a more consistent hot cold classification, the principle of opposites applies in a higher percentage of clear classification events (whether including or excluding FC classification). Understanding of the hot cold classification system comes from understanding the particular classification context for each classification event. The principle of opposites provides classification context and as the results show, it provides a high measure of consistency for different classification events. It provides an explanation for the mechanics that guide classification events and therefore allows for a deeper understanding of the Mesoamerican hot cold classification system. Implementation of the principle of opposites requires in-depth knowledge of medicinal plants and illness etiology and their classifications, demonstrating how these TEK systems intertwine to form the TEK conglomeration that constitutes medicinal plant knowledge. These findings further support the reinterpretation of the hot cold system as an Indigenous TEK system. Because it is part of the conglomeration of TEK domains that constitutes medicinal plant knowledge, this also means that changes in the other TEK domains have consequences for this domain. How this will affect the continued resilience of the hot cold system will become apparent in the future.

The shift in medicinal plant knowledge seems to indicate a change in the way people perceive their environment. The shift in medicinal plant knowledge is linked to the language shift that is taking place. Some elements are transferred into the new language, while others are not. This is related to the focus of the discourses that differ between the original and the new

[122] In Chapter six I wrote that the *ñu'u* are equated with catholic saints which means that many of the catholic *fiestas* in the community are continuations of pre-Hispanic religious practices (for more on this see Casas, Viveros y Caballero, 1994: 56-64). This is separate, however, from the practices related to the *ñu'u* in Mixtec described above, and in Chapters six and seven.

language, reflecting changes in the social and physical environment. How do these findings advance the biocultural diversity theory? The biocultural diversity theory builds upon the linguistic relativity hypothesis and ecolinguistics. The linguistic relativity hypothesis postulates that habits of speech affect habits of mind and that this influences how people interact with their social and physical environment. Ecolinguistics studies language use in its interaction with an environment trying to elucidate the interactive process of exchange that takes place.

Whorf argued that language and culture are in a mutual relationship of influencing one another, but that language however guides this relationship because it is a very slowly changing system that imposes its rules implicitly and subconsciously on the more flexible concept of culture (Whorf, 1991 (1939)). In the situation of language shift it would be another language that starts to impose its rules subconsciously on the culture. However, contrary to how it is often described, this does not appear to be a one-way process. The culture also imposes its framework subconsciously on the new language. The medicinal plant knowledge in Spanish as a shifted form of the Mixtec TEK, as well as the Spanish used in Tilantongo exemplify this. As can be seen above, a lot of the most salient plant species and their uses, taking the change in focus into account, shift into the dominant language. Concepts from Mixtec such as *kuchiro*, which means to bathe and to rub, have equivalents in Spanish when people from Tilantongo say *bañarse con la hierba* or to bathe with a plant by which they signify the Mixtec concept. See Chapters six and seven for more examples. The hot cold system and how people talk about plants, their environment, and the body, appears to be another example of a Mixtec TEK system integrated into the language the community is shifting to. Habits of speech in the original language affect habits of mind, that affect habits of speech in the language the community is shifting to, then habits of speech the community is shifting to affect habits of mind again, which affect habits of speech, etc. This creates a very complex loop of interactions that influence how people interact with their social and physical environment and because this loop indicates a process of change, this would mean that people's interactions with their social and physical environment change.

In a situation of language shift two languages interact, influence one another, and together condition cultural thinking, taking elements from both, changing elements from both, creating new worldviews. The discourse-centered approach to linguistic relativity becomes relevant regarding how people speak and think about the *temazcal*, and other *ñu'u*, ritual and ceremonial speech that does not shift into Spanish, in opposition to the hot cold system that does. This suggests that the perception of the world and the relationship to the environment of people whose language is in a process of displacement do change. Some elements are transferred into the language that is displacing, changing it, while others are changed by it. The discourse-centered approach to linguistic relativity is also relevant concerning the Mixtec plant classification system, which does not have a Spanish equivalent. If people no longer use it because they don't use Mixtec, the habits of mind related to this classification system consisting out of inherent knowledge linked to the plant world and its interactions with the environment, will fade away or at least become more difficult to access. This is reflected in the situation of freelisting Mixtec plant names: 46% of Mixtec plant names in the ethnobotanical database in Appendix 1 were freelisted by the random sample participants, versus 70% of Spanish plant names. It appeared to be harder for the random sample participants to remember Mixtec plant names, I have suggested that this might be because people no longer often use the Mixtec speech domain pertaining to (medicinal) plants, and that this would make it harder to remember plant names in Mixtec. This would support the idea that habits of speech can settle into habits of mind and that this has consequences for memory, or perception, or associations or even practical skills.

The biocultural diversity theory suggests that because the biological, cultural and linguistic diversities are interlinked, changes in one diversity will have profound effects on the other diversities in an affected ecosystem. One approach that can be taken is that Indigenous people who have lived in a certain environment for a long time have co-evolved with their environment and that their languages specialize in co-habiting with the myriad of life that surrounds them. The findings of this thesis suggest that in a situation of language shift, the dominant language that

people shift to, does not have the same relationship with their original environment. This change in relationship is illustrated by the medicinal plant knowledge in Spanish, which is a shifted form of the Mixtec TEK, containing a change in focus which appears to reflect changes in how people perceive their environment, especially the earth and her deities: *ñu'u*. These findings support the idea that culture, language and environment are eroded and changed by the same drivers and threats and that changes in one diversity have profound effects on the other diversities in an affected ecosystem, supporting the biocultural diversity theory. This confirms findings from previous studies (Florey 1998; Florey and Wolff 1998) that TEK and language are endangered by the same processes of socio-cultural change.

What does this mean for the development of the biocultural diversity theory or synthesis as an overarching theoretical framework within ethnobiology? The findings of this thesis support the biocultural diversity theory as they support the theories behind it and show that changes in one diversity type have consequences for the other diversities, emphasizing the integrated and interconnected character of biocultural diversity. Considering that the way we perceive our environment has consequences for how we interact with it (Atran and Medin, 2008) and that ethnobiology is the study of the interactions between humans and their environment, it makes sense to develop the biocultural diversity theory as an overarching theoretical framework within our discipline. Considering the current focus within the discipline of ethnobiology (quantitative studies of changes in TEK) and the significance of TEK for biocultural diversity, which on its turn is crucial for sustainability, the reinterpretation of medicinal plant knowledge as a conglomeration of several TEK domains is important. It has consequences for how we think, approach and study the subject of medicinal plants; its categorization, transmission, revitalization; and consequently, our understanding of it and its significance for biocultural diversity. More research is needed into how other knowledge frameworks that constitute TEK interact and what other TEK conglomerations exist. Is there overlap in which knowledge frameworks constitute TEK conglomerations in different cultural contexts?

There is a growing recognition that cultural and biological diversity are often eroded by the same drivers and threats and that it is necessary to think of the conservation of biocultural diversity as an integrated goal (Maffi, Skutnabb-Kangas, and Andrianarivo 1999; Pretty *et al.*, 2009: 105-106). De Groot (1992: 478) wrote that changing people's worldviews is one of the pivots in the battle for a sustainable future. It seems now more important than ever that the biocultural diversity theory becomes accepted by the larger public. This thesis illustrates the importance of discourse (in several different ways) and suggests that adopting the biocultural diversity theory or synthesis as an overarching theoretical framework within ethnobiology could help develop, advance and popularize this theory. Advancing the biocultural diversity theory could help us formulate more informed responses to the endangerment crises that we are facing today, perhaps helping to change some of the worldviews that need changing along the way in order to attain a sustainable future.

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Appendix 1 – Ethnobotanical database Tilantongo

Key to the Ethnobotanical database
M: Free-listed in Mixtec
S: free-listed in Spanish
Coll. No.: collection number of the voucher specimens linked to the Mixtec and Spanish names listed in the relevant row

Ethnobotanical database

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	abrojo negro	S			Dientes aflojados	Ya no se ve la planta.	
-	ajo	S			Mal aire; controlar el cáncer; la sarna; bajar la presión; desinflamar, dolor del estómago	Mal aire; controlar el cáncer: se toma 3 dientes de ajo picados en medio vaso de agua con medio jugo de limón, 1 vez cada tercer día durante 1 mes. La sarna: se muele el ajo con el geranio y se aplica en la parte afectada hasta tener alivio. Bajar la presión: se tome crudo un dientito, tragado, 1 día y controla. Desinflamar, dolor del estómago: 3 dientitos se traga.	Ndua àju, ajo (Kuiper, 2003).
-	ajo chino	S			Dolor de rodilla	Se pela un dientito, se traga con agua cada noche hasta alivio.	
-	albahaca	S			Dolor de oído; limpias; envidia; controlar la presión	Dolor de oído: se pone la hoja fresca en el oído. Limpias; envidia: se usan los tallos con alcohol para hojear 1 vez. Controlar la presión: se hierven las hojas y se toma como agua de tiempo durante 7 días.	
-	alfalfa	S	AP230	FABACEAE *Medicago sativa* L.	Fortalecer; controlar diabetes	Fortalecer; controlar diabetes: contiene hierro y vitaminas, se pone la hoja en licuados.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	alpiste	S			Controlar la presión; controlar diabetes	Controlar la presión: la semilla se hierve y se toma como agua de tiempo. Controlar la diabetes: se licua la semilla cruda y se toma por ayunas 1 taza para bajar el azúcar.	
-	anona	S			Comestible		Tnúndoko íñû, anona (Kuiper, 2003).
-	árnica de casa	S			Herida; golpe interno	Herida: se hierven las hojas y se lava heridas con esta agua. Golpe interno: se hierven las hojas y se toma el té, 2 a 3 tazas en la noche.	
-	azares (flores de plantas cítricas, como limón, naranja, mandarina, toronja)	S			Estrés	Estrés: se hierven, una taza antes de dormir durante 3 días.	Tnútkuèe, árbol cítrico (Kuiper, 2003).
-	bretónica	S			Bilis	Bilis: la hoja se muele y se toma un vaso en ayunas durante 5 días.	
-	buque		AP217	BIGNONIACEAE *Podranea ricasoliana* (Tanfani) Sprague			
-	cacaya de maguey papalomé/flor de manita	S			Controlar diabetes; comestible	Controlar la diabetes: se pone a hervir la flor y se toma el té en ayunas durante 1 mes. Comestible: la flor se come en cualquier momento.	Compare with flor de manita: chiranthodendron pentadactylon (O'Gorman, 1963: 16).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	canahuala	S			Riñones	Riñones: 2 pedazos de raíz de 5 cm en medio litro de agua y se toma media taza 3 veces al día por 10 días.	
-	capitaneja	S			Lavar el cabello	Se hierve el tallo y se lava el cabello.	
-	cascara de nuez	S			Cólicos menstruales	Se hierve la cascara y se toma como agua de tiempo hasta el alivio.	
-	cebolla	S					Ndua tnujı̃n, cebolla (Kuiper, 2003).
-	cebolla morada	S			Frialdad en el ombligo-desinflamar	Se corta en la mitad y se separa y se pone a asar, se aplica con alcohol en el ombligo en las noches 3 veces para la frialdad y la desinflamación.	
-	cedro	S			Cruda	Se hierven las hojitas y se toma 3 tazas.	
-	cedrón	S			Para el apetito; dolor de estómago; mala digestión	Se hierven las hojas y se toma como agua de tiempo durante 3 días.	
-	cempasúchil	S			Diarrea; plagas	Diarrea: la hoja se hierve, se toma como agua de tiempo hasta encontrar alivio.	
-	chaya	S			Estimulante para activar el cerebro	Se hierven las hojas, 1 taza en ayunas durante 15 días.	
-	cilantro	S			Desparasitar; presión; evitar gases intestinales	Desparasitar: se come la hoja en cualquier comida. Presión: la pura flor (sin semilla) se come 1 vez por 5 días. Evitar gases intestinales: se hierve el tallo y se toma 1 taza por las mañanas durante 3 días.	
-	ciruela pasa	S			Estreñimiento de los intestinos; anemia, para el apetito	Anemia y apetito: se pone a hervir y se toma en té por 15 días media taza 2 veces a día en las mañanas. Estreñimiento: media taza 2 veces al día por 3 días.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	cola de rata	S			Dolor de corazón, soplos; diarrea	Dolor de corazón, soplos: la flor se hierve, un vaso durante la mañana por 7 días. Diarrea: se hierve el tallo y se toma como agua de tiempo.	
-	copa de oro	S			Fiebre, falta de aire por tristeza, dolor de corazón, presión	Fiebre, tristeza, presión: hoja y flor. Corazón: pura flor se pega con alcohol o con agua, se va cambiando hasta que se siente alivio, cuando es muy fuerte la flor se pone negra.	
-	coyul de víbora	S			Heridas	Se muele el coyul y se pone la pulpita en la parte herida y se cambia una vez diario.	
-	cresta de gallo	S			Hemorragia	Se utilizan la flor o rama tierna.	Ita dɨkɨ li'í, cresta de gallo, planta silvestre (Kuiper, 2003).
-	dátil silvestre	S			Aumentar el apetito	Se hierve el dátil y se da 3 cucharas a los niños antes de comer. Media taza para los adultos.	Compare with tnúñûú, dátilera. Tnútnûú, dátilera (Kuiper, 2003).
-	dedo de dios	S			Ojos irritados y nubes, controlar el azúcar	Ojos irritados y nubes: una gotita se exprime del dedo, 1 gota 3 veces al día durante 2 días o hasta que se quita, controlar azúcar: se licua la pura hoja y se toma en ayunas hasta que se componga-1-2 semanas.	
-	doradilla	S			Riñones; dolor de estómago	Se hierve toda la planta con la raíz y se toma media taza durante 3 días.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	encino amarillo	S			Fortalecer los dientes; fuegos en la boca; controlar diabetes	Fortalecer los dientes; fuegos en la boca: la cascara se hierve en té y se utiliza como enjuague diario durante 3 días. Controlar diabetes: hervir la cascara, tomar como agua de tiempo.	De Ávila lists encino amarillo, tnutyɨ'nkɨ juaan (CAB). p 92 De Ávila gives tnutyɨ'nkɨ juaan: encino amarillo for CAB (De Ávila, 2010: 92). tyɨ'nkɨ: bellota (De Ávila, 2010: 93). He also gives these names: nukaji kuaan/tnaa kaji kuaan/tunkaji kuaan: encino amarillo (De Ávila, 2010: 97). Other names from CAB are yitun kuaan/yutnu juaan, tonkuii kuaan/tunkuii kuaan: encino amarillo (De Ávila, 2010: 99), tundiaa kuaan: encino amarillo (De Ávila, 2010: 105).
-	epazote morado/epazote rojo	S			Desparasitar; mal aire; frialdad en los niños	Desparasitar: las hojas se comen en ayunas 3 días, también en té se toma una taza en ayunas; la raíz se muele y se cuela y se toma una taza en las ayunas durante 3 mañanas. Mal aire: se remoja en alcohol y se frota el cuerpo al mediodía durante 3 días. frialdad en los niños: se asan las hojas en el comal con cebolla morada y se pone alcohol y se aplican en la pancita y en la cadera 3 veces, 1 vez diario.	
-	espinosilla verde	S			Cabello	Se hierve y se lava el cabello cada vez que uno se baña durante 1-2 meses.	
-	flor de jazmín	S					Ita ndókô, jazmín (Kuiper, 2003).
-	flor de margarita	S					

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	flor de naranja	S			Insomnio	Se hierven 7 flores de naranja en un litro de agua, se toma 1 taza por la noche hasta alivio.	
-	flor de piedra	S			Quistes en los ovarios, infección de los riñones	Se arranca de la piedra y se hierve y se toma 5-6 días como agua de tiempo para los riñones o 15 días para los quistes.	
-	flor de platanillo	S					
-	geranio	S			Infección del estómago; diarrea; quemaduras de sol; manchas negras en la piel	Infección del estómago: la hoja se hierve y se toma 2 veces diario por 3 días. Diarrea: se hierve la hoja con la punta de níspero y se toma como agua de tiempo. Quemaduras de sol: se muelen las hojas y se aplican en la parte afectada, se lava con té de manzanilla cada media hora y se pone de nuevo hasta alivio. Manchas negras en la piel: se hace una crema con otras plantas.	
-	hierba de canela	S			Temazcal	Se hierve el tallo y se vaporiza, también se puede preparar una pomada que se ocupa después del parto y del temazcal.	De Ávila gives tiakua xiton/tyakua jiton and tiakua yuku vixi: canela for CAB (De Ávila, 2010: 103).
-	hierba de estrella	S	AP248	,	Dolor de estómago	Se hierve el tallo, se toma como agua de tiempo hasta componerse.	
-	hierba de la rozadura	S			Rozadura; quemaduras	Rozadura: se hierve el tallo y se lava 1 vez al día hasta alivio. Quemaduras: se usa toda la planta molida y se aplica hasta que se cae sola.	
-	hierba de uva	S	AP302	VERBENACAE Lantana sp.	Frialdad; reumatismo	Reumatismo: se hierven las hojas y se hacen fomentos con el té caliente 2 veces al día. Frialdad: se hierven las hojas y se toma una media taza en la noche 3 veces.	Compare with VERBENACEAE Lippia callicarpaefolia (O'Gorman, 1963: 70).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	hierba negra	S			Herida	Herida: la hoja se hierve y se toma como agua de tiempo.	
-	hiervo de flor morado, pariente de toronjil		AP262	LAMIACEAE *Salvia lasiantha* Benth.			
-	jitomate	S					Tnána kue'e, tomate, jitomate (Kuiper, 2003).
-	la consuelta	S			Quebradura	Se corta parte de la corteza del árbol y se aplica en la parte quebrada y se amarra (como un yeso), se combina con crementina y escobilla.	
-	las pasas	S			Cansancio, desanimo	Se hierve y cuando se deshace se agrega una manzana asada y se da a comer la cantidad que quiere.	
-	laurel	S			Comestible; dolor del cuerpo	Comestible: da sabor a la comida, se ocupa para hacer atole. Dolor del cuerpo: la hoja se hierve y se baña.	Ita díko, un tipo de laurel silvestre (Kuiper, 2003). De Ávila gives yutnu nda'ya ṯichi: laurel for Tamazulapan (De Ávila, 2010: 104).
-	llantén blanco	S	AP174	PLANTAGINACEAE *Plantago nivea* Kunth	Toz	El tallo se hierve y se toma 1/4 taza cada 8 horas hasta que se componga.	
-	maguey blanco	S			Toz	Se hace pulque, se pone cebolla y chile y se toma la mezcla 1-2 veces al día.	
-	makaxani	S			Baños de parto, temazcal	Se hierve el tallo con flor y hoja y se vaporiza.	Same as makaxani yuku?

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	manita de león	S			Molestias de corazón	Se pone la pura flor con vino tinto, se toma 3 cucharas en la mañana durante 15 días, se descansa y se vuelve.	De Ávila gives tundakua (na'nu)/ ita ndaa: mano de léon for Coicoyán. Identified as MALVACEAE [STERCULIACEAE] *Chiranthodendron pentadactylon* Larreat. Flor medicinal para el dolor, corteza se usa para amarres. ndaa: hand, na'nu: large (De Ávila, 2010: 102).
-	manzana	S			Estómago delicado	Se come la manzana asada antes de cada alimento por 7 días.	Tnúmaxána, manzano (Kuiper, 2003).
-	marihuana	S			Dolores musculares; reumatismo; controlar presión; diabetes; frialdad	Dolores musculares; reumatismo: la hoja remojada en alcohol se unta en la noche por 7 días. Controlar presión; diabetes; frialdad: 3 hojas en medio litro de agua, 1 taza diaria por 7 días.	
-	melón	S			Toz	Se abre el melón y se sacan las semillas y se ponen a hervir al baño amarillo y el jugo que sale se toma media taza, una vez al día por 7 días.	
-	miltomate	S			Anginas	Se talla, se cuece en la lumbre, 1 vez en la tarde se aplica hasta que se componga.	Tnána doko, miltomate (Kuiper, 2003).
-	mostaza		AP86	BRASSICACEAE			
-	naranja	S			La cruda; fortalecer el cuerpo	Fortalecer el cuerpo: un vaso de jugo en ayunas por 3 días. la cruda: Se hierve la cascara y se toma como agua de tiempo.	Tnútkuee chína, naranjo (Kuiper, 2003). De Ávila gives tun laxa: árbol de naranja for Ayutla (de Leon, 1980) (De Ávila, 2010: 100).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	nariz de guajolote	S			Tristeza	Se pone a hervir la pura semilla de 3 narices de guajolote en 1 litro de agua y se toma una taza en la noche durante 3 días.	
-	nildo	S			Calentura	La hoja se hierve y se da una taza a los niños cuando tienen calentura, si siguen con calentura se da otra.	
-	nogal	S			Desparasitar; crecimiento de cabello	Desparasitar: las hojas se hierven y se toma una taza por 3 días. Crecimiento de cabello: se usa el agua para peinar.	De Ávila gives ti'iti: nogal, *Juglans mollis* Engelm., JUGLANDACEAE for Alcozauca (De Ávila, 2010: 96).
-	órgano (de 4 rajitas)	S			Heridas	Se corta una octava parte y se pone a asar en la lumbre, se abre a la mitad y cuando está tibio se aplica en la herida y se cambia una vez al día.	
-	órgano (de 6 rajitas)	S			Cabello	Se corta una octava parte de órgano, se muele crudo y se aplica en el cabello, 15 minutos antes de bañarse por un mes para que se ponga negro.	
-	palmar	S			Comestible	Se come el dátil, es muy saludable.	Tnúñúú kuá'â, palmar real (Kuiper, 2003). De Ávila gives ita nukúká: palm tree for Chalcatongo (Macaulay 1996) and nukuka: palmilla for Yosondúa. Kuka: peine (comb). It is used to decorate the church during fiestas. N̶i̶n̶i̶ ka nastutuda veñu'u jiin nukuka ja kuu taka viko (De Ávila, 2010: 99).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	palo de mulato	S			Disentería; Mal de orina	Disentería: se hierven las astillas (corteza) y se toma como agua de tiempo. Mal de orina: se hierve la cascara y se toma como agua de tiempo.	
-	papaloquelite	S			Comestible		
-	papaya	S			Mala digestión	Se come un pedazo en la mañana.	
-	quebradero	S			Quebradura	Se corta la rama, se asa la rama en la lumbre para separar la cascara y se pone la mitad de la cascara en la parte quebrada una vez por la mañana hasta que la misma cascara se separa y volverlo a hacer 1 a 2 veces más.	
-	rábano morado	S			Herida; desparasitar	Herida: se muele la cascara y se lava la herida con alcohol una vez. Desparasitar: se pone a hervir la cascara y se da 1/4 taza de tomar en ayunas por 3 días.	
-	rosa de castilla	S			Ojos irritados; dolor de estómago	Ojos irritados: se hierven los pétalos y se lava los ojos. dolor de estómago: se hierve la flor y se toma como agua de tiempo.	
-	rosa laurel	S			Adorno		
-	sábila amarilla	S			Herida	Se pone la hoja a coser y se abre por la mitad y se pone en la herida, se venda y se cambia una vez al día.	
-	sábila roja/morada	S			Heridas, baños de parto	Herida: se hierve la penca y se lava la herida 1 vez diario. Baño de parto: se vaporiza para el baño.	
-	sábila verde	S			Problemas estomacales	Se muele la penca y se toma una taza en la mañana durante 3 días.	
-	té naranja	S			Dolor de estómago	Se hierve el tallo y se toma.	
-	toloache blanco	S					

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	toloache morado	S					
-	tomillo	S			Desparasitar; dolor del estómago; dolor de dientes	Desparasitar; dolor del estómago: las hojas se hierven y se toma una taza por ayunas por 3 días. Dolor de dientes: se hierve el tallo y se enjuague hasta que se quita el dolor, 3 veces al día.	
-	toronja	S			Fortalecer el cuerpo; dietética	Se come en ayunas.	De Ávila gives tun laxa ía: árbol de toronja for Ayutla (De Leon, 1980 in De Ávila, 2010: 100).
-	tronadora chiquita, chepil		AP333 & AP339	FABACEAE Crotalaria sp.	Comestible	Para los tamales con mantequilla.	
-	tronco de chivo	S			Riñones	Se hierve 2 trocitos de tronco en 2 litros de agua y se toma como agua de tiempo.	
-	uacatillo	S			Riñones	Se hierve la cascara de la raíz hasta que el agua se pone negro. Agua de tiempo en ayunas durante 1 semana, depende como se siente si sigue.	
-	vaporu	S	AP306	LAMIACEAE *Marrubium vulgare* L.	Fiebre; dolor de cabeza; mal aire; toz	Fiebre; dolor de cabeza; mal aire: se ponen las hojas al dentro de aguardiente y se unta el aguardiente una o dos noches a acostarse. Toz: se pone en los pulmones después de calentar las hojitas en el comal, 3 noches se amarra.	
-	variante de chepil silvestre		AP244	FABACEAE			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
-	yuku vixi	S			Fiebre	Se muelen las ramas crudas y se cuela y se toma una media taza 3 veces.	De Ávila gives tundaa vixi / ndaa vixi: gusanillo for Yosotato, identified as ASTERACEAE *Vernonia aschenborniana,* Schauer. Children nibble on the stem (De Ávila, 2010: 102). The Tilantongo experts thought yuku vixi was probably yuku yaa or espule though.
-	zanahoria	S			Fortalecer la vista	Se muele la zanahoria y se toma con agua en ayunas durante 7 días.	
alkamfor	alcanfor	M,S			Fiebre; dolor de cabeza; mal aire; dolor de muela; resfriados; dolor de estómago; dolor de cuerpo; mal de oído	Fiebre; dolor de cabeza; mal aire: se ponen las hojas al dentro de aguardiente y se unta el aguardiente una o dos noches a acostarse. Mal aire: se muelen la hoja de alcanfor y ruda con ajo, con alcohol y nos bañamos (frotamos) tres veces para curar el mal aire. Dolor de muela: se ocupa la rama, se saca la corteza, se pega la donde hay dolor, se cambia hasta que se quita el dolor. Resfriados: la hoja se hierve y se toma como agua de tiempo durante 3 días. Dolor de estómago: se hierven las hojas y se toma té para aliviar el dolor del estómago. Agua de tiempo. Dolor de cuerpo: se ponen las hojas crudas donde duele el cuerpo. Mal de oído: se pone la hoja en el oído.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
chate itu	cabello de elote	M,S			Riñones; mal de orina	Riñones: se hierve el cabello de 5 elotes en 1 litro de agua y se toma 3 litros al día durante 5 días; se hierve el cabello de elote y se toma como agua de tiempo durante 2 semanas. Mal de orina: los bellitos (el cabello) se combinan con la flor de la hierba santa y se hierve y se toma como agua del tiempo.	
chɨ'ɨ ita kwaa yuku	té de limón	S	AP93	ASTERACEAE			Compare with bidens (O'Gorman, 1963: 136).
chɨ'ɨ kwaa	setillo amarillo		AP72	ASTERACEAE	Comestible	Los animales y los humanos comen las hojas.	Chɨ́'ɨ́ kuàan, un tipo de aceitillo que se come con tortilla cuando está tierno (Kuiper, 2003).
chɨ'ɨ kwechi	-		AP82	ASTERACEAE			
chɨ'ɨ kwixi	setillo blanco		AP71	ASTERACEAE	Los animales comen esta hierba		Chɨ́'ɨ́ kuìxi, un tipo de aceitillo (Kuiper, 2003).
chɨ'ɨ yuku burru	-		AP342	,			Perhaps the same as chɨ́'ɨ́ bùrru or chɨ́'ɨ́ yúku? (Kuiper, 2003).
chiki dini	biznaga	S			Baño de asiento; herida; dolor de oído	Baño de asiento: se limpia como el nopal (se quita toda la espina) y se pone a remojar y ya que se saca toda la babita se mete a la persona al dentro del agua. Herida: se corta un pedazo y se aplica en la parte afectada, se cambia cada tercer día durante 3 días. Dolor de oído: se mete el jugo al dentro de oído.	Chíkídini, un tipo de cactus, la gente lo llama 'asiento de la suegra'. Kuiper gives bisnaga nméndê (Kuiper, 2003). Chiki: opuntia fruit (De Ávila, 2010: 91).
chi'lindo	granadilla silvestre		AP147	PASSIFLORACEAE Passiflora sp.			
chitɨ ɨndɨ	flor de manteca		AP196	EUPHORBIACEAE Euphorbia	Comestible		

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ch꞉y꞉	cucharilla	M	AP366	,	Antes usaron sus raíces como cucharas; mal de orina		Ch́ý̱, cucharilla (Kuiper, 2003).
da’ya ndute	el helecho acuático/cola de pájaro		AP164	,			Perhaps related to dá'yá dáû, plantas de la lluvia, empiezan a crecer durante el tiempo de la lluvia (Kuiper, 2003).
dídido xi xanu	la suegra y la nuera		AP261	VERBENACEAE Lantana sp.			
d꞉k꞉ nda'a da’ya	dedo de niño		AP288	,			
dinu	jarilla, jawei		AP222	BROMELIACEAE *Tillandsia macdougallii* L.B.Sm.			Dínû, un tipo de parásito que invade los árboles (Kuiper, 2003).
dinu kwechi	jarilla chiquita		AP223	BROMELIACEAE *Tillandsia recurvata* L.			
du'a cabayu	cola de caballo	M,S	AP338	EQUISETACEAE Equisetum sp.	Riñones; cólicos de la regla; lavar el cabello	Riñones: se hierve un té de la planta con una ramita con fruta o sola de la manzanita, se toma como agua del tiempo algunos días, se recoge cualquier tiempo donde hay agua. Cólicos de la regla: se ocupa todo el tallo, se hierve y se toma como agua del tiempo. Fortalecer el cabello: se hierve el palito y se ocupa el agua para peinarse.	Could be called both du'a cabayu and nduwa cabayu.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
eucalipto	eucalipto	M,S			Toz; gripe; resfriados	Toz: las hojas se hierven, una taza en la mañana y en la noche o se vaporiza uno en la noche. Gripe: se hierve la hoja de eucalipto con la flor de bugambilia y se toma una taza en la mañana y en la noche. Se puede poner canela también. Resfriados: la hoja en té mezclado con limón, canela y miel, 1 vaso antes de dormir por 3 días, también se puede poner un poco de aguardiente.	
iñu chaa	espino de burro		AP353	,			Iñu cháâ, cardo (Kuiper, 2003). Compare with cirsium mexicanum (O'Gorman, 1963: 144).
iñu chaa	lechuguilla	S	AP229	ASTERACEAE Cirsium sp.			
iñu kɨu	cardo santo/ hierba de burro/ cardo de burro	M	AP168	APIACEAE Eryngium carlinae F.Delaroche	Dolor de oído; mal aire	Dolor de oído: se echa la raíz en agua, se hierve y se pone el agua en el oído que después se seca y se tapa, 3 veces. Mal aire: se ocupa el tallo con alcohol y se hojea la espalda, la cabeza. Algunas veces hasta componerse.	Iñu kɨun, un tipo de cardo (Kuiper, 2003). Mak writes that spirits may be expelled by striking the back of the patient with the thorny leaves and flowers of cardo to draw blood (Mak, 1959: 137). This is probably referring to mal aire.
iñu kɨu	hierba de sapo	M,S	AP58	APIACEAE Eryngium montanum J.M.Coult. & Rose	Dolor de oído, mal de oído; mal aire; golpe	Dolor de oído, mal de oído: se echa la raíz en agua, se hierve y se pone el agua en el oído que después se seca y se tapa, 3 veces. Mal aire: se ocupa el tallo con alcohol y se hojea la espalda, la cabeza. Algunas veces hasta componerse. Golpe: para los golpes se seca y se hace un té.	Mak writes that spirits may be expelled by striking the back of the patient with the thorny leaves and flowers of cardo to draw blood (Mak, 1959: 137). This is probably referring to mal aire.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
iñu leu	chicalote	M,S	AP2 & AP207	PAPAVERACEAE Argemone sp.	Dientes aflojados; mal aire; nubes en los ojos; carnosidad de los ojos; dolor de rodilla; hemorroides; dolor de cuerpo; diabetes	Mal aire: se azota el cuerpo con la rama fresca, una vez con alcohol. Nubes en los ojos: se extrae el jugo de la planta del tallo por la mañana- 2 gotas 2 veces al día durante 3 días. Carnosidad de los ojos: se pone una gotita del jugo que sale del tallo en el ojo. Dolor de rodilla; dolor de cuerpo: se hojea con alcohol una vez. Hemorroides: se hierve el tallo, se siente uno en el agua 3 veces. Diabetes: se hierve la raíz y se ocupa como agua de tiempo.	Iñu nlèu, contra el mal aire la gente se pega con esta planta (Kuiper, 2003). Compare with argemone mexicana (O'Gorman, 1963: 126).
iñu ndɨkɨ ngutu, iñu xe'e chuun	ojo de pollo		AP83	ASTERACEAE	Molesta mucho porque sus espinas (cuando se seca la planta) lastiman a las personas que trabajan en el campo, si se deje se hace plaga		
iñu ta'a	pata de cabra, espino de abrojo		AP233 AP265	SOLANACEAE Solanum grayi Rose, SOLANACEAE Solanum rostratum Dunal			Iñu ta'a, contra el mal aire la gente se pega con esta planta (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
iñu tndu	caretilla	M,S	AP77 & AP181	FABACEAE *Medicago polymorpha* L.	Dolor de los dientes	Se hierve la raíz y se enjuaga la boca para apretar los dientes. Hasta que se compongan los dientes.	Iñu tndúu, los animales las comen (Kuiper, 2003). In Tilantongo tndu'u means amole Tndu could be a contracted derivative. De Ávila gives the name tun^{5} i^{3} ñu^{5} ndu'^{3} u^{5} for an unidentified species for Yoloxóchitl. Ndu'u meaning: amole, gordo, tronco (De Ávila, 2010: 95).
iñu tndu kwixi	carretilla blanca		AP343	,			
ita bombil/bugambilia	bugambilia	M,S	AP231	NYCTAGINACEAE *Bougainvillea spectabilis* Willd.	Toz; gripe	Toz: la hoja de eucalipto con flor de bugambilia y canela se hierven, se toman 2 o 3 tazas en la noche y no se sale al aire como está caliente; la flor se hierve con ajo y cebolla, se toma una taza en la noche antes de dormir. Gripe: se hierven la flor de bugambilia con la hoja de eucalipto o sola y se toma como agua de tiempo.	Ita jombííl, bugambilia (Kuiper, 2003).
ita daa	siempreviva	M,S	AP289	CRASSULACEAE Sedum sp.	Fuegos en la boca; la vista; controlar el azúcar; infección de los ojos; dolor de oído	Vista: las manitas para la vista, se exprime. Se mastica las hojitas para el fuego en la boca. Controlar el azúcar: se licua la pura hoja y se toma en ayunas hasta que se componga-1-2 semanas. Infección de los ojos: se exprime la hojita en el ojo 3 veces al día. Dolor de oído: la hojita se calienta en el comal y se exprime en el oído.	Ita dáa, un tipo de siempreviva que se mastica para curar llagas de la boca (Kuiper, 2003).
ita daa yuku/ita xiti ko'o	siempreviva de monte	S			Quebradura, torcedura	El palo se parte en mitad y se pone y se amarra como tablillas durante 5 días y se cambia.	Ita dáa yúkû, un tipo de siempreviva montés (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita di de'e	-		AP270	ASTERACEAE			Perhaps the same as ita ndádi dé'ê, lengua de buey (Kuiper, 2003).
ita ii	floribundio	S			Fiebre; para madurar clavillos; calmar dolores musculares	Fiebre: la flor se aplica en las partes donde se centra el calor, varias veces hasta ver alivio. Para madurar clavillos: la hoja y flor se muelen frescas y se aplican como pasta en la parte afectada, se deja hasta que solo reviente. Calmar dolores musculares: se aplican hoja y flor directamente con alcohol y se dejan hasta que se va el dolor o hasta que se secan entonces se cambian.	De Ávila gives tunkuisu for KAP identified as LYTHRACEAE *adenaria floribunda* Kunth (De Ávila, 2010: 99). Compare with LYTHRACEAE *adenaria floribunda* Kunth, and with ita ndɨyɨ floripondio, SOLANACEAE *brugmansia* sp.
ita jakaranda	jacaranda		AP205	BIGNONIACEAE *Jacaranda mimosifolia* D.Don			De Ávila gives the following cognates for jacaranda from Caballero[123]: tun ita ndi'i/yiton ita ndi'i/yunu ita ndi'i/yutun ita ndi'i. ndi'i: color azul, color morado. He also gives these two names from Caballero: nu ita tyaa: jacaranda; tnu ita xi'i: 'árbol de la flor morada', jacaranda (De Ávila, 2010: 95).
ita kaaraxi	maravilla		AP206	NYCTAGINACEAE *Mirabilis jalapa* L.			

[123] Caballero Morales Gabriel compiled a Mixtec dictionary with 17500 entries published in 2008. The information was obtained through a questionnaire filled in by bilingual teachers in 49 Oaxacan, 11 Guerrero and 3 Pueblan communities. The dictionary does not mention where the entries come from (De Ávila, 2010: 76).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita ka'i	-		AP90	LAMIACEAE *Salvia cinnabarina* M. Martens & Galeotti	Para pintar ropa o papel		Ita ká'î, un tipo de flor silvestre (Kuiper, 2003).
ita ka'i kwixi	llantén acuático		AP301	ORCHIDACEAE			
ita kando'o, ita ko'o	enredadera morada/quiebra de plato		AP266	CONVOLVULACEAE Ipomoea sp.			Ita kó'ô, campanilla, la flor de un bejuco (Kuiper, 2003).
ita koneju, yuku konejo, yuku gwixi	-		AP284	ASTERACEAE *Tridax coronopifolia* Hemsl.	Comestible	Se hace mole con las hojas tiernas.	
ita kuwa, ita ngandii	flor de mariposa, hierba de golpe		AP78 AP113 & AP240	ONAGRACEAE Oenothera rosea L`Hér. ex Aiton	Dolor de estómago		Yúkú tkúâ, un tipo de hierba medicinal (lit: hierba de mariposa) (Kuiper, 2003).
ita kuwa, ita dini, ita xa niñi	bella atardecer		AP241 AP303 AP317	ONAGRACEAE Oenothera tetraptera Cav., ONAGRACEAE Gaura coccinea Nutt. ex Pursh, , ONAGRACEAE Gaura mutabilis Cav.,			Ita díni, la flor se usa para el dolor de estómago, inducir el parto o curar una herida. Compare yúkú díni (medicinal), se hierve y se toma para dolor de estómago (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita kwaa, ita dini	pericón	M,S	AP60 & AP259	ASTERACEAE *Tagetes lucida* Cav.	Dolor del estómago; diarrea; disentería; mal de orina; dolor de muelas; dolor de huesos, reumatismo; después del parto; herida infectada	Dolor del estómago; diarrea; disentería: la hoja se hierve y se toma como agua de tiempo hasta el alivio. Mal de orina: se toma en té, el tallo, las hojas y la flor, se hierven 5 ramas en 1,5 litro de agua, se toma 3 veces al día por 5 días. Dolor de muelas: se mastican las hojas crudas. Dolor de huesos, reumatismo: se hierve la hoja fresca y se toma como agua de tiempo hasta que se componga. Después del parto: se baña en el temazcal para que deje de sangrar después del parto, se ocupa el tallo. Herida infectada: se muele la hoja, seca o fresca y se echa en la herida podrida.	Ita kuáân, flor de cempasúchil (no es el pericón) usado para adorar los altares de los santos (Kuiper, 2003).
ita kwendɨu yuku	té de limón	S	AP326	FABACEAE Dalea sp.			
ita kwii	-		AP109	APOCYNACEAE *Vinca major* L.			
ita mitu yuku	chupamirto, toronjil	S	AP188	LAMIACEAE Salvia sp.	Desparasitar; apetito; toz; el colibrí chupa la miel.	Desparasitar; apetito: se hace un té de las ramitas, 1 taza en ayunas media hora antes de almorzar durante 3-5 días. Toz: se hierven las flores y se toma una taza al día hasta alivio.	
ita mitu/yuku mirtu	mirto	M,S	AP287	LAMIACEAE *Salvia microphylla* Kunth	Dolor de estómago, vómito; dolor de corazón; limpias, mal de ojo, mal aire; baños de parto y temazcal	Dolor de corazón: la pura hoja fresca tierna se hierve en té y se toma como agua de tiempo hasta que se componga. Limpias, mal de ojo, mal aire: se golpea con la rama con alcohol. Baños de parto y temazcal: se hierve la rama y se vaporiza. Dolor de estómago, vómito: se hierve el tallo seco o verde y se toma como agua de tiempo hasta que se componga.	De Ávila gives tuisi: mirto for possibly *Salvia* sp., LAMIACEAE for Micaltepec (De Ávila, 2010: 95).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita ndɨkɨ, ita viko	flor de encaje		AP76	APIACEAE *Ammi majus* L.			
ita ndɨyɨ	flor de muerto	M	AP96 AP99 AP268	ASTERACEAE, PLANTAGINACEAE Penstemon sp., ,			Compare with penstemon campanulatus (O'Gorman, 1963: 130).
ita ndɨyɨ	floripondio	M	AP203	SOLANACEAE *Brugmansia candida* Pers			
ita ndɨyɨ	hierba de muerto	M	AP257	ASTERACEAE	Dolor de muela		
ita nu itu, ita du'a kachi, ita nu ñu'u	cola de borrego, flor de milpa, flor de tierra		AP73 AP102 & AP185	OROBANCHACEAE Castilleja sp	Comestible	Las hojas se pueden comer	Could be multiple species linked to the name ita nu itu. Both AP73 and AP185 were identified as OROBANCHACEAE Castilleja sp. Compare with Castilleja (O'Gorman, 1963: 142).
ita nu tnu'u kwechi	kawal chico		AP255	ASTERACEAE			
ita nuni	ita nuni	M,S	AP361	,	Purga	Para limpiar la barriga, se usa un pedazo del palo y se hierve y una taza pequeña da diarrea, vómito durante 2-3 días, hay que saber cómo manejarlo, combinarlo con un caldo para que no hace daño.	Ita núnî, cacalosuchil (Kuiper, 2003). Compare with cacaloxochitl: plumeria rubra (O'Gorman, 1963: 36).
ita nuungandii	cara del sol		AP114 & AP142	VERBENACEAE *Verbena canescens* Kunth			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita roxa kwixi	rosa blanca	M,S	AP238	ROSACEAE Rosa sp.	Ojos irritados; infección de los ojos; alergias (de la piel); calentura; empacho	Ojos irritados: la flor se hierve y se hacen enjuagues a cada rato hasta que se componga. Infección de los ojos: pétalos de 2 rosas en 1 taza de agua y se aplican de 3 a 4 gotas 3 veces al día por 5 días. Alergias (de la piel): se hierven los pétalos, te lavas 3 veces al día el lugar afectado. Calentura: se hierven las puntitas de durazno, capulín con los pétalos de rosa blanca y se toma el té como agua de tiempo.	
ita san jose	-	M				Se hierven los pétalos de flor y se limpia dónde está malo.	Ita san juseé, flor de san josé, el gobierno no permite cultivar esta planta (Kuiper, 2003).
ita seriw, ita inu	flor de cerrillo, doncella	M,S	AP62 AP159 AP182	RUBIACEAE *Bouvardia ternifolia* Schltdl., , RUBIACEAE *Bouvardia* sp.	Toz; gripe; toz ferina; mordeduras de animales; mordedura de víbora; quemadura	Toz; gripe: se hierve el tallo y se toma como agua de tiempo. Toz ferina: se hierve el tallo y se toma como agua de tiempo hasta componerse. Mordeduras de animales: se machuca la hierba y la cocimos y la pegamos en la mordedura 2 veces. Mordedura de víbora: se combina con nopal de coyote y se pone en el lugar donde mordió la víbora.	Could be multiple species linked to the name.
ita te'u yuku	dalia	M,S	AP274	ASTERACEAE Dahlia sp.	Mal aire	Se barre.	Ita yuku úâ, dalia (Kuiper, 2003). See O'Gorman, 1963: 154, 156.
ita tnu tnu'u vita	hierba lisa		AP74	ASTERACEAE Tithonia sp.	Los animales la comen		
ita tnu yatu	-		AP246	ASTERACEAE			
ita yaa	flor de ceniza	S			Calambre; hinchazón; empacho	Se muele ajo, flor de ceniza y se mete con un trapo en la planta del pie o se frota con ceniza para hinchazón o empacho.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ita yɨdɨ	hierba de borracho/borrachito/el borracho/flor de novia	M,S	AP33	LAMIACEAE *Satureja oaxacana* Standl.	Para que nazca el bebe; dolor de estómago; frío; baños de parto; dolor de oído; temazcal; se reparte esta flor cuando uno se casa a las personas que vienen de visita.	Para que nazca el bebe: la mujer embarazada se huma con la hierba, se echa una ramita con flor y hoja en la lumbre y se huma la mujer y con eso se nace rápido el bebe. Dolor de estómago; frío: hacemos un té del tallo con flor, se toma como agua de tiempo hasta que se componga. Baños de parto: se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Dolor de oído: en té se aplica la hierba para el oído- 3 gotas 5 veces en las noches. Temazcal: se vaporiza en el temazcal.	Ita yɨdî, un tipo de poleo, la novia reparte la flor el día del casamiento. También se usa para inducir el parto, contra el escalofrío y contra dolor de cabeza causada por cruda (Kuiper, 2003).
ita yɨdɨ kwechi	hierba de borracho chica	M,S	AP153	LAMIACEAE	Frío; dolor de estómago; después del parto	Frío; dolor de estómago: se hierve el tallo, se toma como agua de tiempo hasta componerse. Después del parto: se hierven las hojas el día del parto y la mujer toma una taza durante tres días.	
ita yɨdɨ na'nu	hierba de borracho grande	M,S	AP91	LAMIACEAE	Dolor del estómago; Para que nazca el bebe	Dolor del estómago: se hierve el tallo y se toma como agua de tiempo. Para que nazca el bebe: se hierve el tallo y se toma en té, también se caldea con el rollo con la hierba de ángel.	
ite du'a kolo	pasto de cola de pavo		AP167	POACEAE	Toz		Ítê, pasto (Kuiper, 2003).
ite katnu	pasto		AP242	CYPERACEAE *Cyprus spectabilis* Link			Compare yúkú tkátnû, juncos, bejuco (lit: hierba de nudo) (Kuiper, 2003).
ite kweñi	pasto de mosquito	S	AP295	POACEAE	Desparasitar	Se hierve la raíz y se toma media taza por 7 días en ayunas.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ite ndute	pasto de agua		AP224	CYPERACEAE *Eleocharis geniculata* (L.) Roem & Schult.			
ite tndaku kwechi	pasto de gusanito	S	AP294	POACEAE	Desparasitar	Se hierve la pura flor con semilla, se toma el té 3 mañanas una media taza.	
k̶i̶n̶d̶i̶	hierba clara		AP104 AP126	ASTERACEAE, LAMIACEAE Salvia sp.,		Cuando hay basura en el ojo, se pone una semilla en el ojo y con eso se saca.	Ita tkín̶dî, chía (lit: flor de mariposa), se usa para curar el ojo en que ha entrado una basura (Kuiper, 2003). Mak describes a treatment where a tiny seed of the plant chia is put in the eye to make a foreign object come out (Mak, 1959: 137).
k̶i̶n̶d̶i̶	la verbena		AP112 AP151 & AP162	LAMIACEAE Salvia sp.			Tnútakín̶dî, salvia. Mide uno a dos metros de altura. Sus flores son azules y delgadas y contienen miel que chupan los chuparrosas. Se muelen las semillas y se mezclan con agua. Se usa esta solución para curar los ojos de los animales cuando están nublados (Kuiper, 2003).
k̶i̶n̶d̶i̶ kidi	pegajosa	S	AP271	,			
k̶i̶n̶d̶i̶ kwechi (por sus semillas), yuku k̶i̶n̶d̶i̶	la verbena (grande)		AP170	LAMIACEAE Salvia sp.			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
kɨndɨ yuku	-		AP95	LAMIACEAE *Salvia mexicana* L.	Las semillas son medicinales		
kɨ'u/ yuku alfaresia	hierba tinta/ flor de tinta/ berresija	M,S	AP190 AP215	, ACANTHACEAE *Justicia spicigera* Schltdl.	Alferecía; tristeza; berrinche; baños de parto; bilis	Alferecía: se muele la hoja cruda y se aplica en el cuerpo con la chica chola, algunas veces, depende como uno se siente. Tristeza: se hierve la punta con la punta de capulín, durazno blanco, carrizo, chamizo, tronadora y se toma 3 veces en ayunas y se baña en las noches; se muele la hoja y se serena y al otro día se toma una taza en ayunas, también se puede bañar con la planta molida en agua fría por 2-3 mañanas. Algunos dicen que hay que robarla para que sea efectiva. La hoja se echa a remojar en el sereno (el agua se queda negra) y se toma 1 vaso en las ayunas durante 5 días. Berrinche: se hace té del tallo con flor y hoja y se da una taza al niño o uno la toma. También se baña el niño. Baños de parto: se hierve el tallo con flor y se vaporiza. Bilis: se machacan las hojas, se meten en agua y se cuelen las hojitas, el enfermo toma el agua 1 taza al día.	
kutnu yuku, yuku kweyido	verdolaga de monte		AP141 & AP258	AMARANTHACEAE *Gomphrena serrata* L.	Para que nazca el bebe	Se hierve y se pone una lavadura cuando la criatura no está ubicada bien al dentro del vientre de mujer.	Tkútnû: verdolaga (silvestre) (Kuiper, 2003: 13).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
kwendɨjɨ	guayaba	M,S			Infección del estómago; diarrea; diabetes	Infección del estómago: la hoja se hierve, se toma una taza 3 veces al día hasta que se componga; de la fruta se hace té y se toma como agua de tiempo durante 3 días. Diarrea: se hierve la hoja con la punta de níspero y de geranio y se toma como agua de tiempo; se hierven las hojas con la cascara de granada y coyul y se combinan con maguey papalomé. Diabetes: la hoja se hierve y se toma como agua de tiempo.	
mansaniya	manzanilla	M,S			Dolor de estómago; diarrea; vista; infección vaginal; infección de los ojos	Dolor de estómago; diarrea: se hace un té del tallo con las hojas y flor, se corta toda la ramita, se toma como agua del tiempo hasta que se calme el dolor. Vista: se hierve el tallo con flor y hoja y se lava 2-3 veces a la noche, contra las infecciones. Infección de los ojos: se hierven las puras flores en una taza de agua y se aplican de 3 a 4 gotas, 3 veces al día por 3 días. Infección vaginal: baños de asiento, se hierve todo el tallo, una vez diario 3-5 días antes de acostarse.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
mino kastila	hierba buena	M,S	AP27	LAMIACEAE *Mentha* sp.	Toz; dolor del estómago; estimulante, ayuda con los problemas digestivos; empacho; comestible	Toz: se usan las hojas, se recogen cuando la planta es verde en Octubre. Se lavan las hojas y entonces se ponen a hervir 10 minutos. Se toma el té. Para los niños pequeños se les da unas 4 cucharas. Se toma 3 veces/día, una vez en la noche hasta que se componga. No se usa nada al lado de la planta. Dolor del estómago: su ramita se recoge cualquier tiempo se necesita, se lava y se hierve, se toma cómo agua de tiempo hasta que se calme el dolor. Estimulante, ayuda con los problemas digestivos: se toma en té, se hierve todo el tallo, 1 taza por las noches hasta alivio. Empacho: se muele la hoja fresca y se da al niño para que toma 2 o 3 veces.	Mino kaxtìla, hierbabuena, se usa para dar sabor a los caldos, calabazas y chilacayotes tiernos (Kuiper, 2003).
mino ngutu	epazote de zorrillo	S	AP180	CHENOPODIACEAE *Chenopodium graveolens* Willd.	Madurar el clavillo; dolor de estómago	Madurar el clavillo: se muelen las hojas frescas y se pegan hasta que revienten. Dolor de estómago: el tallo se hierve y se toma 7 días media taza en las ayunas.	
mino/ mino ñuu dau	epazote	M,S	AP22 & AP332	CHENOPODIACEAE *Dysphania ambrosioides* (L.) Mosyakin & Clemants	Comestible; desparasitar; dolor de estómago; fortalecer	Desparasitar: la raíz se hierve, se buscan 3-4 raíces grandes. Se toma en ayunas, 3 mañanas una taza. Dolor de estómago: el tallo se hierve y se toma como agua de tiempo hasta que se componga. Fortalecer: se toma un caldillo de los tallos con hojas.	Mino ñuu dáû, epazote, se usa para dar sabor a los frijoles negros, nopales y hongos (Kuiper, 2003). De Ávila gives tumiñi: epazote for CAB identified as CHENOPODIACEAE *Dysphania ambrosioides* (L.) Mosyakin & Clemants (De Ávila, 2010: 100).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ña'u (camote tamorial)	tamorial	M,S			El camote es comestible; golpes, los venados también se comen esta planta cuando están heridos; herida; dolor de estómago; diabetes	Golpes; herida: el camote se pone en alcohol (aguardiente) durante un mes, también se puede hervir y hacer un té. Se lava bien el camote y se pone a hervir 20 minutos hasta que se hierve el agua. Se toma lo más caliente que se puede. Todo el año se puede recoger, se ocupa un machete o el zapapico. Cuando la herida está seca se unta el alcohol durante el tiempo que sea necesario. Con un golpe fuerte 1-2 meses. 4/día se pone el alcohol, 3/día se toma el té, 2 en la noche. Nada al lado de la planta. Herida: molemos el camote de tamorial, con el camote de la hierba del manso, con las hojas de la vergonzosa con la crementina y lo ponemos en la herida; se muele el camote en seco y el polvo se rosea en la herida, 2-3 veces hasta que se seca la herida. Dolor de estómago: se mastica 1/4 parte de camote 1 vez al día, 3 días. Diabetes: se hierve el camote y se toma como agua de tiempo.	Yuku tamarreál, tamarrial (medicinal). El camote de tamarrial se parece al camote del lirio. Se tuesta en el comal y se muele. Se pone este polvo encima de una herida. También se puede hervir y usar el agua para lavar una herida (Kuiper, 2003).
ña'u yuku, ña'u kwechi	jícama silvestre		AP243	FABACEAE *Macroptilium gibbosifolium* (Ortega) A.Delgado	Comestible	Se come el camote.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ndedu	tomatillo		AP277	SOLANACEAE *Jaltomata procumbens (*Cav.) J.L.Gentry	Comestible	Se come la frutita.	Tndédo, un tipo de hierba (comestible) crece hasta 30 cm, su fruta es pequeña, suave, con una cáscara delgada, azul y dulce, tiene semillas adentro (Kuiper, 2003).
ndewa	chichicaxtle	M,S			Torcedura; dolor de cuerpo; mal aire; reumatismo; temazcal; calambre	Torcedura: los palitos se ocupan con alcohol y se pegan suavemente 1 vez diario durante 3 días. Dolor de cuerpo: se ocupa la pura hojita con alcohol y se pega y se venda y se deja un día y se pone otra vez hasta que se componga; se entra en el temazcal y se pone en el lugar donde duele, también se puede hojear 10 minutos antes que entra en el temazcal. Cuando duele el hueso también se pega. Mal aire: las hojas se aplican con alcohol pegando la cabeza 1 vez. Reumatismo: se pega con las hojas en la parte dolorosa con alcohol 2 veces al día hasta alivio. Calambre: se pega y sale una leche blanca y se quita el calambre.	Ndéuâ, un tipo de hierba silvestre que la gente llama chicaxle (Kuiper, 2003). De Ávila gives tnundeve: chichicaxtle for CAB (De Ávila, 2010: 104). Mak describes that rheumatism is treated by striking the body with ndeva, a plant with sharp leaves (Mak, 1959: 138).
ndewa buru	chichicaxtle de burro	M,S	AP362	,	Mal aire; ronchas; frío; torcedura	Mal aire; frío; torcedura: se pega con el tallo con alcohol. Ronchas: se pone aguardiente con la hoja y se amarra.	
ndewa ngutu	chichicaxtle silvestre	M,S			Torcedura; quebradura	Torcedura: se pega diario con el tallo hasta componerse, se pone alcohol después en el lugar afectado. Quebradura: se barre donde se quebró, se pone aguardiente y se amarra.	Ndéuá nkútu, chicaxle de toro, es curativa (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ndewa tata	chichicaxtle de casa	M,S			Mal aire; dolor de cuerpo; torcedura	Mal aire; dolor del cuerpo: tiene menos espina, se talla con aguardiente una vez. Torcedura: se pega diario con el tallo hasta componerse, se pone alcohol después en el lugar afectado.	
ndewa tɨtnɨñɨ	chichicaxtle de ratón	M	AP308	EUPHORBIACEAE *Tragia nepetifolia* Cav.			Ndéuá tɨtnɨñɨ, chicaxle de ratón, es curativa (Kuiper, 2003).
do'o tɨtnɨñɨ yuku, do'o tnɨñɨ yuku, ita nuungandii	oreja del ratón silvestre, cara del sol		AP57 & AP160	POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.	Temperatura; quemadura	Temperatura: Se muele la planta y se toma. Quemadura: se combina con escobilla y flor de cerillo.	
nduwa ndoo	hierba santa	M,S	AP31	PIPERACEAE *Piper auritum* Kunth	Comestible; mal de orina; parásitos; desinflamar el estómago; golpe interno	Se hace caldo de pollo. Mal de orina: los bellitos (el cabello) de maíz se combinan con la flor de la hierba santa y se hierven y se toma como agua del tiempo. Parásitos: se hierve la hoja y se toma un vaso antes de desayunar por 3 días. Desinflamar el estómago: se coloca un parche de hojas en el estómago hasta que hay alivio. Golpe interno: se muele la hoja con la cebolla morada y la pulpa se aplica en la parte afectada hasta que se seca.	Ndua ndóô, hierba santa, se usa para dar sabor as los chícharos, los champiñones y a los caldos (Kuiper, 2003).
nduwa chi'na	-		AP335	APIACEAE *Berula erecta* (Huds.) Coville			Ndua chína, un tipo de berro, para el cuerpo adolorido se hace té, se usa para aliviar la fiebre; se muele crudo y se echa en agua para hacer té y se cuela. Es una hierba fría (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
nduwa ditu	berro del monte	S			Riñones	Riñones: se come crudo cuando hay por las mañanas.	Ndua dítu, berro de montón, es comestible (Kuiper, 2003).
nduwa ditu ndute, nduwa yute	berro de agua	S	AP337	BRASSICACEAE	Comestible; pulmones; riñones; barros; el hígado	Se come la hoja con tortilla. Pulmones: se come crudo en ayunas. Riñones: se come crudo cuando hay por las mañanas. Barros: 2 días molido y untado en la tarde hasta que se componga. Para el hígado: comer 7 ramitas, cada tercer día en las ayunas.	
nduwa ndudu	chepiche		AP88	ASTERACEAE *Porophyllum linaria* (Cav.) DC.	Comestible		Compare with ndua ndudu ídu, un tipo de romero (Kuiper, 2003).
nduwa yaa	lechuga	S	AP210 AP278	ASTERACEAE, ASTERACEAE	Comestible	La gente come las hojas tiernas. El venado también come esta planta.	Ndua yáá, diente de león, comestible (color cenizo) (Kuiper, 2003).
nduxa	coyul	M,S	AP41	OXALIDACEAE *Oxalis nelsonii* (Small) Knuth	Diarrea, disentería; comestible	Diarrea: el coyul se hierve con la cascara de granada y las hojas de guayaba y se combina con maguey papalomé. Disentería: se hierve toda la planta con flor y se toma cómo agua de tiempo, se pone panela.	Ndúxâ, trébol, es comestible. Se mezcla con yau ngichi, se cuece y se pone dulce. También se cuecen las flores y se muelen con chile en el molcajete (Kuiper, 2003).
nduyu/te'e nduyu	chilacayote	M,S			Espinilla; carnosidad de los ojos	Espinilla: la hoja fresca se refriega en la espalda 3 veces en la mañana. Carnosidad de los ojos: cuando está tierna la fruta se raspa la cascara y el agua que sale se pone en los ojos-se extrae con una jeringa. 2 gotas en cada ojo en las mañanas hasta alivio.	Te'e tndúyû, chilacayotera, se come chilacayotes que son frías para bajar la fiebre, pero no es bueno que una persona herida los coma porque producen pus en la herida (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
nispero	níspero	M,S			Diarrea; riñones; diabetes; presión	Diarrea: se hierve la hoja de guayaba con la punta de níspero y de geranio y se toma como agua de tiempo; se hierve la hoja sola y se toma como agua de tiempo o se hierve la cascara de granada con la hoja de guayaba con el punto de níspero y se toma como agua de tiempo. Riñones: se hierve el tallo, 7 días, 3 tazas diario. Diabetes: se hierven las hojas y se toma como agua de tiempo hasta alivio. Presión: la pura hoja se hierve y se toma como agua de tiempo.	
orejano	orégano	M,S			Dolor de estómago; comestible; parásitos en el estómago; contra veneno; toz; limpiar cuando ya no menstrua	Dolor de estómago: las puntitas, se hierven y se toma como agua de tiempo hasta que se componga. A veces se pone aguardiente en el té; se hierve la hoja con la cascara de granada y las hojas de guayaba, 1 taza en la noche hasta que se componga. Parásitos en el estómago: las hojas se hierven para parásitos, se toma 1 taza en ayunas durante 3 días. Contra veneno: se muele para el veneno con ajo y limón y manteca de puerco y lo toma uno y provoca el vómito. Toz: se hierven los tallos y se toma una taza por las noches y mañanas. Limpiar cuando ya no menstrua: se hierve el tallo y se toma una taza en ayunas durante 3 días.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
ruta	marubio	M,S			Dolor de estómago; varicela; bilis; cólicos; latido; bajar de peso; presión; apetito; frialdad; baños del parto y temazcal; empacho	Dolor de estómago: se hace un té del tallo, tiempo de la lluvia se recoge, una vez una taza. Se puede usar fresco o seco. También se puede tomarlo en aguardiente. Varicela: las hojas se hierven y con el agua se baña 3 días, una vez diario. Bilis: el tallo se hierve, se toma como agua de tiempo hasta que se componga. Cólicos; latido: se hierven los tallos y se toma té como agua de tiempo hasta que se componga. Bajar de peso: se toma cómo agua de tiempo 8 días. Presión: se hierven las hojas y se toma 1 taza en las mañanas durante 7 días. Apetito: se hierve el tallo (con flor y hoja) y se toma media taza en ayunas. Frialdad: se hierve el tallo con flor y hoja y se toma media taza en ayunas por una semana. Baños del parto; temazcal: se hierve el tallo con flor y hoja y se vaporiza al dentro del temazcal. Empacho: se hace té de sus ramas, se toma cualquier hora hasta desaparezca la molestia.	
ruta kuchi	-	M			Controlar diabetes		
ruta ua	poleo, marubio amargo	M,S	AP357	,	Dolor de estómago; diabetes	Se hierve el tallo y se toma como agua de tiempo.	
ruta vidi	poleo menta blanca, marubio dulce	M,S	AP322 AP334	, LAMIACEAE *Mentha suaveolens* Ehrh.,	Dolor de estómago; frío; mal de ojo; mal aire	Dolor de estómago; frío; se hierve el tallo y se toma como agua de tiempo. Mal de ojo; mal aire: se queman las hojas en un brasero y se ahumea el niño con las ramitas.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
silantru da'ya ndute, da'ya ndute	cilantro del monte/cilantro acuático		AP166	PTERIDACEAE Adiantum sp.	Inflamación del estómago		
silantru idu	cilantrillo	S			Provocar la Menstruación, abortivo	Provocar la Menstruación, abortivo: se hierve toda la planta, se toma como agua de tiempo durante 7 días.	
silantru idu	cilantro de venado	S	AP348	,	Inflamación de los intestinos; Para los niños que orinan mucho	Inflamación de los intestinos: se come crudo, máximo de 5 tallos entre comidas durante una semana. Para los niños que orinan mucho: los niños que orinan mucho lo toman como agua de tiempo en té durante 8 días.	
silantru idu, yuku idu, yuku xaxi idu	la lengua de venado/ cilantro de venado	S	AP146 AP260 AP267	, , ,	Baños del parto, temazcal	Se hierve la planta y se hace vaporización.	
tamorial blanco	tamorial blanco	M,S	AP97	GERANIACEAE *Geranium carolinianum* L.			
tamorial morado/ tamorial rojo	tamorial morado/ tamorial rojo	M,S	AP344	,			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tanaña/tnuta naña	chayotal	M,S			Controlar la presión; dolor de oído; para que nazca el bebe	Controlar la presión: 7 hojas de zapotal y 7 hojas de chayotal se hierven y se toma como agua de tiempo. Se combina con el ajo molido de que se toma una cuchara diaria; se hierven 3 hojas en 1 litro de agua y se toma 1 taza 3 veces al día por un mes. Dolor de oído: se hierve la hoja y se pone en el oído que duele. Para que nazca el bebe: se hierven las hojas y se toma el día que no quiere nacer el bebe una taza.	Tanáñâ, chayote (Kuiper, 2003). De Ávila gives nunaña/ tnunaña/ tnutɨnaña/tunaña/yiton naña/yuton naña/yutun naña, ita naña/tanaña, te'e naña/tye'e naña, tinaña/tɨnaña, yuku naña/yuku tinaña: chayotal for CAB. Tánaña: chayotera for San Miguel el Grande, yo'ó te'e naña: bejuco de chayote for Xochapa (De Ávila, 2010: 100).
tayoo	violeta		AP116 & AP124	MALVACEAE *Anoda cristata* (L.) Schltdl.	Comestible	Se comen las hojas tiernas.	Tayóo, violeta, comestible. Yùa tayóo, violeta (Kuiper, 2003).
tayoo kuchi	malva	M,S	AP121 AP212	MALVACEAE *Malva parviflora* L., MALVACEAE *Malva* sp.	Desinflamar los intestinos; lavar los intestinos; empacho; desparasitar; calentura; infección; mal aire	Desinflamar los intestinos: la hoja se hierve y se toma como agua de tiempo. Lavar los intestinos: se hierve con el carrizo en un litro de agua y se lava los intestinos en forma de lavado, se pone en el recto con una manguerita. Empacho; desparasitar: se hierve el tallo con flor y se toma una taza en ayunas por 5 días. Calentura: se hierve toda la planta con raíz y se baña. Infección: se hierve toda la planta y se lava el lugar afectado. Mal aire: para el aire, se unta con alcohol.	Yùa tayoo kúchî, un tipo de hierba (lit: hierba violeta de puerco). Según la gente es una hierba fría (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tayuchi	hierba de chicle		AP276	,	Comestible	Se colecta la leche que sale del tallo y se hierve en un carrizo en agua para hacer chicle.	Tayúchî, chicozapote, crece hasta un metro y medio en altura y las flores y leche son blancas. Hace años hubo chicozapote en Diuxi. La leche se extrae de las hojas en canutos de carrizo y se pone a hervir, al día siguiente se saca un chicle para masticar (Kuiper, 2003).
tayuchi tkachi	chicle de borrego		AP350	,	Comida para animales	Su flor es una bolita rosa, los borregos lo comen.	
tɨ te'e	cabeza de viejo	S			Dolor de oído; inflamación del estómago; baño de asiento; controlar la epilepsia	Dolor de oído: se corta el tallo de la zarzamora para obtener la leche que sale, se ponen algunas hojas de la ruda, se asa la cabeza de viejo y se saca el corazón, todo se pone en el oído 2 veces al día; se asa en la braza y se pone el corazoncito en el oído contra el dolor. Inflamación del estómago: la mitad de la cabeza pelada en té, media taza por 3 días. Baño de asiento: se limpia como el nopal (se quita toda la espina) y se pone a remojar y ya que se saca toda la babita se mete a la persona al dentro del agua. Controlar la epilepsia: la fruta controla la epilepsia, se come enseguida.	Tɨta'i? (Kuiper, 2003).
tiko	hinojo	M,S			Dolor de estómago; dolor de oído	Dolor de estómago: se hierven las hojas, se recogen cualquier hora de día, se toma 2 o 3 veces hasta quitar el dolor. Dolor de oído: se pone la hoja cruda en el oído contra el dolor.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
titi te'yu	quelite podrido/hierba de pastor	M,S	AP245	EUPHORBIACEAE Acalypha sp.	Diarrea	Se hierve la hoja seca o fresca hasta que pinta el agua morado, se toma como agua de tiempo.	T-ítî, quelite (Kuiper, 2003).
tkwiti	papa	S			Desinflamar	Se muele el camote crudo y se amarra en el lugar afectado.	
tnana kwechi	hierba mora		AP253	SOLANACEAE *Solanum nigrescens* M.Martens & Galeotti			
tnana ngutu	el tomatillo silvestre		AP173	SOLANACEAE *Physalis lagascae* Roem. & Schult.			
tndu'u	amole	M,S	AP358	,	Lavar el cabello, crecer el cabello, contra la caspa; la sarna; piojos	Lavar el cabello, crecer el cabello, contra la caspa: se muele el camote fresco, se remoja en el agua y se lava el cabello con esta agua. La sarna; piojos: el camote se muele crudo y se prepara en agua y se baña 2 veces. Tiene un camote muy grande que antes se ocupaba como jabón**.**	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu de'ñu	enebro	M,S	AP13 AP128	CUPRESSACEAE *Juniperus* sp., CUPRESSACEAE *Juniperus flaccida* Schltdl.	Cruda; mal aire; resfriados; reumatismo; mal de ojo; temazcal; quemadura	La cruda: se hierve el tallo, se toma como agua de tiempo. Mal aire: se junta las ramas con las ramas de la hierba loca y se pega con alcohol contra el mal aire, también se puede usar solo las ramas de enebro con alcohol. Las veces dependen de como uno se siente. Reumatismo: se hierve la hoja con fruta y se baña en las noches 3 veces; se hace una pomada con otras hierbas. Resfriado: se hierven las hojas y se toma media taza diaria hasta ver alivio. Mal de ojo: se corta siete ramas verdes de enebro y se barre el niño con alcohol. Temazcal: se barre con las ramas al dentro del temazcal. Quemadura: la fruta es fría y se muele fresca y se pone en la quemadura.	Tnúdé'ñu, enebro, se hacen antorchas de enebro, la gente se pega con las ramas contra el dolor, las mujeres toman té de las hojas cuando tienen problemas al dar a luz o cuando la placenta no sale (Kuiper, 2003). Interestingly, De Ávila has an entry for Alcozauca identified as CUPRESSACEAE *Juniperus flaccida* Schltdl. for ti'ití: sabino (De Ávila, 2010: 96) see also the database entry for nogal.
tnu dichi	órgano (de 5 rajitas), organal	S	AP44	,	Reumatismo; teñir/pintar el cabello	Reumatismo: se hierve y se vaporiza 1 vez en la noche cada tercer día hasta alivio. Teñir/pintar el cabello: se corta y se pone negro en 2 horas, se muele fresco para dejar lo reposar cuando está negro se unta una vez y se enjuaga.	Tnúdíchi, saguaro, cactus órgano (Kuiper, 2003). De Ávila gives many different Mixtec forms for tnu dichi related cognates of tnudichi refer to a variety of different species of CACTACEAE in the Mixtec languages. Many of the forms have a second descriptor possibly specifying the species (De Ávila, 2010: 93-94).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu duñu	romerillo	M,S	AP34 AP135 AP214	ASTERACEAE *Baccharis pteronioides* DC., ASTERACEAE, ASTERACEAE	Dolor de muela; para que nazca el bebe	Dolor de muela: se muele el tallo y se pone en la muela, se cambia hasta que se va el dolor, pequeña dosis. Para que nazca el bebe: durante el parto para que nazca el bebe se da una taza bien calientita a la mujer.	Tnúdúñu, un tipo de arbusto que se usa para barrer (Kuiper, 2003).
tnu granada	granada	M,S	AP216	LYTHRACEAE *Punica granatum* L.	Infección del estómago; diarrea; toz	Infección del estómago: se hierve el tallo y se toma 2 tazas, mañana y tarde hasta 3 días. Diarrea: se hierve la cascara y se toma como agua de tiempo hasta el alivio; se hierve la cascara con las hojas o la fruta de guayaba con coyul y se combina con maguey papalomé. Toz: se hierve la cascara de la fruta y se toma antes de dormir hasta que se componga.	De Ávila gives yutnu ndɨdi: granado árbol for Tamazulapan (De Ávila, 2010: 105).
tnu iña	ramosilla		AP309	ROSACEAE *Cercocarpus pringlei* (C.K.Schneid.) Rydb.	Se hace trompos de su madera		Tnú íña, las hojas de este árbol parecen mucho a las del moral, crece de igual tamaño que el moral, pero su tronco no es tan grueso. Los bueyes comen sus hojas (Kuiper, 2003).
tnu kawa/tnu kawa kwaa/yuku tnu kawa (kwaa), tnu yuku kawa	hierba de ángel	M,S	AP15 AP66 AP193	ASTERACEAE *Ageratina petiolaris* (Mociño & Sessé ex DC.) R.M. King & H. Robinson, ASTERACEAE, ASTERACEAE	Caldearse cuando duele el cuerpo; granos; bilis; después de alivio; temazcal; calentura; dolor de estómago; desparasitar; frío; frialdad; diarrea; para dar a una mujer que está dando leche a su bebe; reumatismo; cólicos	Se caldea con la hoja para dolor del cuerpo, también se puede ocupar en el temazcal. Se baña para el grano. Con la hierba loca se usan las hojas para enrollar la bracita de lumbre y se ponen en el estómago para la bilis. Después del parto: se combina con escobilla, romeru y se bañan las mujeres después de aliviar, se ocupan las ramas, una vez diario tres veces lo más caliente que aguantan, también al dentro del temazcal; se hierve el tallo y la mujer se baña después de	Tnúkáva, un tipo de hierba de ángel. Tnúkáva kuáan, un tipo de hierba de ángel. Este árbol crece hasta 3 a 4 metros, se usa para construir techos y hacer corrales para los animales. Tiene flores amarillas. Se usan las ramas para bañarse, se hierven en agua con dedalera (chuparrosa) y otras hierbas.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
						dar a luz 3 veces. Se combina con hierba loca y oreja de ratón; se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Calentura: la hoja se pone en las plantas de los pies y se va cambiando hasta alivio; las hojas se tallan con alcohol 1 o 2 veces por la noche. Dolor de estómago: se calienta la hoja en el comal y se pone en el estómago; se pone la hoja fresca con las hojas de la hierba loca y oreja de ratón en el comal, se envuelven en un trapo y se ponen en el estómago donde se caldea 3 veces ; se hierven las hojas y se toma media taza 2 veces. Desparasitar: se hierven las hojas y 3 días se toma una media taza en ayunas. Frío: se calienta la hoja en el comal y se caldea donde hay frío. Frialdad: se utilizan las hojas, cociendo las en la lumbre, formando un tamal y se aplica el tamal en el lugar donde hay dolor, cambiando 2 veces al día. Diarrea: se hierven las hojas y se toma el té. Para dar a una mujer que está dando leche a su bebe: se hierven hierba de ángel, espule, oreja de ratón y se baña la mujer con estas hierbas amargas para que da más leche. Reumatismo: la hoja se pone en el comal y calientito se pega en el lugar afectado. Cólicos: Una bolita de hojas con la lumbre al dentro se ponen en el estómago para los cólicos, se calma en 20 minutos.	También se ponen sobre el estómago de las mujeres embarazadas si tienen problemas dar a luz. Es hierba caliente (Kuiper, 2003). De Ávila gives i^{3}ta^{2} tu^{1} ka^{5}va^{2} for Yoloxóchitl, an unidentified species in the ASTERACEAE. He also gives yuku kawa: hierba de ángel for Tidaá. Identified as ASTERACEAE *eupatorium sp.* (the majority of species formely included in *eupatorium* are now placed in several other genera). kava/kawa: vesícula/corazón o médula del árbol/ tuerce, se enreda/ peña (CAB). Se ocupa antes de parto. Io inka nuu yuku ya'a te dani xenie'un tana xi nu sangui ña da'a (De Ávila, 2010: 98).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu kwendɨu	limón	M,S			Herida (infectada); diarrea	Herida infectada: se exprime el jugo de la fruta en la herida, una vez diario hasta alivio. Diarrea: se hierve la punta y se toman dos o tres tazas del té hasta que se corte.	Compare with tnútkuee ndɨû, un tipo de limónera (Kuiper, 2003). De Ávila gives nulimún: limón for Xayacatlán and tun limón: limónero for Ayutla (de Leon, 1980) (De Ávila, 2010: 100).
tnu nde'a drasnu	durazno	M,S	AP202	ROSACEAE *Prunus persica* (L.) Batsch	Bilis; calentura; nervios; diurético	Bilis: las hojas del durazno, capulín y el cogollito del carrizo se machacan y se baña la persona con el jugo tres veces en la mañana. Calentura: se hierven las puntitas de durazno, capulín con los pétalos de rosa blanca y se toma como agua de tiempo. Nervios; diurético: se hierve el agua y hasta el ultimo se ponen las flores y se toma como agua de tiempo.	Tnúndè'a tràxnu, durazno (Kuiper, 2003). De Ávila gives tonda'yá: peach tree for Alacatlatzala (De Ávila, 2010: 103). De Ávila also gives nunde'é trasnú: el durazno for San Miguel el Grande; nunde'e trasnú: duraznal for Chalcatongo and yutnu nda'ya: durazno el árbol for Tamazulapan (De Ávila, 2010: 104).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu nde'a kuxi/ tnu nde'a kwixi	capulinar, capulín blanco	M,S	AP28 & AP237	ROSACEAE *Prunus serotina* var. capuli (Cav.) McVaugh	Inflamación del estómago; calentura; bilis; alferecía; diarrea; gripe	Inflamación del estómago: 3 hojas en un litro de agua, una taza, es muy delicado/venenoso. Calentura: se hierven las puntitas de durazno, algunas hojas de capulín con los pétalos de rosa blanca y se toma como agua de tiempo. Bilis: las hojas del durazno, capulín y el cogollito del carrizo se machacan y se baña la persona con el jugo tres veces en la mañana. Gripe: se hierven las hojas y se toma como té.	Tnúndè'a kùxi, capulín (Kuiper, 2003). De Ávila gives tunde'e poli for Coicoyán, identified as ROSACEAE *Prunus serotina* Ehrh. var. *capuli* (Cav.) Mc Vaugh. Poli looks like a borrowing from Náhuatl capolin (De Ávila, 2010: 103). De Ávila also gives nunde'é tɨtúun: el cerezo, el capulín for San Miguel el Grande; nunde'e tɨtúun: capulinal for Chalcatongo and tnunda'ya: cerezo el árbol/guindo for Tamazulapan (De Ávila, 2010: 104).
tnu nde'a yo'o	hierba de chapulín		AP145	FABACEAE Dalea sp.	Frialdad	Se hierve el tallo en 4 litros de agua y se lava la parte afectada: vaporización hasta ver alivio, 1 vez a la noche.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ndee	somaque	M,S	AP64	ANACARDIACEAE *Rhus oaxacana* Loes.	Cicatrizar; infección del cuero cabelludo; rozadura; dientes aflojados; fuegos en la boca; dolor de muelas; problemas estomacales	Cicatrizar: la hoja se muele fresca o seca y la masa o el polvo se echa en la herida hasta que se cicatrice. Infección del cuero cabelludo: se muelen la hoja y la fruta verde y se revuelven en 1,5 litros de agua y se lava el cuero cabelludo 4 veces al día. Rozadura: se muelen la hoja y la fruta verde y se revuelven en 1,5 litros de agua y se lava la rozadura 1 vez al día por 5 días. Dientes aflojados: se mastica la hoja hasta que se componga. Fuegos en la boca: se mastica la hoja hasta que salga el jugo durante 2 días en la mañana y tarde antes y después de comer. Dolor de muelas: se hierve la hoja fresca o seca y se hacen enjuagues, también se mastica la hoja fresca. Problemas estomacales: se hierve la hoja y se toma como agua de tiempo para limpiar el estómago.	Tnúndèe, un tipo de arbusto que crece hasta un metro. Sus frutas pequeñasy rojas se mastica para curar llagas en la boca. Se muelen las hojas y la corteza y se pone el polvo en una herida (Kuiper, 2003). De Ávila gives tu'iya for ANACARDIACEAE *Rhus oaxacana* Loes. for Mixtepec (De Ávila, 2010: 96). De Ávila gives yutu nda'a ndee: árbol o arbusto de rama flexible for Apoala. ndee: tiene resistencia/llega/cuesta, vale/color azul (CAB). He also gives tunda'a ndee: copalillo for CAB (De Ávila, 2010: 102).
tnu ndee nda'a kwechi	somaque	M,S			Herida	Se hierven las hojas y se lava la herida.	
tnu ndee nda'a na'nu	somaque	S	AP318	,	Temazcal	Sirve para caldear en el temazcal.	
tnu ndee nda'a tkadɨ	somaque	S	AP16 & AP310	ANACARDIACEAE *Rhus standleyi* F.A.Barkley			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ndete	huaje	M,S	AP219	MIMOSACEAE *Leucaena* sp.	Quemaduras; comestible	Quemaduras: se usa la cascara en té y se lava la parte quemada, y la otra parte de cascara se muele y después de lavar se aplica el polvo. Se cambia diario hasta alivio. Comestible: se come la punta tierna o el huajito.	Tnúndéte, huaje (Kuiper, 2003).
tnu ndete koo	huaje de víbora, barba de chivo	M,S	AP299 AP38	MIMOSACEAE *Calliandra grandiflora* (L'Hér.) Benth., Compare with MIMOSACEAE *Calliandra* spp. and *Zapoteca* spp.	Diarrea	Se utilizan las hojas, se hierven en té y se toma como agua de tiempo hasta que se quita la molestia.	
tnu ndido	manzanita/ pinguica	M,S	AP8 & AP59	ERICACEAE *Arctostaphylos pungens* Kunth	Riñones; quistes en los ovarios; varicela; dolor de estómago; diabetes; granos en la boca	Riñones: se hierve la rama con las hojas o con la fruta y las hojas, se toma como agua de tiempo, un mínimo de 2 litros de té al día durante 15 días; la hoja se hierve con el cabello de elote, flor de piedra, níspero, la cola de caballo, se toma como agua de tiempo durante una semana. Quistes: la hoja se hierve con flor de piedra, se toma como agua de tiempo, una semana se descansa, una semana después se toma otra semana. Varicela: se hierven las hojas sin echar agua y se baña con el agua de planta durante 2 mañanas. Dolor de estómago: se hierve la fruta y se toma el té como agua de tiempo. Diabetes: se mezcla con cola de caballo, tronadora y se hace té, agua de tiempo. Granos en la boca: se mastica la hoja.	Tnútndídô, un arbusto que crece hasta 2 metros. Da moras comestibles de color amarillo, se toma el té de las hojas de este arbusto para curar la disentería o la infección de los riñones (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ndii	encino		AP349	,			Tnúndíî, un tipo de encino, mide hasta 10 metros y es duro. Se usa para hacer mangos de las hachas, las cuñas de los arados y yugos. Su corteza es roja y rasposa. Sus hojas son pequeñas y los chivos las comen. Da bellotas. La corteza cruda se mastica para curar llagas en la boca (Kuiper, 2003). De Ávila gives nukajín: encino for Chalcatongo (De Ávila, 2010: 97); tonchii: encino for Chinango and tundii for Coicoyán; tun^{5}ndi^{1}i^{5} for Yoloxóchitl; tunii tuun: encino for Yosotato; ndyii: encinos for San Juan Mixtepec, all identified as FAGACEAE *Quercus* sp. He also gives Yitun ndii/ndii: encinos for Cuatzoquitengo (De Ávila, 2010: 105).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ndɨu	granicillo/huele de noche, sanalotodo	M,S	AP3 AP12 AP92 AP143 AP235	SOLANACEAE Cestrum sp. 1, SOLANACEAE Cestrum sp. 2, SOLANACEAE *Cestrum laxum* Benth., SOLANACEAE *Cestrum oblongifolium* Schltdl., SOLANACEAE *Solanum* sp.	Dolor de estómago; calentura; mal de ojo; sarampión	Dolor de estómago: se forma un tamal de las hojas y se lo pone donde hay dolor. Calentura: la hoja se pone en las plantas de los pies, se deja hasta que absorbe la temperatura (menos tiempo cuando está más alta la temperatura) y se cambia hasta que se componga; se ponen las hojas abajo de la sabana o en la cama en que se acuesta el enfermo. Mal de ojo: se hojea con la ramita con alcohol 3 veces, con copal.	Tnútndɨû, un tipo de arbusto. Se muelen las hojas y se usan para curar quemaduras. Es una hierba fría (Kuiper, 2003).
tnu ndɨu yuku, kɨndɨ yuku	-		AP103 AP359	SOLANACEAE *Solanum pubigerum* Dunal, ,			
tnu ndoko	zapotal	M,S			Controlar la presión; limpias; insomnio; toz ferina	Controlar la presión: 7 hojas de zapotal y 7 hojas de chayotal se hierven y se toma como agua de tiempo para controlar la presión. Se combina con el ajo molido de que se toma una cuchara diaria; las hojas se hierven y se toma como agua de tiempo cuando uno se siente mal. Limpias: se ocupa el tallo con alcohol. Insomnio: se ponen las hojas en la cama y se hierven las hojas y se toma. Toz ferina: se pone la hoja con vaporu en los pulmones en la noche, tres a cuatro veces.	Tnúndókô, zapote (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ndoko lingu	zapotal blanco	M,S	AP43	RUTACEAE *Casimiroa edulis* Llave & Lex.	Controlar la presión (cuando es alta); insomnio; dolor de huesos; temazcal; calentura	Controlar la presión: para la alta presión se hierven 3 hojas y se toma 1/4 de taza por 3 días; se hierven las hojas y se toma cómo agua de tiempo. Insomnio: las hojas en té, igual se puede comer la fruta, una taza antes de dormir durante 3 días; se come 1 o 2 frutas de zapote después de la comida por 3 días. Dolor de huesos: se ocupa la hoja, se caldea donde duele, se puede pegarla con el ladrillo que es caliente. Temazcal: se hacen rollitos de las hojas y se hojea en el temazcal. Calentura: se golpea con los tallos.	Tnúndoko língô, zapote blanco (Kuiper, 2003).
tnu nduchi idu	gacho del venado	M,S	AP32 & AP304	SAPINDACEAE *Dodonaea viscosa* (L.) Jacq.	Baños de parto, temazcal	Baños de parto: se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Temazcal: se pega con el rollo de los tallos frescos en el temazcal; también se baña la mujer después de dar a luz al dentro de temazcal con esta planta.	Tnúnduchi ídû, es un arbusto que crece hasta 4 metros, tiene flores azul-moradas, se usan las hojas para pegar el cuerpo en el temazcal (Kuiper, 2003). De Ávila gives the name tuche'e (MXT) with the identificationfor SAPINDACEAE *Dodonaea viscosa* (L.) Jacq. (for San Juan Mixtepec (De Ávila, 2010: 91)).
tnu nduchi nde'e	grillal	M,S	AP195	EUPHORBIACEAE *Ricinus communis* L.	Calentura	Calentura: se pega la hoja fresca en el frente, en el estómago con un pedazo de tortilla, se rosea con un poco de agua y se va cambiando hasta que se baja la temperatura.	Tnúnduchi dé'en, higuerilla (Kuiper, 2003). It is the sole species in the monotypic genus Ricinus, yet the people of Tilantongo distinguish between grillal rojo and grillal blanco.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu nduchi nde'e kwe'e	grillal rojo	M,S			Dolor de pecho, aire	Las hojas con alcohol se aplican donde duele, se cambian cada 20 minutos.	
tnu nduchi nde'e kwixi	grillal blanco	M,S	AP25	EUPHORBIACEAE *Ricinus communis* L.	Calentura; dolor de cuerpo	Calentura: se cortan las hojas y se pone alcohol y se aplican en el cuerpo, se cambian cada 20 minutos hasta alivio; se cortan las hojas y las tiende uno en la cama y allá se acuesta, cada día se cambian las hojas; se coloca la planta fresca en las plantas de los pies, en la espalda, en la cabeza y se va cambiando las hojas. Dolor de cuerpo: la hoja con clara de huevo se pega donde hay dolor y se amarra hasta que se seca y se cambia.	
tnu neñu	moral		AP280	ROSACEAE *Rubus trilobus* Ser.	Comestible	Se come la frutita.	Tnúnéñû, un tipo de árbol que da moras (Kuiper, 2003). De Ávila gives nunéñú: moral for San Miguel el Grande, neñu: mora, probably MORACEAE *morus* sp. He also gives tnuneñu: árbol de mora, moral for CAB along with other cognates (De Ávila, 2010: 100, 101).
tnu neñu yuku, tnu neñu kolo	zarzamora	S	AP227	ROSACEAE *Rubus adenotrichus* Schltdl.	Comestible; dolor de oído	Se corta el tallo de la zarzamora para obtener la leche que sale, se ponen algunas hojas de la ruda, se asa la cabeza de viejo y se saca el corazón, todo se pone en el oído 2 veces al día.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu nii	elite	M,S	AP320	BETULACEAE Alnus sp.	Sarna; viruela	Sarna: se hierve la hoja y se baña uno normalmente hasta que se quita. Viruela: se hierve la hoja y se baña uno hasta que pasa.	Tnúníi, elite, con la madera se hace canoas, bateas y cucharas grandes (Kuiper, 2003). De Ávila gives tunii: elite for Coicoyán, identified as BETULACEAE *alnus* sp. Bunches of its leaves are used in the *temazcal*. He also gives tunii for San Juan Mixtepec identified as BETULACEAE *alnus acuminata* Kunth subsp. *glabrata* (Fernald) Furlow. nii/niñi/nɨñɨ: sangre (blood)/mazorca (corncob) from CAB. Also, in Acuña tnunii, described as a tree whose bark is ground and painted in the manner of red ochre, identified by Martínez 1979 as BETULACEAE *alnus* spp. (De Ávila, 2010: 101).
tnu ñuu	encino capulincillo	M,S	AP347	,	Temazcal	Se hacen rollitos de las hojas y se hojea con la rama en el temazcal.	Tnúñúû, un tipo de encino, crece hasta 5 metros de altura. Los chivos, borregos y bueyes comen sus hojas cuando son tiernas. Cuando estas hojas retoñan, el encino da una fruta llamada luyu que la gente come tierna (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ñuu chi	fresno/encino de agua	S	AP218	OLEACEAE *Fraxinus uhdei* (Wenz.) Lingelsh.	Temazcal; fortalecer los dientes; calentura; teñir el cabello; la caspa; herida	Temazcal: si no hay Gacho de venado entonces se ocupa la rama del fresno. Calentura: se pone la hoja en la cama en el día y se acuesta algunas horas. Fortalecer los dientes: la corteza se mastica para los dientes flojos, cualquier momento. Se hierve el tallo con hoja, se usa cómo enjuague. La caspa: se hierve el tallo con hoja, se usa cómo enjuague para la caspa, para teñir se peina diario con el agua. Herida: se hierve la corteza, se lava la herida, 1 vez y después se pone pomada del médico.	Tnúnñúchi, fresno (Kuiper, 2003).
tnu ñuu kastila	sauce		AP316	SALICACEAE *Salix humboldtiana* Willd.			
tnu ñuu kwe'e	encino rojo	M,S			Dolor de muela; hemorragia; controlar la menopausia; lavado al dentro cuando bajaron los ovarios	Dolor de muela: se mastica la corteza o se hiérvala y se hacen enjuagues 3 veces al día durante 2 días. Hemorragia: para detener la hemorragia, se hierve la cascara y se toma una taza. Controlar la menopausia: tomar como agua de tiempo y bañar. Se hierve la corteza y se baña uno en la noche. Cubrirse muy bien. Lavado al dentro cuando bajaron los ovarios: se hierve la corteza en agua y se lava al dentro con una manguera.	Compare with tnútnúú kue'e, un tipo de encino (rojo) (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ñuu kwixi	encino blanco	M,S			Diarrea; herida; fortalecer los dientes	Herida: se usa la astilla (un parte del palo del árbol, se pega el palo con un hacha y la pura carne es la astilla). Se echa una hojita que se hierve negro el agua y se lava la herida, diario se lava algunas veces hasta que se componga. Se tuesta la astilla y el polvo se echa en la herida. Diarrea: se echa la hojita y se toma el agua, como agua de tiempo hasta que se componga. Fortalecer dientes: para los dientes se enjuaga 2-3 veces diario hasta que se componga.	Compare with tnútnúú kuíxi, un tipo de encino (blanco) (Kuiper, 2003). De Ávila gives nukaji kuiji/tnukaji kuiji/tunkaji kuiji: encino blanco for Caballero. Tukatsi kuitsi: encino blanco, *Quercus* sp., FAGACEAE for TXA (De Ávila, 2010: 97). Yutnu kuixi, iton kuxi/yiton kusi: encino blanco CAB (De Ávila, 2010: 99, 100).
tnu piru	el pirul negro	M	AP154	ANACARDIACEAE *Pistacia mexicana* Kunth			De Ávila lists several Mixtec names associated with pirul of which tnudia/tnudiya (CGM) seems closest to Tilantongo. ANACARDIACEAE *Schinus molle* L. p. 93
tnu piru	pirul	M,S			Limpias; temazcal; después del parto; diarrea	Limpias: se ocupa el tallo con alcohol y con la ruda y el chamizo blanco, se hojea una vez para el mal aire, cualquier tiempo se recoge. También se puede usar el tallo solo con alcohol para hojear para quitar el aire o el espanto. Temazcal: se hierve y se vaporiza. Después del parto: se hierven las ramas y se baña todo el cuerpo 3 veces. Diarrea: se come la punta tierna.	De Ávila gives the name ton dia'a: pirul for *Schinus molle* L. ANACARDIACEAE for Chinango.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ta'u	Pipal	M	AP189	FABACEAE Erythrina sp.	Dolor del cuerpo; comestible	Dolor del cuerpo: se caldea la parte afectada con las hojas calentadas en el comal. Comestible: se come la flor, frito.	Tnúta'ú, colorín, pipal. Las flores del colorín son sabrosas cocidas con frijoles y ejotes. Se asa la corteza del colorín, y sirve para curar heridas (Kuiper, 2003). Compare with Erythrina Americana (O'Gorman, 1963: 24).
tnu tau tnuu	chamizo negro	S	AP328	ASTERACEAE	Limpias	Con alcohol o agua bendita se hojea 3 veces.	
tnu tau/ tnu tau yute	chamizo del río/ chamizo de quete	M,S	AP30 AP65 AP200 AP321	ASTERACEAE *Baccharis salicifolia* (Ruiz & Pavón) Pers., ASTERACEAE, ASTERACEAE, ASTERACEAE	Espasmos; temazcal; dolor de hueso; frío; dolor de barriga	Espasmos: las hojas se utilizan para hacer parches, como plasmas, donde hay molestia, se cambian 2 veces al día hasta que se componga. Temazcal: hervir las ramitas en agua y se mete el agua en las piedras para vaporizar en el temazcal; también se puede utilizar las ramas para hojear. Dolor de hueso: se hace entablillados. Frío, dolor de barriga: se hierven las hojas y se caldea calientito.	Tnútáu, chamizo. Mide tres metros y medio de altura y sus flores son blancas. Se usa para hacer escobas, también se usan las ramas para pegarse en el temazcal (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu ti̶chi̶	aguacate	M,S	AP40	LAURACEAE *Persea americana* Mill	Después del parto para deshacer la sangre, hemorragia; cólicos de la regla; para que nazca el bebe; frío; dolor del estómago; golpe interno	Después del parto, hemorragia: se hierven las hojas y se toma como agua de tiempo; el hueso se muele y se hierve y se toma como agua de tiempo, hasta que se componga; baños de parto: se hierven las hojas y se hace una vaporización 2 veces. Cólicos de la regla: se hace un té de las hojas, 3 días se toma en ayunas. Para que nazca el bebe: se hierven las hojas cuando viene el tiempo que nazca el bebe y la mujer toma el té como agua de tiempo. Frío; dolor del estómago: se hierven las hojas y se toma como agua de tiempo. Golpe interno: las hojas se hierven y se toma como agua de tiempo para que deshace la sangre, hasta que se componga.	Tnúti̶chi̶, aguacate. Cuando las mujeres preparan quelites o violetas, ponen hojas de aguacate como condimento. También se usan las hojas para hacer un té que toman las mujeres para limpiar el útero después de dar a luz. Además, lo toman las personas que se han caído de un lugar alto (Kuiper, 2003).
tnu ti̶chi̶ ngutu	aguacate de monte		AP345	,			
tnu titnu, tutitnu	hierba loca	M,S	AP6 AP108	SOLANACEAE *Solanum lanceolatum* Cav., SOLANACEAE *Solanum* sp.	Mal aire; dolor del cuerpo; amamantar; berrinches; golpe; dolor del estómago; pies que apestan; después del parto; frío; empacho	Mal aire: se juntan las ramas de enebro con las ramas de la hierba loca y se pegan con alcohol contra el mal aire. Dolor del cuerpo: la pura hoja se talla, se pone en la lumbre con un poco de alcohol, se refriega la hoja con alcohol, se calienta y se talla uno bien 2-3 veces en la tarde en días siguientes. Amamantar: la fruta madura se unta en el pecho. Berrinche: la fruta se exprime en la boca para los niños berrinchudos. Golpe: se pega la hoja fresca y se amarra, se cambia cuando se seca, hasta que se componga. Dolor del estómago: se ocupa la hoja fresca, se calienta en el comal y se amarra donde hay dolor hasta que se calme, se cambia la	Tnútítnû, tútítnû, berenjena. Se calientan las hojas de la berenjena cerca de la lumbre y se ponen encima del estómago empachado (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
						hoja; se pone la hoja fresca con las hojas de la hierba de ángel y oreja de ratón en el comal, se envuelven en un trapo y se ponen en el estómago donde se caldea, 3 veces; se calienta la hoja en el comal y se pone en el estómago con alcohol o esquimil (con tabique) se vaporiza y se pone en el estómago en las tardes hasta componerse. Pies que apestan: Las frutas amarillas se secan y se untan en los pies para que no apestan. Después del parto: se hierve el tallo y la mujer se baña después de dar a luz 3 veces. Se combina con oreja de ratón y hierba de ángel; se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Frío: se caldea el estómago con la hoja calentada en el comal. También se puede hervir la hoja y hacer fomentos. Empacho: se pone grasa de chivo (es caliente, no del borrego como es frío) en la hoja fresca y se calienta con el carbón de lumbre y se pone en el estómago.	
tnu tkee	engreña, modroño, modroñal	M	AP18 AP67	ERICACEAE, ERICACEAE *Comarostaphylis polifolia* (Kunth) Zucc. ex Klotzsch	Frío, el guajolote come la fruta		

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu tnaña	cucharal		AP21	FAGACEAE Quercus sp.			Tnútnáñâ, un tipo de roble. Se hierve la corteza con agua y se enjuaga la boca con el té si un diente se ha aflojado y duele la boca. Si se enjuaga la boca a diario con ese té, los dientes que se han aflojado vuelven a ponerse firmes (Kuiper, 2003).
tnu tna'nu	quiebra hueso	M,S	AP363	,	Quebradura; falsedura	Quebradura: se caldea, se amarra la rodilla, se ocupa la hoja, se calienta con la lumbre, se puede combinar con la escobilla, se cambia hasta que se componga. Falsedura: se ocupa la corteza que se calienta en la lumbre y se amarra en la mano o el pie falseado.	Compare with ASTERECEAE Senecio praecox (O'Gorman, 1963: 76).
tnu tnd~~ɨ~~d~~ɨ~~	tnd~~ɨ~~d~~ɨ~~ kaka: elotes de cuervo	M			Diarrea		

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu tnu'a	casahuate	M,S	AP148	CONVOLVULACEAE *Ipomoea murucoides* Roem. & Schult.	Hinchazón; frío de los huesos; calentura; dolor de estómago; mordedura de víbora; temazcal; es una planta delicada/sagrada	Hinchazón: se hierven las hojas y la flor se hace una vaporización y se hace una pomada; se caldea con la hoja hervida y se amarra para que no pega el aire, hasta que se componga. Frío de los huesos: la hoja tierna se calienta en la lumbre, se pega y se venda, hasta que se componga, mañana y tarde. Calentura: se hojea con la ramita con alcohol 1 a 3 veces. Dolor de estómago: se ponen las hojas en la braza con agua y después se ponen en el estómago con el vapor. Mordedura de víbora: se asa la penca de sábila y se aplica con la hoja de casahuate molida que se calienta y se unta en la mordida. Temazcal: se hierve la hoja con la escobilla y se ocupa el agua en el temazcal para vaporizar el cuerpo.	Tnútnú'â, casahuate. Cuando se cortan las hojas sale un leche que se usa para curar pies heridos. También se ocupa para curar animales con mordidas de culebras. Se hierven las hojas en agua y con el té se calienta el área que está hinchada por la mordedura (Kuiper, 2003). De Ávila gives the name tuchima for CONVOLVULACEAE *Ipomoea murucoides* Roem. & Schult. for San Juan Mixtepec (De Ávila, 2010: 92).
tnu tnu'u ndayi kwechi	kawal chino/ kawal rasposo/ kawal espinudo		AP85	ASTERACEAE			Compare tnútnu'u ndáyu, un tipo de hierba (espinosa). La comen los animales (Kuiper, 2003). De'ye/nda'i/nda'yu/nde'yu/ntsa'yu: lodo (CAB (De Ávila, 2010: 99).
tnu tnu'u ndayi yuku	kawal del monte		AP312	ASTERACEAE			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu tnu'u vita	kawal, kawal de castilla, kawal liso	S	AP84 AP275	ASTERACEAE Tithonia sp., ASTERACEAE	Inflamación del estómago, estimulante estomacal	Inflamación del estómago, estimulante estomacal: se ponen a hervir los pétalos y las hojas y se toma media taza 3 veces al día antes de cada comida por 8 días.	Tnútnu'u víta, acahual. El acahual se parece a la hierba tnútnu'u ndáyu, nada más que las hojas de la otra planta son ásperas. Las hojas de acahual son redondas y amarillas (Kuiper, 2003). De Ávila gives tukava: cagual for Coicoyán, identified as ASTERACEAE *Tithonia diversifolia* (Hemsley) Gray. Its stems are used to make *corralitos* (animal enclosings) and *camillas* (small table or bed to transport the ill) (De Ávila, 2010: 98). De Ávila gives tunuu: cahual for el rosario Micaltepec, unidentified species in ASTERACEAE. Yuku tunuu for Jicayán de Tovar, identified as ASTERACEAE *Tithonia rotundifolia* (Miller) S.F. Blake (De Ávila, 2010: 102).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu tnuu, encino negro	Tejocote, encino negro	M,S	AP331 AP356	ROSACEAE *Crataegus mexicana* D. Don, ,	Toz; bajar de peso; gripe; dolor de estómago	Toz: la fruta se hierve, 1/4 taza cada 8 horas hasta alivio. Bajar de peso: el tallo y hojas se hierven, media taza antes de cada comida. Gripe: se hierve la fruta con canela y se toma como agua de tiempo. Dolor de estómago: se hierve la fruta y se toma como agua de tiempo.	Tnútnùu, tejocote. Tnútnúû, un tipo de encino (Kuiper, 2003). De Ávila lists encino negro, tnutyɨ'nkɨ tnuu (: encino negro for CAB), tyɨ'nkɨ: bellota (CAB) De Ávila, 2010: 93). He also gives nukaji tnuu/tnaa kaji tuun/tunkaji tuun: encino negro for CAB (Ávila, 2010: 97). Tonkuii ndiayi: encino negro (CAB) (De Ávila, 2010: 99). Ávila gives the name tunumi for San Juan Mixtepec, identified as ROSACEAE *Crataegus mexicana* Mociño & Sessé ex DC. From CAB tejocotal: tonumi/tuntinumi/ yiton tinumi/ nutinuu (De Ávila, 2010: 101).
tnu yaa kwaa	cucharon amarillo		AP352	,			Tnúyáá kuáân, un tipo de roble (amarillo) (Kuiper, 2003). De Ávila gives tukuoyo: encino de cuchara for Alcozauca. Identified as FAGACEAE *Quercus urbanii* Trel. (De Ávila, 2010: 99).
tnu yaa kwii	cucharon verde		AP346	,			
tnu yaa kwixi	cucharon blanco		AP355	,			Tnúyáá kuìxi, un tipo de roble (blanco) (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu yaka	cuatillo	M	AP291	FABACEAE *Eysenhardtia subcoriacea* Pennell	Mal de orina, riñones	Cortamos su corteza y la hervimos en agua y lo tomamos como agua de tiempo hasta se quita la molestia.	Compare with tnúyákú. Las hojas de este árbol son rasposas. Este árbol casi se ha extinguido (Kuiper, 2003).
tnu yɨkɨ	espinal amarillo	S	AP155	MIMOSACEAE *Acacia farnesiana* (L.) Willd.	Insecticida, repelente	De la flor y semilla se hace un aceite y se aplica en la piel para repelar los mosquitos.	Tnúyɨkɨ̂, un tipo de huizache (Kuiper, 2003). De Ávila gives the name tnuchindyichi: huizache for probably MIMOSACEAE *Acacia farnesiana* (L.) Willd. for Chigmecatitlán (De Ávila, 2010: 86). For Yoloxóchitl Ávila gives the name tun^{5} i^{3}ñu^{5} nda^{3} ya^{5} for MIMOSACEAE *Acacia farnesiana* (L.) Willd. (De Ávila, 2010: 95). He also gives tnukua: cubata for Chigmecatitlán, it has yellow flowers and is probably MIMOSACEAE *Acacia* sp. (De Ávila, 2010: 98).
tnu yɨkɨ nda'a vilu, tnu yɨkɨ tnɨñɨ vilu	uña de gato	S	AP325 AP327	MIMOSACEAE Mimosa sp., MIMOSACEAE Mimosa sp.	Controlar la presión si es baja	Se hierven las hojas y se toma 1 taza diaria durante 7 días.	Compare tnúyɨkɨ íñû, un tipo de planta (espinosa) (Kuiper, 2003). De Ávila gives tuchínchi: uña de gato, apparently a thorny species in the MIMOSACEAE for el Rosario Micaltepec (De Ávila, 2010: 92).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu yɨkɨ tnuu	espinosilla negra	S			El cabello; heridas	El cabello: se hierve y se lava el cabello cada vez que uno se baña durante 1-2 meses. Herida: las hojas se muelen, se hierven y se aplican como fomentos, con el agua se lava la herida, una vez diario hasta alivio.	
tnu yoko ndɨ'yɨ	llegalan		AP186 & AP292	ROSACEAE *Malacomeles denticulata* (Kunth) G.N.Jones			Tnúyoko tndɨ'yî, un tipo de yagalán (Kuiper, 2003).
tnu yoo	carrizo	S	AP220	POACEAE *Arundo donax* L.	Infección del cuero cabelludo; dolor; bilis	Infección del cuero cabelludo: se usa el cogollo (parte más tierna del carrizo), se hierve y se lava con el agua tibia cada tercer día por una semana; se hierven las hojas y se baña la persona durante 1 mes cómo tiene costumbre bañarse.	Tnúyóô, un tipo de carrizo (Kuiper, 2003).
tnu yuju	sabino	S	AP149	CUPRESSACEAE *Taxodium mucronatum* Ten.	Controlar varices	Se hierven la rama y la fruta y se hace una vaporización y se aplica la pomada hecha de lo mismo. Durante un mes, en la noche.	Tnúyújûn, sabino (Kuiper, 2003).
tnu yuku ñama	lengua de vaca/tepozán	M,S	AP39 AP63	LOGANIACEAE *Buddleja cf. crotonoides* A. Gray, BUDDLEJACEAE *Buddleja cordata* Kunth	Mal aire; empacho; hinchazón; temazcal; controlar diabetes; vista enferma; purga	Mal aire: se hojea con alcohol hasta mejorar. Empacho: se hierven las hojas con cal y se toma 1/4 taza por 3 días en ayunas. Hinchazón: se pegan las hojas con alcohol, se cambian 2 veces al día. Temazcal: se hierve la hoja y se vaporiza al dentro del temazcal. Controlar diabetes: se hace té de la hoja y se toma como agua de tiempo. Vista enferma: se muele la corteza y se pone el polvo en los ojos con un papelito para que sane la vista. Purga: se hierven las puntas tiernas, se toma el té en ayunas como purga 3 veces.	Tnúyuku ñámâ, lengua de vaca (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnu yuku ñama kwechi, yuku ngutu	tepozán chico		AP23 & AP204	SCROPHULARIACEAE *Buddleja sessiliflora* Kunth			
tnu yundu	modroño/ palo guero/ capulín de monte	S	AP351	,	Endurecer los huesos	Cuando duelen los huesos hay que tomar un baño de asiento, se hierve la cascara.	Tnúyú'ndu, un tipo de madroño (arbutus glandulosa). Se utilizan los palos para hacer horcones de casas y para leña. Los chivos comen sus hojas (Kuiper, 2003).
tnu yuxa	ocote	M,S	AP11 & AP129	PINACEAE Pinus sp.	Cólicos de la regla; frío; inflamación del estómago; fracturas; torceduras; toz; mal aire; herida; dolor de espalda; reumatismo; tirar la placenta; hemorragia	Cólicos de la regla: las puntitas verdes se combinan con las puntitas de ruda, se hierven y se toma el té 3 mañanas en ayunas. Frío: las hojas se hierven y se toma para el frío como agua de tiempo; se hierven las astillas (de las ramitas) y se toma la crementina que sale, una taza por la tarde. Inflamación del estómago: se hierven las astillas y se toma la crementina que sale, una taza por la tarde. Fracturas; torceduras: se usa la crementina, se derrite y se unta en la parte afectada con periódico, se puede untar con la escobilla con la miel, se deja y se venda y solo se despega; crementina con flor de chuparrosa y escobilla con sus hojas tiernas. Se corta un pedazo del árbol y sale la crementina. Se pega en el lugar y se venda. Si suda mucho hay que quitarla y volverla a poner temprano y en la tarde. Como las torceduras son frías; se ocupa la crementina, se pega donde hay quebradura, cruda con alcohol o con escobilla. Toz: se hierven las	Tnúyúxâ, ocote. Poco copal sale del ocote. Se usa su resina para pegar la piel donde hay una herida. Antes la gente hacía antorchas de ella (Kuiper, 2003). De Ávila gives yutnu ite/yutnu yusa: pino for Tamazulapan (extinct) (De Ávila, 2010: 96).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
						rajitas y se toma el té con canela y ajo. 1 taza en la noche por 3 días; se hace té, media cuchara de crementina en medio litro de agua y se toma 1/4 taza 2 veces al día, 7 días. Mal aire: se hace té, media cuchara de crementina en medio litro de agua y se toma 1/4 taza 2 veces al día, 7 días. Herida: la crementina se pone en una herida, se unta; molemos el camote de tamorial, con el camote de la hierba del manso, con las hojas de la vergonzosa con la crementina y lo ponemos en la herida. Dolor de espalda: la crementina se unta cuando duele la espalda, algunas veces y se amarra. Reumatismo: se pega la crementina sola en el lugar afectado, tibiecita. Hemorragia: se ocupan las rajas de ocote, se hierven y se toma el té 3 veces.	
tnuta duxa	árnica amarilla/árnica chica	M,S			Herida; aire; dolor de estómago; golpe; tuchi; diarrea	Herida: se aplican las hojas molidas con alcohol una vez; se hierve el tallo con hoja y flor y se lava la herida con el agua. Dolor de estómago: se hierven las flores y se toma 1 taza al día hasta alivio. Aire: se aplican las flores con alcohol una vez. Golpe: se hierve el tallo con hoja y flor y se toma el té 2 o 3 veces. Tuchi; diarrea: se hierven las hojas o los tallos con hoja y flor y se toman 2 a 3 tazas al día hasta alivio.	Tnútadúxâ, un tipo de hierba (lit: árbol de flor de copal). Tiene flores amarillas, es pegajosa, se vierten dos o tres tazas del té de las hojas en una herida para limpiarla (Kuiper, 2003).
tnuta mino	chamizo de monte		AP17 AP354	ASTERACEAE *Baccharis heterophylla* Kunth, ,			Tnútamínô, un tipo de hierba (Baccharis conferta) (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnuta ndeka	lirio	S			Garganta irritada	Se hierven 2 camotes en medio litro de agua y se hacen enjuagues 2 veces al día hasta alivio.	Ita ndékâ, un tipo de orquídea, color rosa (Kuiper, 2003).
tnuta ve'yu kwechi	-		AP236	CAMPANULACEAE *Lobelia laxiflora* Kunth			
tnuta ve'yu, ita chiki rio'o, ita dyorio	chuparrosa, hierba del ramo, hierba de chuparrosa	M,S	AP75 AP105 & AP150	OROBANCHACEAE Lamourouxia sp.	Fracturas; torceduras; dolor de pies; temazcal; mordedura de animales	Fracturas; torceduras: crementina (se corta un pedazo del árbol y sale) con flor de chuparrosa, escobilla con sus hojas tiernas. Se pega en el lugar y se venda. Si suda mucho hay que quitarla y volverla a poner temprano y en la tarde. Como las torceduras son frías. Dolor de pies: se calientan las hojas en el comal, se ponen en los pies y se vendan, se cambia la venda cada día hasta que se componga. Es caliente hay que tener cuidado. Temazcal: se hierve el tallo y se baña en el temazcal. Mordedura de animales: se hierve y se lava donde pica el animal.	Ita nchíkirió'o, dedalera (lit: flor de chuparrosas). Tnútavé'yu, dedalera. Mide hasta un metro de altura. Las ramitas son ocupadas para curar los pies hinchados y torcidos. Se hierven en agua y esta solución se vierte en el pie. Los chuparrosas chupan la miel de sus flores rojas (Kuiper, 2003).
tnuta yatu	tronadora	M,S	AP19 & AP194	BIGNONIACEAE *Tecoma stans* (L.) Juss. ex Kunth	Controlar la presión; controlar la diabetes; dolor de estómago; diarrea; empacho	Controlar la presión; controlar la diabetes: la pura hoja se hierve y se toma como agua de tiempo. Dolor de estómago: se hierve la pura hoja y se toma una taza diaria hasta que se componga. Diarrea; empacho: se hierven las hojas con flor y se toma 1/4 taza por 3 días en ayunas.	Tnútayátu, tronadora (tecoma stans) (Kuiper, 2003). De Ávila gives tuni katiru siin: trovadora for Pinotepa Nacional, identified as BIGNONIACEAE *Tecoma stans* (L.) Juss. ex Kunth. Planta muy medicinal, viene siendo como el tabardillo de bueno (De Ávila, 2010: 101).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tnuta yuxi	chamizo blanco	M,S	AP14 & AP209	ASTERACEAE *Barkleyanthus salicifolius* (Kunth) H. Robinson & Brettell	Temazcal; mal de ojo; mal aire; limpias; calentura; ansiedad de los burros	Temazcal: se hierven las ramas con flor en agua y se mete el agua en las piedras para vaporizar en el temazcal. Mal de ojo: Se junta con el alcohol y se barre a los niños. También se prende y se pasa el humo debajo un trapito sobre la cara de los niños. Se ocupa con un huevo (limpia), se ocupa la ramita con pura hoja. 7 puntas para barrer y prenderlas. Se recogen todo el año. Se combinan con la ruda. Primero se limpia con el huevo, entonces se pone alcohol en las ramas y se barre el niño. Mínimo 3 días dura, 2/día limpiamos el niño en la noche y en la mañana. Mal aire, limpias: se hojea con 7 ramitas con ruda y con alcohol y con una oración. 3 veces en la tarde, 3 días enseguidas; uno machaca la hoja y con esta agua que sale uno se baña. Calentura: se barre con las ramas con alcohol para bajar la temperatura; se muelen las hojas y con el agua que sale se baña. Ansiedad de los burros: se remoja la hoja y se da el agua a tomar al burro contra el ansia, 1-3 mañanas.	Tnútayúxî (lit: él árbol de la flor del mal de ojo. Tiene flor amarilla. Se usan para limpiar a las personas a las que han hecho el ojo. Se soba la cabeza, la cara y la espalda (Kuiper, 2003).
tnutka'a	el injerto	M,S	AP156	VISCACEAE *Phoradendron reichenbachianum* Oliv.	Varicela; sarampión; lavar el cabello	Varicela; sarampión: se corta, se hierve y se revuelve con agua fría y se baña uno tres días. Lavar el cabello: se hierve y se lava el cabello cada vez que uno se baña durante 1-2 meses.	Compare with tnútka'a kuáan, un tipo de laurel amarillo (Kuiper, 2003).
tnutka'a vidi	laurel del monte	S	AP365	,	Apetito	Se hierven las hojas y se toma una taza en ayunas durante 3 días para estimular el apetito.	Tnútka'a vídî, un tipo de laurel. Se hace té de las hojas que se toma cuando uno tiene empacho (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
tutitnu kwixi	hierba loca blanca	M,S			Dolor del cuerpo; frío; dolor del estómago; dientes aflojados; diarrea	Dolor del cuerpo; frío: se utilizan las hojas, cociendo las en la lumbre, formando un tamal que se aplica en el lugar donde hay dolor, cambiando 2 veces al día. Dolor del estómago: se pone la hoja fresca en el estómago y se amarra con un trapito dos a tres veces. Dientes aflojados; se enjuague la boca con el agua hervida (en que se hirvió la planta). Diarrea: se hierve la planta y se toma el té para la diarrea.	
valeriana	valeriana	M,S			Nervios; problemas del cerebro; problemas estomacales; mal aire	Nervios; problemas del cerebro; problemas estomacales: se hierven 3 pedazos de raíz en 2 litros de agua y se toma 1/4 taza 2 veces diario por 7 días. Mal aire: se remoja el camote en aguardiente y se talla el cuerpo 3 veces.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
vi'inde	nopal	M,S			Presión; controlar diabetes; gastritis; dolor de intestinos; cruda; estreñimiento de los intestinos	Presión; se pela y se hierve con la cascara de miltomate, la sábila y se deja en el sereno y se toma como agua de tiempo. Controlar diabetes: se pela y se hierve con la cascara de miltomate, la sábila y se deja en el sereno y se toma como agua de tiempo; se pela, se muele crudo, se licua con agua y se ponen 7 gotas de limón, se toma diario durante un mes; crudo se licua y se toma en ayunas 2-3 veces. Gastritis: se hace un licuado de la hoja cruda, se toma en las ayunas durante 3-7 días. Dolor de intestinos: se licua la penca y se toma un vasito diario hasta que se componga. Cruda: se pela y se caldea el estómago con el pedazo el día que uno tiene la cruda, también se muele y se toma. Estreñimiento de los intestinos: se come crudo el nopal o se ponen a hervir 3 nopales en 1 taza de agua y se toma 1 taza en la mañana por 3 días.	Tnúvítnde, nopal. El nopal macizo es carnoso por dentro y su cáscara es dura (Kuiper, 2003).
Vi'inde chiki ko'o	nopal de coyote	S			Controlar diabetes	Se comen 5 tunas (las frutas del nopal) en la mañana durante 1 mes.	Chiki: opuntia fruit (De Ávila, 2010: 91)
vi'inde ñuu vidi	-	M					
yau kastila	maguey sábila/ sábila	M,S	AP20	ASPHODELACEAE Aloe sp.	Golpe; controlar diabetes; la vesícula; heridas; cicatrizar; acné; cabello; toz; picadura de animal; torcedura	Golpe: se calienta la penca en el comal y se pone y amarra donde hay golpe, se enfría y se pone otra vez hasta que se componga. Controlar diabetes: se licua con nopal y se toma; se le saca la pulpa y se toma así, es muy amarga, 5-7 días una vez diario. La vesícula: se pela la penca y se saca la carnita y se muele y se deja en el sereno y se toma	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
						una taza tres mañanas en ayunas. Heridas: el jugo de la penca se aplica hasta que se componga, mañana y tarde; se abre la penca y se pone un pedacito en la herida hasta que se seca y se pone otra vez si es necesario; la penca en la lumbre y se pega en la herida, se amarra, 3 veces una vez diario; se pone la penca en la lumbre, después de abrirla y se pone en la herida y se amarra, quita cuando se enfría y se pone otra vez hasta que se cierra la herida. Cicatrizar: se asa una penca/ se parta y se unta en la parte afectada y se espera hasta que se absorba, 1 vez en la noche por 3 días. Acné: se corta, se parte la mitad y se saca la pulpa y se unta en la parte afectada, se deja 15-30 minutos. Dos veces diario, mañana y noche durante 3 días. Crecimiento del cabello: se parte la mitad y se unta la pulpa en el cabello y se deja penetrar media hora y se lava cada vez que se baña. Toz: se cuece la penca y se pega en el pecho o espalda y desinflama. Picadura de animal: se caldea cocido donde picó un animal; se asa la penca de sábila y se aplica con la hoja de casahuate molida que se calienta y se unta en la mordida. Torcedura: se asa en el comal y se coloca como plasma y se venda para que desinflama.	
yau kwii	maguey verde		AP132	AGAVACEAE Agave sp.			Yáu kuìi, un tipo de agave para pulque. Sinón: yáu tàta (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yau nduxa	maguey papalomé	M,S			Golpes (internos); herida; vesícula; los riñones; quistes; diabetes	Golpes (internos); herida: se muele la penca cruda para sacar el jugo y se toma la mitad de un vaso en las mañanas hasta desaparece el dolor. Da mucha comezón. Se aplica el jugo también, cada mañana hasta que se componga. Herida: se abre la penca y se asa en la lumbre y se amarra. Se caldea y se venda muy buen. Algunas veces, depende de la herida. Vesícula: se machuca la penca y se recolecta el jugo y se toma una taza cada mañana 3 días en ayunas. Los riñones: se muele la penca, se cuela y se toma un cuarto de vaso 1 vez al día por 3 días como máximo. Diabetes; quistes: se corta la penca y se asa en el comal y se saca el juguito machacando la penca y se toma el jugo.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yau ngichi		M			Herida; golpe interno	Herida: se muele la penca cruda y se exprime el jugo y se toma una jícara pequeña una hasta tres veces. Golpe interno: se exprime el jugo y se toma crudo por las ayunas hasta componerse.	(Yáu) ngíchî, un tipo de maguey o sábila. Las pencas de este maguey son delgadas; no son anchas como las de los demás magueyes. Se hierven y se toma el agua si la sangre se ha coagulado en el pecho o si se tiene dolor de estómago. También se asan y se untan en la mano o el pie para curar torceduras. Así se prepara para masticarlo y comerlo: se corta la parte blanca de la penca, se pela y se despedaza. Luego se busca coyul. Se mide en partes iguales el coyul y el maguey: un tenate de maguey y un tenate de coyul. Debido a que el coyul es agrio, los dos se cuecen juntos y se ponen dulces por el maguey. Se echan en una olla y se ponen en la lumbre donde se cuecen por cuatro o cinco horas, hasta que se pueden masticar. Según la gente también sirve para curar manchas en la cara y heridas (Kuiper, 2003).
yau twixi	Maguey vedo	M, S			Lavar el cabello; lo comen los animales	Lo comen los puercos, chivos, toros. Lavar el cabello: se hierve la penca y se lava el cabello.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yudi nde'a	guayabita, hierba del toro		AP115 AP269	ONAGRACEAE *Lopezia racemosa* Cav. var. Racemosa, ,	Desparasitar		Yadi ndé'â, un tipo de hierba (comestible y silvestre). Crece 20 o 30 centímetros en altura. Da una flor roja. Se echan las hojas tiernas en una olla con agua, chile, sal y ajo. Se hierven hasta que se cuezan, y se comen (Kuiper, 2003).
yudi yuku, yudi yutnu	pastle/ eno	S	AP341	BROMELIACEAE *Tillandsia usneoides* L.	Controlar diabetes; prevenir cáncer	Controlar diabetes; se hierve y se toma como agua de tiempo.	Yúdi, eno (Kuiper, 2003).
yuku anis	anís	S	AP283	ASTERACEAE Tagetes sp.	Dolor de estómago; mal digestión	Dolor de estómago: toda la ramita se hierve y se toma como agua de tiempo. Mal digestión: se pone en aguardiente y se toma una media copita en la mañana antes de almorzar.	
yuku anis yuku	pariente de anís		AP252	ASTERACEAE			
yuku arnika kwixi	la árnica blanca		AP163	ASTERACEAE	Dolor de estómago		
yuku arnika ndee	árnica morada	S	AP300	ASTERACEAE	Dolor de estómago	Dolor de estómago: se muele el tallo y la pulpa se pega donde duele, se cambia 2 veces al día, hasta que se componga; el tallo se hierve, se toma una media taza de té una vez al día.	
yuku arnika yuku	árnica de monte	S			Herida; golpe interno	Herida: se hierven las hojas y se ocupa el agua para lavar heridas. Golpe interno: se hierven las hojas y se toma el té 2 a 3 veces en la noche.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku arnika/ arnika	árnica	M,S	AP199 AP329	ASTERACEAE, ASTERACEAE	Herida; golpe; golpe de corazón	Herida: se hierve el tallo con las hojas y se lava la herida con el agua 5 veces al día hasta que se componga. Golpe; golpe de corazón: se hierven las hojas o el tallo con las hojas y se toma como agua de tiempo.	Compare with heterotheca inuloides (biblioteca digital de la medicina tradicional mexicana). De Ávila gives the entry tiaxi, árnica (ZAU), which appears with the identification *Acourtia Dugesiidugesii* (Gray) Reveal & King, ASTERACEAE (for Alcozauca Guerrrero (De Ávila, 2010: 91)).
yuku chaa	cola de gato	M	AP56 AP98	FABACEAE *Dalea bicolor* Humb. & Bonpl. In Willd., ,	Toz	Se hierve té.	
yuku chaa da'ya ndute, da'ya chaa yuku	helecho, cría de agua	S	AP138	,	Baños, reumatismo	Se vaporiza con las hojas y también se hojea en el temazcal.	
yuku chanda	hierba de la cabezona	S	AP264	ASTERACEAE	Hinchazón de los pies	Se hierven la flor y hoja y se hace una vaporización en la noche hasta alivio.	
yuku chi'i	hierba de zorrillo, mostazon de zorrillo		AP120 AP175	BRASSICACEAE, BRASSICACEAE	Sarna; roña; piojos	Para la sarna, roña y los piojos se muele fresca, se hierve y se baña.	Yúkú chí'in, un tipo de hierba (medicinal, lit: hierba de zorrillo. Crece medio metro de altura en las milpas, campos de trigo y a la orilla de los caminos. Sus flores son blancas y delgadas. Los burros las comen (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku chɨ'ɨ ñaña	ruibarbo	M	AP307	EUPHORBIACEAE CrotonCroton [124]	Diarrea, purga	Se ocupa el tallo, se toma muy poquito, es peligroso.	Compare De Ávila tunii for Jicayán de Tovar identified as EUPHORBIACEAE *croton draco* Schldl (De Ávila, 2010: 101).

[124] I have not been able to find this botanical identification in any of the online botanical databases.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku chudini	oreja de ratón/ orejita de ratón/ hierba de estrella/ hierba de lucero	M,S	AP29 AP70 & AP101	ASTERACEAE *Brickellia veronicifolia* (Kunth) A. Gray	Vómito; frío; dolor de estómago; bilis; después del parto; temazcal; calentura; para dar a una mujer que está dando leche a su bebe; estreñimiento de los intestinos	Vómito: la punta fresca con flor se hierve y se toma 2 veces diario, temprano y tarde. Frío: se hierven los tallos solos o con hierba de ángel y antes de acostarse se baña uno y se enrolla en las cobijas. 2-3 noches. Dolor de estómago: hervimos un tallo y tomamos lo que podemos hasta que se componga- 3 días. Agua de tiempo; se pone la hoja fresca con las hojas de la hierba loca y hierba de ángel en el comal, se envuelven en un trapo y se pone el trapo en el estómago donde se caldea 3 veces. Bilis: se hierve el tallo, se toma como agua de tiempo hasta que se componga; después del parto: se hierve el tallo y la mujer se baña después de dar a luz 3 veces. Se combina con hierba loca y hierba de ángel; se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Se puede hervir la planta seca para bañar; tnuta ve'yu, ita dini, tnu kawa kwaa, se hierve y se baña al dentro del temazcal para que deje sangrar. Calentura: cortarla cuando uno tiene calentura o escalofrío, hervirla y bañarse 1-2 veces en la noche. Para dar a una mujer que está dando leche a su bebe: se hierven hierba de ángel, espule, oreja de ratón y se baña la mujer con estas hierbas amargas para que da más leche. Estreñimiento de los intestinos: se hierven los tallos y el enfermo toma el té como agua de tiempo.	Yúkú chudínî (medicinal, lit: hierba de estrella). Crece medio metro de altura. Da flores blancas desde el fin de septiembre hasta el mes de noviembre. Se hierve en agua para hacer té para curar el dolor de estómago. Son muy amargas. Compare ita chúdínî, se usa para dolor de estómago (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku chuun	lentejilla		AP127 & AP296	BRASSICACEAE Lepidium sp.	Gripe	Se pone toda la planta en alcohol durante 5 días y se baña todo el cuerpo con esta planta.	
yuku da'ya/ita kwixi kwechi	tipo de enredadera	M			Purga	Cuando viene el dolor del nacimiento del bebe, se hierven las hojas y se toma.	
yuku daxi	hierba de disentería, hierba de pollo, hierba de diarrea	S	AP107 & AP247	ASTERACEAE *Zinnia peruviana* L.	Disentería	Se hierve el tallo seco o verde con la orejita de ratón y se toma como agua de tiempo hasta que se componga.	
yuku dɨku	hierba de sapo	S	AP81 AP118 & AP169	EUPHORBIACEAE *Euphorbia* postrata[125], EUPHORBIACEAE *Euphorbia* sp.	Rozadura, herida	Rozadura: se pone la leche que sale del tallo en la piel. Herida: donde se corta uno se le pone la lechita que sale del tallo y con eso se cierra.	
yuku hierba nuestra	-	M					
yuku idi iñu, yuku ndi'i	hierba de espinilla		AP187 & AP208	PLUMBAGINACEAE *Plumbago pulchella* Boiss.			
yuku ita duxa	árnica de castilla, árnica de burro	S	AP221 & AP297	ASTERACEAE *Grindelia inuloides* Willd.	Barros; alergia; granitos de los moscos; baños de parto	Barros; alergia; granitos de los moscos: se hierve el tallo con flor y hoja y se lava la parte afectada 2 veces al día hasta alivio. Baños de parto: se hierve el tallo con flor y hoja y se vaporiza 3 veces.	

[125] I have not been able to find this botanical identification in any of the online botanical databases.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku kaja, makaxani yuku	yuku kaja	S	AP226 & AP336 AP298	LYTHRACEAE *Cuphea angustifolia* Jacq. ex Koehne, LYTHRACEAE *Cuphea aequipetala* Cav.	Baños de parto; temazcal	Se hierve el tallo con flor y hoja y se vaporiza.	
yuku kanserde, yuku yɨjɨ kwechi, ita kuwa	hierba de cáncer	M,S	AP119 AP125 AP134	, , ONAGRACEAE *Oenothera tetraptera* Cav.	Herida; granos	Herida: se hierve la hoja y se lava. Granos: se muele el camote y se aplica la pasta encima de los granos.	http://www.conabio.gob.mx/malezasdemexico/onagraceae/oenothera-tetraptera/fichas/ficha.htm#3.%20Identificaci%C3%B3n%20y%20descripci%C3%B3n. Same botanical identification and same name as ita kuwa.

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku kawa/ yuku kawa kwechi/ yuku ñaña/ tnu kawa ua	hierba de coyote	M,S	AP37 AP290	, ,	Dolor de estómago; temazcal; bilis; latido; dolor del cuerpo	Dolor de estómago: se toma con aguardiente para dolor de estómago 1 vez en la mañana; o se hace un té del tallo, también para latido, se recoge en el tiempo de lluvia, una vez diario, 3 mañanas se toma. Temazcal: se ocupa en el temazcal para el dolor del cuerpo o aire, hervido. Bilis: se muele la hoja fresca y se echa en agua y se toma una taza en ayunas durante 3 días. Dolor del cuerpo: vamos a juntar las hojas pequeñas de yuku kawa, las calentamos en la lumbre (las ponemos en el estómago, la espalda, nuestra cadera), se juntan las hojas frescas, y se calientan en el carbón y se ocupan para caldear el lugar afectado.	Tnúkáva úâ, un arbusto amargo de medio metro a un metro de altura. Flores blancas, hojas asperas. Se usa en el temazcal. Compare yúkú coyótê, se hierve la hierba con agua y se toma ese té para curar un ligamento que se ha movido de su lugar en el vientre. Es muy amarga (Kuiper, 2003). De Ávila gives ton kawa: el chilaco, *Montanoa tomentosa* Cerv., ASTERACEAE for Chinango. It is used to help give birth when the baby is having difficulty being born. Its flowers are used to decorate altars. He also gives nukavá: amarguita for San Miguel el Grande (De Ávila, 2010: 97-98).
yuku kaxi	hierba del frío	S			Calentura	Calentura: se hierve el tallo y se toma en té o molido, se toma como agua de tiempo con azúcar.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku kidi	escobilla	M,S	AP9 AP61 & AP100	ASTERACEAE *Gymosperma glutinosum* (Spreng.) Less	Dolor de rodilla; frío; quebradura; torcedura; golpes, heridas; reumatismo; baño cuando una mujer da a luz; asma	Dolor de rodilla; frío: la puntita verde, encima se pone aguardiente (caliente) y así se amarra y se cambia cada 24 horas. Con la lumbre la escobilla pierde fuerza. Quebradura: las hojas se ponen frescas o se calientan en el comal, por lo regular frescas y se vendan, y se cambian cuando se secan, se ponen con miel de abeja. También se pone crementina de ocote; se hace un entablillado con la hoja fresca, se quita cuando se seca y se pone otra vez. Torcedura: la pura hoja se pega en la parte afectada y se enrolla en un periódico-si el cuerpo lo acepta queda pegado 5-7 días y la planta se va a despegar, si se seca y empieza a picar hay que cambiarla; crementina con flor de chuparrosa, escobilla con sus hojas tiernas. Se corta un pedazo del árbol y sale. Se pega en el lugar y se venda. Si suda mucho hay que quitarla y volverla a poner temprano y en la tarde. Como las torceduras son frías. Golpes, heridas: se pega la hoja fresca y se amarra, se cambia cuando se seca, hasta que se componga. Reumatismo: las hojas tiernas se ponen con aguardiente en la rodilla, se vendan y se cambian cuando se secan hasta que se mejore. Baño cuando una mujer da a luz: se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Asma: las puntas tiernas se serenan y al día siguiente se toma una taza en la mañana por 3 días.	Yúkú kídi, un tipo de hierba (lit: pegajosa). La gente de la región la llama cedrón. Crece hasta 30 cm de altura. Son muy pegajosas y sus flores son amarillas. Se hierven y se ponen en las manos si se han fracturado o torcido. Son hierbas calientes. También se ponen esas hierbas en las partes del cuerpo adoloridas o donde hay reuma. Se envuelven las partes adoloridas con una tela. Tienen que estar pegadas durante mucho tiempo (Kuiper, 2003). De Ávila gives tundaku sivi: escobilla for el Rosario Micaltepec. Es más correoso. sivi: barrer, limpiar (De Ávila, 2010: 102).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku kidi, yuku cha'u	pegajosa	S	AP79 & AP250	FABACEAE *Desmodium subsessile* Schltdl.	Golpes internos; purificar la sangre; riñones; herida (interna)	Golpes internos; purificar la sangre: el camote se hierve, una taza en ayunas durante 5-6 días. Riñones: camote de color naranja, se hierve el camote seco y se toma como agua de tiempo. Herida: se seca el camote y se muele crudo y se echa el polvo y se amarra o se pone en agua hervida y se toma para heridas internas como agua de tiempo.	
yuku kɨndɨ	hierba clara		AP170	BORAGINACEAE *Antiphytum caespitosum* I.M.Johnst.	Diarrea		
yuku kolo, nde'a kolo	hierba real, hierba de guajolote		AP4 AP184	VERBENACEAE Lantana sp., VERBENACEAE Lantana sp.	Diarrea, dolor de oído		
yuku kwedayu	estafiate	M,S	AP35 & AP330	ASTERACEAE *Artemisia ludoviciana* Nutt.	Dolor del estómago	Se hierve con cal y panela y se toma.	
yuku kwedayu	gordolobo	M,S	AP110 AP136 & AP178	ASTERACEAE Gnaphalium sp.	Toz	Se hierve el tallo y se toma como agua de tiempo.	
yuku kwedayu yuku	gordolobo silvestre/ llantén	S	AP161	PLANTAGINACEAE *Plantago major* L.	Toz	Se hierve el tallo y se toma media taza 2 veces al día durante 1 semana.	
yuku kwete kwechi, yuku tndoo	hierba de cuete, hierba de araña		AP122 & AP176	GERANIACEAE *Erodium cicutarium* (L.) L'Her. ex Aiton			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku kweyido	hierba de dolor	M,S			Dolor de cuerpo; tristeza	Dolor de cuerpo: se busca el camotito y se pela un poquito y con la carnita se bata y sale espuma y se pone en la hoja del grillal blanco y se echa donde duele. 3 veces. Tristeza: se hierve la hoja con la flor de la rosa y se toma; se utiliza una mitad del camote batiendo lo como la clara de huevo hasta formar una espuma y esto se aplica en las costillas cuando hay temperatura, se puede combinar con la hoja de grillal, o para los sentimientos, se usa una vez.	Yúkú dolór. Un tipo de hierba medicinal. Parece hoja de zanahoria. Se muele finamente el camote y se pone en un plato hondo que contiene agua. Se bate para hacer espuma y se pone la espuma donde le duele al qué está enfermo de tristeza y enojo. También la gente lo toma crudo (Kuiper, 2003).
yuku kwiña, yuku yɨkɨ, yuku disipela	hierba de calavera, disípela, hierba de pasma	M	AP177 AP183 AP311	, , ,	Hinchazón		
yuku mansu	hierba de manzo	M,S			Quebradura; herida	Quebradura: se muele la raíz y se aplica la pulpa en la parte afectada hasta que se seca y se cae sola. Herida: se muelen las hojas frescas de la vergonzosa, con coyul, con el camote de tamorial y el camote de la hierba de manzo y se aplica la pasta en la herida.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku na tna'a	vergonzosa, hierba sosa	M,S	AP286	MIMOSACEAE *Mimosa albida*	Herida; cerrar el cuerpo; dolor de la espalda; infertilidad	Herida: se hierven las hojas y se toma como agua de tiempo. Se muele la hoja seca y se pone en la herida que se cierre después de lavarla con agua de sal. También se lava con el agua hervida de las hojas; molemos el camote de tamorial, con el camote de la hierba del manso, con las hojas de la vergonzosa con la crementina y lo ponemos en la herida. Cerrar el cuerpo: se toma en té, tallo y hojas 5 veces 1 vez diario en la noche. También se baña uno, cierra el cuerpo cuando duele, rejunta los nervios. Dolor de la espalda: se utilizan las puntas crudas y se pegan con crementina donde hay dolor de espalda o de las costillas una vez en la mañana y en la noche se toma un té de las hojas de la vergonzosa para calmar el dolor 2 o 3 veces. Infertilidad: se hierven las hojas y se toma como agua de tiempo por 3 días.	
yuku ndichi tkute	-		AP137	SCROPHULARIACEAE *Mecardonia procumbens* (Mill.) Small	Calentura		Ndichi: ejote (De Ávila, 2010: 92). ndichi: vaina (pod) (Amith and Castillo in De Ávila, 2010: 105).
yuku ndɨ'i	pegajosa		AP36	LOASACEAE *Mentzelia hispida* Willd.			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku ndoo	flor de la reina (morada)		AP251 AP273 AP279	COMMELINACEAE CommelinaCommelina, COMMELINACEAE Tinantia erecta, COMMELINACEAE			Compare O'Gorman, 1963: 146)
yuku ndo'o	-	M			Mal aire	Se remoja y se muele la raíz y se frota el cuerpo contra el mal aire.	Tnúndó'ô? (Kuiper, 2003).
yuku nduku da'ya	-		AP111 AP313	ASTERACEAE, ASTERACEAE	Ojo, mal aire, limpias		
yuku nga'a	diente de león	M,S	AP165	ASTERACEAE Taraxacum sp.	Controlar la diabetes; verrugas; dolor de estómago	Controlar la diabetes: se hierven las hojas y se toma como agua de tiempo. Verrugas: se muelen las hojas y se pone la pasta como una pomada. Dolor de estómago: se hierven las hojas y las flores y se toma el té dos veces.	
yuku nu ndo'io	-		AP211	RESEDACEAE *Reseda luteola* L.,			
yuku nu toto	hierba de estrellita	S	AP139 AP172	CARYOPHYLLACEAE *Sagina saginioides* (L.) H.Karst., ,	Mal de orina	Se hierve toda la planta, se toma como agua de tiempo.	Yúkú nuu tóto, un tipo de hierba (lit: hierba cara de la roca). Se asan las hojas en la lumbre para curar granos en la piel de los niños. Son hierbas calientes (Kuiper, 2003).
yuku nu toto/ yuku yuu	hierba mata gusano	M	AP158	APOCYNACEAE *Asclepias linaria* Cav.	Desparasitar	Es una hierba venenosa, se ocupa para matar gusanitos en heridas podridas de animales.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku ñuu	pico de pájaro		AP191 AP198 & AP239	ONAGRACEAE *Gaura coccinea* Pursh			Yúkú ñúû, un tipo de hierba (Oenothera) (Kuiper, 2003).
yuku nuu, yuku ii, ita ii	toloache	S	AP7 & AP234	SOLANACEAE *Datura stramonium* L.	Dolores musculares; reumatismo; hongos de los pies; plasmas; infecciones de los pies	Dolores musculares; reumatismo: se remoja la hoja en alcohol y se unta en las noches hasta que hay alivio. Hongos de los pies: se hierven las semillas y se mete los pies en el agua. Plasmas: se ponen las hojas con alcohol en el pecho y se cambian cada 10 minutos. Infecciones de los pies: se utilizan las hojas, flor y fruta, se hierven y se lava los pies en las noches durante 10 días.	Yúkú núu, un tipo de hierba alucinante (Kuiper, 2003). Bade writes about hallucinogenic seeds called semilla de la virgen used by a Mixtec migrant to divine the cause of her illness (Bade, 1994: 25). One of my experts told me about the seeds of toloache being used for divination, warning it is very dangerous. Another name for toloache is hierba de la virgen.
yuku pasma, yuku pasma kwechi, ita pasma kwechi, ita li'i	hierba de pasma	M,S	AP87 AP89 & AP131	PRIMULACEAE Anagalis arvensis	Bilis; hinchazón, desinflamar; toz ferina; mal aire; dolor de cabeza	Bilis: se muele la hoja y se licua, en una taza se pone en el sereno y se toma 3 días en ayunas. Hinchazón: se hierve la hoja y se caldea con un trapo donde duele. Desinflamar: se hierven las hojas y se pone sal, se lava con el agua o se enjuaga si es la garganta. 1 vez en las noches, no se toma agua fría, hasta alivio. Dolor de cabeza: se hierve y se baña la cabeza con esto cuando se cae el cabello o duele la cabeza.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku romeru	romero	M,S			Después del parto para deshacer la sangre, hemorragia; frialdad; limpias; mal aire; dolor de estómago; frío del estómago; frío; lavar el cabello; reumatismo; granos, infección; cuerpo cortado; nervios	Después del parto para deshacer la sangre, hemorragia: se hierve con hierba de ángel, escobilla y se baña lo más caliente que aguante una vez diario durante 3 días una mujer después de aliviarse; se usan 7 de las 8 hierbas mencionadas, se hierven rollitos de estas hierbas y la mujer se baña 3 noches. Se hierve el tallo seco o verde y se toma como agua de tiempo durante 40 días después de dar a luz. Frialdad: se toma como té en la mañana 3 veces. Limpias: se ocupa el tallo con alcohol y con la ruda y el chamizo blanco, se hojea una vez para el mal aire, cualquier tiempo se recoge; la hoja seca se quema para ahumear. Mal aire: se hierve el tallo cuando está floreando. 1/4 taza 2 veces. Dolor de estómago; frío del estómago: se hierve la pura hojita y se toma como agua de tiempo hasta que se componga. Frío: la ocupamos en el temazcal. Lavar el cabello: se hierve la hoja y se puede usar el agua para peinarse para tratar las puntas abiertas del cabello. Reumatismo: se hace una pomada con otras hierbas. Granos, infección: se hierve el tallo y se toma. También se echa los palos en alcohol y se dejan 2 semanas y después se lavan los granos con alcohol. Cuerpo cortado: se hierven las ramas, se toma el té 2 o 3 veces. Nervios: se hierve el tallo, se toma como agua de tiempo hasta componerse.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku santa maria	santa maría/ flor de santa maría	M,S	AP192 AP281	ASTERACEAE, ,	Dolor de estómago; bilis; baños de parto; dolor del cuerpo; el hígado, problemas estomacales; la vesícula; desinflamar; latido; nervios; cólicos menstruales; limpias; diarrea	Dolor de estómago: se hierven las hojas y se toma como agua de tiempo. Bilis: se muele la hoja fresca, se echa en agua y se toma en ayunas por 3 días. Baños de parto: se hierven los tallos con flor y hoja y se hace una vaporización 2 veces. Dolor del cuerpo; el hígado, problemas estomacales; la vesícula; desinflamar: las hojas y flores (el tallo) se hierven y se toma media taza en ayunas y en la noche durante 3 días. Latido: se hierve el tallo y se toma un vaso por ayunas 3 mañanas. Nervios; cólicos menstruales: se hierven los tallos, se toma el té 2 o 3 veces hasta quitar la molestia. Cantidades pequeños. Limpia: se barre con alcohol. Diarrea: se hierven las hojas y se toma el té hasta alivio.	Ita sánta mariá, flor de santa maría, se hierven las flores en agua para curar el estómago cuando gruñe (Kuiper, 2003).
yuku tachi kwixi/ yuku tachi	camote de conejo/ hierba de conejo	M,S	AP42	ASCLEPIADACEAE *Pherotrichis mixtecana* Brandegee	Dolor de estómago; mal aire; dolor de cabeza	Dolor de estómago: se muele el camote crudo y se toma una vez en la mañana y se repite una o 2 veces más si sigue el dolor; se escarba y se extrae la raíz y te comes 1/10 parte de raíz o te la tomas en 1/10 parte de raíz en 1 copa de aguardiente durante 5 días, descanso, otra vez el tratamiento hasta alivio. Mal aire: tomamos el camote verde, lo molemos y ponemos en agua o aguardiente, 1 copa al día en las ayunas hasta componerse; se muele la hierba y se talla o toma. Las hojas frescas o secas y el camote. Dolor de cabeza: se toma para el dolor de cabeza.	Yúkú tàchi kuíxi. Un tipo de hierba medicinal. Es pequeña y blanca. Se tuesten y se muelen los camotes de esta hierba. Se ponen en aguardiente, y se toma cuando entra aire en el vientre de una persona por no haber comido durante mucho tiempo (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku tachi tnuu	samarrial	M	AP263 AP285	ASTERACEAE, ASTERACEAE	Para bañarse; mal aire; dolor de cabeza; temazcal	Para bañarse: se ocupa el camote. Mal aire: se baña, se muele la hoja y se pone en agua tibia y se pone en la cabeza y la espalda; también se ocupa el camote para mal aire. Dolor de cabeza: se toma para el dolor de cabeza. Temazcal: se hojea al dentro del temazcal.	Yúkú tàchi tnúu, un tipo de hierba medicinal (lit: hierba de aire negro). Estas hierbas son pequeñas y su camote es oblongo. Los camotes se tuesten y se muelen, se echan en aguardiente y se toma cuando entra aire en el vientre de una persona por no haber comido durante mucho tiempo (Kuiper, 2003).
yuku tatna ruda, ruda	ruda	M,S	AP5 AP305	RUTACEAE *Ruta chalepensis* L., RUTACEAE *Ruta graveolens* L.	Mal de ojo; mal aire; latido; bajar la presión; dolor de oído; nervios; desparasitar; dolor de huesos; vómito; toz; dolor de estómago; empacho; calambre; dolor de cabeza	Mal de ojo: Se usan las hojas, se ponen en el alcohol 15 días y se unta el cuerpo. Se recogen todo el año. Se usa 3 veces al día hasta que se cure. Se cortan también ramas de 30 cm y se limpia a los niños, se les barre todo el cuerpo con la planta. Se calienta el alcohol en un frasco en una olla de agua y entonces se unta en el cuerpo. Para los niños es solamente lo de barrer, para los adultos solamente el alcohol. Mal aire: se rompe la hojita y se refriega la hoja con alcohol, se calienta y se talla uno bien 2-3 veces en la tarde en días siguientes; con la ramita se hojea con alcohol, se combina con chamizo blanco, pirul y oración, 3 días en medio día; Se ocupa con una frotación, con una limpia con huevo criollo, una oración también. Temprano 2-3 veces durante 2-3 días; molemos la hoja de ruda cruda con la hoja de alcanfor y ajo y alcohol y frotamos el cuerpo 3 veces; se usan las ramas para	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
						bañarse con alcohol 1 vez en la noche. Latido: las hojitas, se recogen cualquier tiempo, se muelen las hojitas en la licuadora en la mañana con cerveza y se toma 3 mañanas; se hierven las hojas y se toma como agua de tiempo. Bajar la presión: se hace un té de las hojitas, una taza diaria hasta que se componga. Pequeña dosis. Dolor de oído: las hojitas tiernas se ponen en el oído, se cambian cuando se secan hasta que se componga; se corta el tallo de la zarzamora para obtener la leche que sale, se ponen algunas hojas de la ruda, se asa la cabeza de viejo y se saca el corazón, todo se pone en el oído 2 veces al día. Nervios: se toman en té las puras hojitas 1 vez diario durante 3 días. Desparasitar: pura hoja en té en ayunas durante 3 días. Dolor de huesos: se muelen las hojas y se las ponen donde duele con alcohol. Vómito: las hojas en té, tomar un cuarto de taza en la noche 2 o 3 veces. Toz: se hierven las hojas y se pone chocolate, 1 taza en la noche durante 3 días. Dolor de estómago: se hierven las hojitas y se toma una taza. Empacho: se muele fresca la hoja y se toma. Calambre: se talla con alcohol. Dolor de cabeza: se toma en chocolate caliente y se come tortilla quemada.	
yuku tita	hierba de cucaracha	S			Temazcal	Se hierve la rama y se vaporiza.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku tɨtnɨñɨ kwaa, ita kwaa kwechi	hierba de ratón		AP106 AP130	ASTERACEAE, ,	Dolor de muela		
yuku tnama	la progresa		AP364	,	Dicen cuando crece va a dar hambre		
yuku tnani ñu'u	-	M	AP68 AP319	ASTERACEAE, ASTERACEAE	Dolor de respiración; frío; parto; inflamación	Dolor de respiración: se calienta la hoja fresca en el comal y se aplica en la espalda y el pecho, se cambia hasta que se siente alivio. Frío: se hierve y se baña uno tres noches para sacar la enfermedad fría. Parto: se toma un jarrito cuando va a venir el bebe para que nace rápido, las puntitas se hierven. Inflamación: para caldear o con vapor se pone donde hay inflamación.	Yúkú tnani ñú'u, un tipo de hierba (lit: hierba zoyate de tierra). Crece hasta 2 metros. Se muelen sus hojas y se ponen en una herida. Las flores y las hojas se hierven y se toma el té para curar el dolor de estómago. Para curar la diarrea o el paludismo, se hierven hasta que se ponga negro el té. se toma tres veces al día. También se hierven y se toma el té para curar el estómago frío. Además, es bueno que una señora lo tome cuando tenga problemas dar a luz (Kuiper, 2003).
yuku tnda'a	quelite de gusanito		AP249 & AP272	ASTERACEAE *Galinsoga parviflora* Cav.	Comestible	Se comen las hojas.	
yuku tndaka	-		AP94	DENNSTAEDTIACEAE Pteridium sp.			

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku tndaku	hierba de gusano, gordolobo de cuaresma	S	AP179 AP228	ASTERACEAE, ASTERACEAE Erigeron sp.	Alergia	Las hojas se hierven y después se pone la leche en el té y con eso se lava, las veces dependen de la alergia.	De Ávila gives tun^{5}nda^{15}ku^{3} : MORACEAE *Brosimum* sp. for Yoloxóchitl (De Ávila, 2010: 102).
yuku tne'e	-		AP133	VERBENACEAE Verbena sp.			
yuku tuchi	altamisa	M	AP1	,	Cólicos de la regla, sangre pegada		De Ávila gives the plant name tuchii for *Clethra mexicana* DC., CLETHRACEAE for San Juan Mixtepec (De Ávila, 2010: 91, 96).
yuku tuchi	amola de monterrey	M	AP360	,	Dolor de estómago; coraje; trabajos pesados; latido	Dolor de estómago: se usa toda la planta, se hierve y se toma. Coraje: 3/4 taza en ayunas hasta que se calma, se ocupa toda la planta, se hierve. Trabajos pesados: toda la planta en aguardiente, una copa. Latido: muy amarga, se hace té o se pone en aguardiente.	De Ávila gives tuchii/tuiyuw with the identification *Clethra mexicana* DC., CLETHRACEAE (De Ávila, 2010: 91).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku ua/ yuku kawa/ yuku hierba maestra	ajenjo/hierba maestra	M,S			Dientes aflojados; bilis; coraje; tuchi o cuerdas; dolor de estómago; la vesícula; dolor después del parto	Bilis: se serena la planta, se muele cruda y se toma en ayunas durante 3 días; se hace té de la ramita con hoja, se toma hasta que se calme, 3 mañanas una taza. Coraje; tuchi: se hace té de la ramita con hoja o las puras hojas, se toma hasta que se calme, 3 mañanas una taza. Dolor de estómago: se hace té de la ramita con hoja, se toma hasta que se calme, 3 mañanas una taza; se remoja el tallo con hoja en aguardiente y se toma una copita en ayunas. La vesícula: se muelen 5 hojas y se toman en un vaso de agua por 7 días en la mañana. Después del parto para el dolor se toma una taza de té de las hojas o del tallo.	

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku yaa	espule/ hierba de chapulín	M,S	AP10 & AP140	ASTERACEAE *Pinaropappus roseus* (Less.) Less.	Sarampión; bilis; varicela; ronchas; salpullidos; berrinche; coraje; calentura; para dar a una mujer que está dando leche a su bebe	Sarampión: toda la planta con raíz se muele y se pone en el sereno, al siguiente día se baña el niño en la mañana durante 3 mañanas, también toma el niño una cuchara durante 3 mañanas. Bilis: se muele toda la planta y se cuela con agua y azúcar y se toma 3 mañanas. Varicela; ronchas; salpullidos: se muele toda la planta con raíz y se revuelve con agua y se baña hasta que se apaguen los granos. Berrinche; coraje: se muele la pura hoja, se cuela con agua y se toma 3 mañanas una taza en las ayunas. Calentura: se muele toda la planta y con esta agua se talla/baña uno 3 veces. Para dar a una mujer que está dando leche a su bebe: se hierven hierba de ángel, espule, oreja de ratón y se baña la mujer con estas hierbas amargas para que da más leche.	Yúkú yàa, un tipo de hierba (pinaropappus roseus). Parece diente de león. Se la muele, echa en agua y se baña con ella si padece de sarampión (Kuiper, 2003).
yuku yawa	hierba de sapo	S	AP293	EUPHORBIACEAE *Euphorbia hispida* Boiss.	Hinchazón	Se hierve toda la planta con raíz y se baña 1 vez en la noche en la semana durante 1 mes.	
yuku yɨkɨ, kɨ'u yuku	hierba de tinta silvestre, hierba de hueso	M,S	AP152	,	Teñir el cabello, tonsilitis, yɨkɨ (hueso), su raíz pinta, fortalecer los dientes	Teñir el cabello: se hierve toda la hierba y se aplica 10 minutos antes de bañarse cada vez que se baña. Yɨkɨ (hueso): el camote se bate y sale espuma y se toma con agua tibia. Fortalecer los dientes: para fortalecer los dientes se mastica la raíz.	Yúkú yɨkɨ, un tipo de hierba medicinal (lit: hierba de la enfermedad de hueso). Mide 5 a 10 cm de altura. La gente hierve esta hierba con agua y el bebé toma el té. Se les da a los bebés cuando pierden el apetito por padecer de una enfermedad de los huesos (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuku yɨkɨ kwechi	llantén morado	S	AP80 & AP171	POLYGALACEAE *Polygala alba* Nutt.	Baños	Se hierve el tallo y se vaporiza.	
yuku yu'a, tnu yuku yaa	mostazon de burro, mostazon		AP26 & AP157	SOLANACEAE *Nicotiana glauca* Graham			
yuku yuu	hierba de san pablo, tabacón	S	AP69 AP144	, BORAGINACEAE Wigandia urens	Dolor del cuerpo; mal aire; reumatismo; frío	Dolor del cuerpo: se caldea donde duele con alcohol, se calienta la hoja en el comal. Se puede hojear también. Mal aire: se corta la rama y se pega con la rama con hoja y espina o se talla uno con la hoja, sin espina, tierna, con alcohol. Reumatismo: se hierve la hoja con flor y el tallo tierno y se hace una vaporización o fomentos con el agua caliente, después se puede golpear con las hojas crudas 1 vez en la noche cada tercer día. Frío: se calienta la hoja en el comal y se caldea donde hay frío.	Yúkú yúû, un tipo de arbusto (lit: hierba de cañada). Es espinoso. Sus hojas son muy grandes. Tiene flores moradas que no tienen ningún uso. compare tnúyuku yúu, un tipo de arbusto que crece hasta un metro y medio. Es verde cenizo y muy espinoso. Sus hojas son grandes y redondas (Kuiper, 2003). De Ávila gives tu kalá for Wigandia urens (Ruiz & Pavon) Kunth HYDROPHYLLACEAE for Tonahuixtla (De Ávila, 2010: 97).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuwa chuwa/ yuku chuwa	tika chola/ chica chola	M,S	AP197 AP282	, APOCYNACEAE Matelea sp.	Bilis; alferecía; calentura; purga; empacho; coraje	Bilis: se recoge el camote (su fruta), se muele y se deja en el sereno, se toma una taza diaria en las ayunas durante 3 mañanas. Alferecía: se muele la hoja cruda y se aplica en el cuerpo con la berresija algunas veces, depende como uno se siente. Calentura: tomando un camotito que se muele, se cuela para sacar el jugo y se toma de una a 2 veces en las mañanas en ayunas. Se serena. Purga; empacho: se muele el camote fresco y se cuela y se toma el juguito, 1 taza. Coraje: se machacan los camotes, se serenan y una virgen los muele y la persona los toma en agua, colada, 3 mañanas.	Yu'u chúan, estas plantas no crecen verticalmente, sino que se extienden en el suelo. Dan flores blancas. Cuando esas flores se marchitan, se forma el fruto que se llama chúan. Su tamaño es como el de un chile morrón. Tiene partes blancas y verdes. Se asa la fruta en la lumbre y se come con cáscara y carne, pero no se comen las semillas. Saben dulces y tienen la consistencia de una fruta algo seca y no jugosa. Saben como manzanas (Kuiper, 2003).
yuwa iti	quelite quintonil		AP123	AMARANTHACEAE *Amaranthus hybridus* L.	Comestible	Se comen las hojas tiernas.	Yùa t-ítî, un tipo de quelite. La gente come las hojas tiernas. Se lavan, se cuecen por cinco minutos y después se exprimen. Se revuelven con sal, cebolla, chile verde y jitomate, y de la mezcla se hacen bolas. Entonces se fríen en aceite. Se ponen en tortillas para comérselas (Kuiper, 2003).
yuwa ngutu, yuku nama	jabonera		AP254	PHYTOLACCACEAE *Phytolacca icosandra* L.			Yùa nkútu, un tipo de hierba (lit: hierba de toro). Se usa el fruto de esta hierba para hacer jabón (Kuiper, 2003).

Mixtec name	Spanish name	Free-listed	Coll. No.	Botanical name	Uses	Preparations	Notes
yuwa taka kolo/ yuwa taka ñu'u	quelite de guajolote	S	AP213	CHENOPODIACEAE *Chenopodium murale* L.	Comestible; herida	Herida: se hierve el tallo y se lava la herida 1 vez al día hasta alivio.	Compare yùa tákâ, un tipo de hierba. Parece huazontle. La gente come las hojas y las flores de esta hierba. Así se preparan las flores: se cuecen en un poco de agua y se exprimen; después se mezclan con cebolla, ajo y sal. Se untan las flores con huevos batidos y se fríen con aceite. Así se preparan las hojas: se echan en una olla con agua y se ponen en la lumbre a hervir. Se echan ajo, sal, chile y cebollas en la olla. Se cuecen durante quince minutos (Kuiper, 2003).

Mixtec plant names that refer to several plant species (see Appendix 3)

yuku tatna	Spanish name	Free-listed	Botanical name
da'ya ndute	el helecho acuático/cola de pájaro		,
da'ya ndute, silantru da'ya ndute	cilantro del monte/cilantro acuático		PTERIDACEAE Adiantum sp.
iñu chaa	espino de burro		,
iñu chaa	lechuguilla	S	ASTERACEAE Cirsium sp.
iñu kɨu	cardo santo/hierba de burro/cardo de burro	M	APIACEAE Eryngium carlinae F.Delaroche
iñu kɨu	hierba de sapo	M,S	APIACEAE Eryngium montanum J.M.Coult. & Rose
iñu ta'a	pata de cabra, espino de abrojo		SOLANACEAE Solanum grayi Rose, SOLANACEAE Solanum rostratum Dunal
ita kuwa, yuku kanserde, yuku yɨjɨ kwechi	hierba de cáncer	M,S	ONAGRACEAE Oenothera tetraptera Cav.,
ita kuwa, ita ngandii	flor de mariposa, hierba de golpe		ONAGRACEAE Oenothera rosea L`Hér. ex Aiton
ita kuwa, ita dini, ita xa niñi	bella atardecer		ONAGRACEAE Gaura mutabilis Cav., ONAGRACEAE Oenothera tetraptera Cav., ONAGRACEAE Gaura coccinea Nutt. ex Pursh
ita dini, ita kwaa	Pericón	M,S	ASTERACEAE *Tagetes lucida* Cav.
ita ndɨyɨ	flor de muerto	M	ASTERACEAE, PLANTAGINACEAE Penstemon sp.
ita ndɨyɨ	Floripondio	M	SOLANACEAE Brugmansia candida Pers
ita ndɨyɨ	hierba de muerto	M	ASTERACEAE
ita nuungandii, do'o tɨtnɨñɨ yuku, do'o tnɨñɨ yuku	oreja del ratón silvestre, cara del sol		POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.
ita nuungandii	cara del sol		VERBENACEAE *Verbena canescens* Kunth
kɨndɨ	hierba clara		LAMIACEAE Salvia sp., ASTERACEAE
kɨndɨ	la verbena		LAMIACEAE Salvia sp.
kɨndɨ kwechi (por sus semillas), yuku kɨndɨ	la verbena (grande)		LAMIACEAE Salvia sp.
kɨndɨ yuku	-		LAMIACEAE *Salvia mexicana* L.
kɨndɨ yuku, tnu ndɨu yuku	-		SOLANACEAE Solanum pubigerum Dunal
silantru idu	cilantro de venado	S	,
silantru idu, yuku idu, yuku xaxi idu	la lengua de venado/cilantro de venado	S	,
tnu ndɨu	granicillo/huele de noche	M,S	SOLANACEAE Cestrum sp. 1, SOLANACEAE Cestrum sp. 2, SOLANACEAE Cestrum laxum Benth., SOLANACEAE Cestrum oblongifolium Schltdl.

yuku tatna	Spanish name	Free-listed	Botanical name
tnu piru	el pirul negro	M	ANACARDIACEAE *Pistacia mexicana* Kunth
tnu piru	Pirul[126]	M,S	
yuku kaja, makaxani yuku	yuku kaja	S	LYTHRACEAE Cuphea angustifolia Jacq. ex Koehne, LYTHRACEAE Cuphea aequipetala Cav.
yuku kidi	Escobilla	M,S	ASTERACEAE Gymosperma glutinosum (Spreng.) Less
yuku kidi, yuku cha'u	Pegajosa	S	FABACEAE Desmodium subsessile Schltdl.
yuku kwedayu	Estafiate	M,S	ASTERACEAE *Artemisia ludoviciana* Nutt.
yuku kwedayu	Gordolobo	M,S	ASTERACEAE Gnaphalium sp.
yuku kweyido[127]	hierba de dolor	M,S	
yuku kweyido, kutnu yuku	verdolaga de monte		AMARANTHACEAE Gomphrena serrata L.
yuku tatna ruda, ruda	Ruda	M,S	RUTACEAE *Ruta chalepensis* L., RUTACEAE *Ruta graveolens* L.
yuku tuchi	altamisa	M	,
yuku tuchi	amola de monterrey	M	,
yuku yɨkɨ, yuku kwiña, yuku disipela	hierba de calavera, disípela, hierba de pasma	M	,
yuku yɨkɨ, kɨ'u yuku	hierba de tinta silvestre, hierba de hueso	M,S	,
yuku yuu	hierba de san pablo, tabacón	S	BORAGINACEAE Wigandia urens
yuku yuu, yuku nu toto	hierba mata gusano	M	APOCYNACEAE *Asclepias linaria* Cav.
yuku nu toto	hierba de estrellita	S	CARYOPHYLLACEAE Sagina saginioides (L.) H.Karst.

[126] As this plant was not collected, it is impossible to compare it to the other plant with the same Mixtec name, it is therefore not included in Appendix 4

[127] As this plant was not collected, it is impossible to compare it to the other plant with the same Mixtec name, it is therefore not included in Appendix 4

Spanish plant names that refer to several plant species (see Appendix 4)

yuku tatna	Spanish name	Free-listed	Botanical name
do'o tɨtnɨñɨ yuku, do'o tnɨñɨ yuku, ita nuungandii	cara del sol, oreja del ratón silvestre		POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.
ita nuungandii	cara del sol		VERBENACEAE *Verbena canescens* Kunth
-	Chepil, tronadora chiquita		FABACEAE Crotalaria sp.
-	hierba de estrella	S	,
yuku chudini	hierba de estrella, oreja de ratón, orejita de ratón, hierba de lucero	M,S	ASTERACEAE *Brickellia veronicifolia* (Kunth) A. Gray
yuku kwiña, yuku yɨkɨ, yuku disipela	hierba de calavera, disípela, hierba de pasma	M	,
yuku pasma, yuku pasma kwechi, ita pasma kwechi, ita li'i	hierba de pasma	M,S	PRIMULACEAE Anagalis arvensis
iñu kɨu	hierba de sapo	M,S	APIACEAE Eryngium montanum J.M.Coult. & Rose
yuku dɨku	hierba de sapo	S	EUPHORBIACEAE Euphorbia postrata
yuku yawa	hierba de sapo	S	EUPHORBIACEAE *Euphorbia hispida* Boiss.
tnu ndee	somaque	M,S	ANACARDIACEAE *Rhus oaxacana* Loes.
tnu ndee nda'a kwechi	somaque	M,S	
tnu ndee nda'a na'nu	somaque	S	,
tnu ndee nda'a tkadɨ	somaque	S	ANACARDIACEAE *Rhus standleyi* F.A.Barkley
chɨ'ɨ ita kwaa yuku	té de limón	S	ASTERACEAE
ita kwendɨu yuku	té de limón	S	FABACEAE Dalea sp.

Appendix 2 – Plants collected that were not identified or identified only to family name

(in order of appearance in the ethnobotanical database):

Hierba de estrella. AP248.

N 17° 12’ 20.7’’ 097° 24’ 20.6’’ 2159 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas elípticas y flor solitaria blanca. Vegetación asociada: crece al lado de la milpa

variante de chepil silvestre. AP244: FABACEAE

N 17° 12’ 20.8’’ **097° 24’ 20.6’’** **2159 m.s.n.m.**

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas obovadas, paripinnadas, flor rosa, se extiende por la tierra**.** Vegetación asociada: crece al lado de la milpa

Photo missing

chɨ'ɨ ita kwaa yuku, té de limón. AP93: ASTERACEAE

N 17° 15’ 29.5’’ **097° 21’ 22.5’’** **2715 m.s.n.m.**

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 60 cm. Tiene flor solitaria amarilla. Hojas lobuladas compuestas. Vegetación asociada: Crece en bosque de encino.

chɨ'ɨ kwaa, setillo amarillo. AP72: ASTERACEAE

N 17° 18’ 54.1’’ 097° 20’ 14.8’’ 2347 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba. Tiene flor amarilla solitaria y hojas elípticas con el margen aserrado. Los animales comen esta hierba. Los humanos comen las hojas. Vegetación asociada: Crece en la milpa.

chɨ'ɨ kwechi. AP82: ASTERACEAE

N 17° 15’ 52.0’’ 097° 19’ 05.9’’ 2083 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 30 centímetros, tiene hojas chiquitas lobadas. Tiene flor amarilla. Vegetación asociada: Crece en la milpa.

chɨ'ɨ kwixi, setillo blanco. AP71: ASTERACEAE

N 17° 18’ 54.1’’ 097° 20’ 14.8’’ 2347 m.s.n.m.

Municipio: Santiago Tilantongo. Características de Planta: Es una hierba. Tiene flor blanca solitaria, hojas opuestas elípticas con un margen aserrado. Los animales comen esta hierba. Vegetación asociada: Crece en la milpa.

chɨ'ɨ yuku burru. AP342

N 17° 15’ 59.1’’ 097° 21’ 16.1’’ 2626 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba. Hoja lanceolada con el margen aserrado, flor amarilla solitaria. Vegetación asociada: Crece al lado de los caminos en la sombra de los encinos.

chɨyɨ, cucharilla. AP366

N 17° 15’ 46.7’’ 097° 21’ 00.5’’ 2691 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Hojas lineares, espinosas, color verde claro. sus raíces se ocupaban como cucharas**.** Vegetación asociada: crece en campo abierto en el monte

da’ya ndute, el helecho acuático/cola de pajaro. AP164

N 17° 16’ 07.2’’ 097° 19’ 06.0’’ 1997 m.s.n.m.

Municipio: **Santiago Tilantongo.**Características de Planta: es un helecho con hojas con el margen dentado. Vegetación asociada: crece al lado del rio.

dɨkɨ nda'a da’ya, dedo de niño. AP288

N 17° 14’ 17.2’’ 097° 18’ 10.9’’ 2190 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una siempreviva con hojas chiquitas y gruesas. Vegetación asociada: la gente la cultiva alrededor de las casa**.**

iñu chaa, espino de burro. AP353

N 17° 15’ 59.8’’ 097° 21’ 16.7’’ 2622 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 1,5 metro. Tiene tallo de color gris. Tiene una roseta de hojas basales grandes, partidas y espinosas, verde arriba, gris abajo. Flor roja. Vegetación asociada: Crece al lado de los caminos

iñu ndɨkɨ ngutu, iñu xe'e chuun, ojo de pollo. AP83: ASTERACEAE

N 17° 15’ 52.0’’ 097° 19’ 05.8’’ 2083 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que se extiende por la tierra. Hoja opuesta, flor amarilla. Cuando se seca la flor, salgan espinas. Molesta mucho a la gente. Vegetación asociada: Crece en la milpa

iñu tndu kwixi, caretilla blanca. AP343 must be a FABACEAE *Medicago* sp.

N 17° 15’ 59.6’’ 097° 21’ 16.6’’ 2641 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hoja elíptica trifoliada. Su flor es blanca. Vegetación asociada: Crece al lado de los caminos en la sombra de los encinos

ita di de'e. AP270: ASTERACEAE

N 17° 15’ 56.4’’ 097° 21’ 17.0’’ 2655 m.s.n.m.

Municipio: **Santiago Tilantongo. C**aracterísticas de Planta: Es una hierba que crece hasta 1,5 m. Tiene hojas basales que crecen hasta 30 cm largos con la base cordada y el ápice redondo y un margen lobado y espinoso. Las hojas ubicadas más alto en el tallo tienen la base decurrente. La

flor tiene color morado-blanco y crece en umbelas. Vegetación asociada: Crece en el campo, alrededor hay otras hierbas y arbustos

ita ka'i kwixi, llantén acuático. AP301: ORCHIDACEAE

N 17° 15’ 43.7’’ 097° 19’ 12.4’’ 2104 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con una roseta basal de hojas oblongas. Tiene flor blanca que crece en un racimo. Vegetación asociada: crece en las piedras

ita ndɨyɨ, hierba de muerto. AP257: ASTERACEAE

N 17° 12’ 18.6’’ 097° 24’ 21.2’’ 2157 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas compuestas, elípticas, aserradas. Flores solitarias de color naranja. Vegetación asociada: crece al lado de la milpa

ita nu tnu'u kwechi, kawal chico. AP255: ASTERACEAE

N 17° 12’ 18.5’’ 097° 24’ 21.3’’ 2157 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: hierba flor solitaria amarilla/naranja. hoja opuesta, elíptica. Vegetación asociada: crece al lado de la milpa

ita nuni. AP361

N 17° 15’ 45.0’’ 097° 21’ 07.2’’ 2684 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto con hojas opuestas, elípticas de color verde con morado. Tiene flor blanca chiquita, florece al principio de la temporada de lluvia**.** Vegetación asociada: Crece al lado de otros arbustos y hierbas

ita tnu yatu. AP246: ASTERACEAE

N 17° 12’ 20.8’’ 097° 24’ 20.6’’ 2159 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas elípticas con el margen aserrado, opuestas. Tiene flor blanca que crece en corimbos de capítulos. Vegetación asociada: crece al lado de la milpa

ita yɨdɨ kwechi, hierba de novia/hierba de borracho chica. AP153: LAMIACEAE

N 17° 15’ 30.0’’ 097° 18’ 35.5’’ 1983 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto que crece hasta un metro y medio de altura. Las hojas son ovales y muy pequeñas, de medio centímetro de largo. La flor es una tuba roja de 2 centímetros de largo. Vegetación asociada: Crece al lado del rio en la sombra.

ita yɨdɨ na'nu, hierba de borracho grande. AP91: LAMIACEAE

N 17° 15’ 29.5’’ 097° 21’ 22.8’’ 2711 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto que crece hasta 1,5 m. Tiene hojas aristadas espinosas, opuestas de un color verde claro. Tiene flor solitaria de color naranja-rosa que crece en forma de tubo de 3 cm. Vegetación asociada: Crece en bosque de encino

ite du'a kolo, pasto de cola de pavo. AP167: POACEAE

N 17° 16’ 07.8’’ 097° 19’ 05.4’’ 2002 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es un pasto con hojas lineares, su semilla crece en una espiga de espigas de color verde. Vegetación asociada: crece al lado del rio.

ite kweñi, pasto de mosquito. AP295: POACEAE

N 17° 15’ 52.8’’ 097° 19’ 06.9’’ 2091 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un pasto con hojas lineares, flores purpureas casi negras, semillas verdes en una espiga. Vegetación asociada: crece en el campo.

ite tndaku kwechi, pasto de gusanito. AP294: POACEAE

N 17° 15’ 52.7’’ 097° 19’ 05.8’’ 2091 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un pasto con hojas lineares y flor blanca, semilla negra en una espiga. Vegetación asociada: crece en el campo.

kɨndɨ kidi, pegajosa. AP271

N 17° 15’ 56.9’’ 097° 21’ 16.9’’ 2655 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto, con hojas opuestas, elípticas con el margen aserrado. Su flor es morada y crece en espigas. Vegetación asociada: Crece en el campo, alrededor hay otras hierbas y arbustos.

ndewa buru, chichicaxtle de buru. AP362[128]

N 17° 15’ 41.5’’ 097° 21’ 10.5’’ 2684 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto muy espinoso. Tiene hojas palmeadas espinosas. De su tallo sale una leche blanca. Su fruta es una capsula. Vegetación asociada: La gente lo cultiva.

[128] Could this be EUPHORBIACEAE tragia sp.?

nduwa ditu ndute, nduwa yute, berro de agua. AP337: BRASSICACEAE

N 17° 17’ 25.7’’ 097° 21’ 00.7’’ 2137 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas ovales con el margen sinuado. Sus tallos se extienden en forma estolonífero. Se come la hoja con tortilla. Vegetación asociada: crece donde hay agua, helecho y ruta alrededor.

nduwa yaa, lechuga. AP210, AP278: ASTERACEAE

N 17° 16’ 57.7’’ 097° 20’ 24.3’’ 2223 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas alternas, pinnatisectas con la base amplexicaule. tiene flor solitario de color amarillo. La gente come las hojas tiernas. El venado también come esta planta. Vegetación asociada: alrededor hay otras hierbas y pasto.

ruta ua, poleo/marubio amargo. AP357

N 17° 15’ 44.4’’ 097° 21’ 09.6’’ 2684 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas opuestas, ovales que crece hasta 1 metro. Tiene flor blanca que crece en conglomeraciones en forma de bolitas en el tallo. Sirve para diabetes**.** Vegetación asociada: Alrededor hay otras hierbas y arbustos

silantru idu, cilantro de venado. AP348

N 17° 16’ 04.9’’ 097° 21’ 18.9’’ 2619 m.s.n.m.

Municipio: **Santiago Tilantongo.**Características de Planta: Es una hierba pequeña con hojas compuestas muy anchas. los niños que orinan mucho lo toman como agua de tiempo en té durante 8 días. Vegetación asociada: crece en el bosque de encino.

AP146

AP260

AP267

silantru idu, yuku idu, yuku xaxi idu , la lengua de venado/cilantro de venado. AP146, AP260, AP267

N 17° 12’ 12.5’’ **097° 24’ 17.0’’** **2152 m.s.n.m.**

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con una roseta basal de hojas. Las hojas son cuneadas con el margen crenado. Su flor crece en capítulos de color azul. Vegetación asociada: crece al lado de la milpa

N 17° 15’ 55.8’’ **097° 21’ 16.9’’** **2655 m.s.n.m.**

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas basales con la base cordada y el ápice agudo con el margen crenado. Tiene flores azules, solitarias. Vegetación asociada: Crece en el campo, alrededor de otras hierbas y arbustos.

tamorial morado/tamorial rojo. AP344

N 17° 16’ 04.6’’ 097° 21’ 18.6’’ 2613 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: flor blanca, raíz roja al dentro. Es una hierba que se extiende por la tierra. Hoja palmeada, lobada de color morado. Vegetación asociada: crece en bosque de encino

tayuchi, hierba de chicle. AP276

N 17° 15’ 56.6’’ 097° 21’ 16.9’’ 2655 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto. Tiene flor amarilla. Hojas elípticas con una pelusa blanca minúscula abajo del hoja. La leche blanca que sale del tallo se ocupa para hacer chicle. Vegetación asociada: Crece en el campo, alrededor de otras hierbas y arbustos.

tayuchi tkachi, chicle de borrego. AP350

N 17° 16’ 06.1’’ 097° 21’ 19.8’’ 2594 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas entre elípticas y lineares de un color rojo y verde. su flor es una bolita rosa, los borregos lo comen, la planta tiene leche blanca, tiene bolitas al fin de su raíz. Vegetación asociada: crece en bosque de encino

tndu'u, amole. AP358

N 17° 15’ 44.3’’ 097° 21’ 09.7’’ 2685 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una enredadera. Su fruta es una capsula de cuatro cavidades. Tiene hojas palmeadas en tres. tiene un camote muy grande que antes se ocupaba como jabón**.** Vegetación asociada: hay hierbas y arbustos alrededor

tnu dichi, organal. AP44

N 17° 16.960 W 097°20.404 Elevación 7336 ft.

Es un cactus que crece hasta 4 metros de altura. Crece hacia arriba en forma de pentágono con mellas entre cada dos bordos. Tiene 5 filas de espinas en cada bordo; cada fila de abajo hasta arriba del cactus. Crece en tierra normal, alrededor de las casas en un clima templado.

tnu ndee nda'a na'nu, somaque. AP318

N 17° 19’ 47.6’’ 097° 18’ 58.4’’ 2344 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: **Es un arbusto. Tiene hojas lanceoladas de color verde oscuro, Flor blanca que crece en espigas compuestas. Sirve para caldear en el temazcal.** Vegetación asociada: Alrededor hay otras hierbas y arbustos, crece en la sombra de los árboles.

tnu ndii, encino. AP349

N 17° 16’ 05.7’’ 097° 21’ 19.8’’ 2576 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 15 m, su fruta tiene un diámetro de 6 cm. Tiene hojas obovadas con el margen sinuado y espinoso. Vegetación asociada: Crece en bosque de encino.

tnu ñuu, encino capulincillo. AP347

N 17° 16’ 04.6’’ 097° 21’ 18.6’’ 2626 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 15 m, Hoja lanceolada, dentada. Su fruta es un aquenio. Vegetación asociada: Crece en bosque de encino.

tnu tau tnuu, chamizo negro. AP328: ASTERACEAE

N 17° 19’ 37.3’’ 097° 19’ 13.6’’ 2384 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto con hojas cuneadas. Su fruta es una conglomeración de bolas negras. Vegetación asociada: Crece en el monte, otros arbustos, pinos y encinos alrededor**.**

tnu tɨchɨ ngutu, aguacate de monte. AP345

N 17° 16’ 04.6’’ W097° 21’ 18.6’’ 2613 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 6 metros, hoja elíptica, dura, con el margen sinuado. Vegetación asociada: bosque de encino

tnu tna'nu, quiebrahueso. AP363

N 17° 15’ 40.4’’ 097° 21’ 10.6’’ 2681 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol de madera muy flexible. Tiene hojas triangulares partidas. Vegetación asociada: la gente lo cultiva

tnu tnu'u ndayi kwechi, kawal chino/kawal rasposo/kawal espinudo. AP85: ASTERACEAE

N 17° 15’ 51.9’’ 097° 19’ 05.5’’ 2081 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 1 metro. hojas elípticas, opuestas. flor amarilla. Vegetación asociada: Crece en la milpa.

tnu tnu'u ndayi yuku, kawal del monte. AP312: ASTERACEAE

N 17° 19’ 50.3’’ 097° 19’ 00.7’’ 2365 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba leñosa que crece hasta 1 metro. Tiene hojas elípticas duras con la base del limbo decurrente y el margen crenado. Su tallo es de color café oscuro, cubierto en pelos blancos de 2 mm. Tiene flor de color amarilla que crece en capítulos. Vegetación asociada: Alrededor hay pasto y otras hierbas.

tnu yaa kwaa, cucharon amarillo. AP352

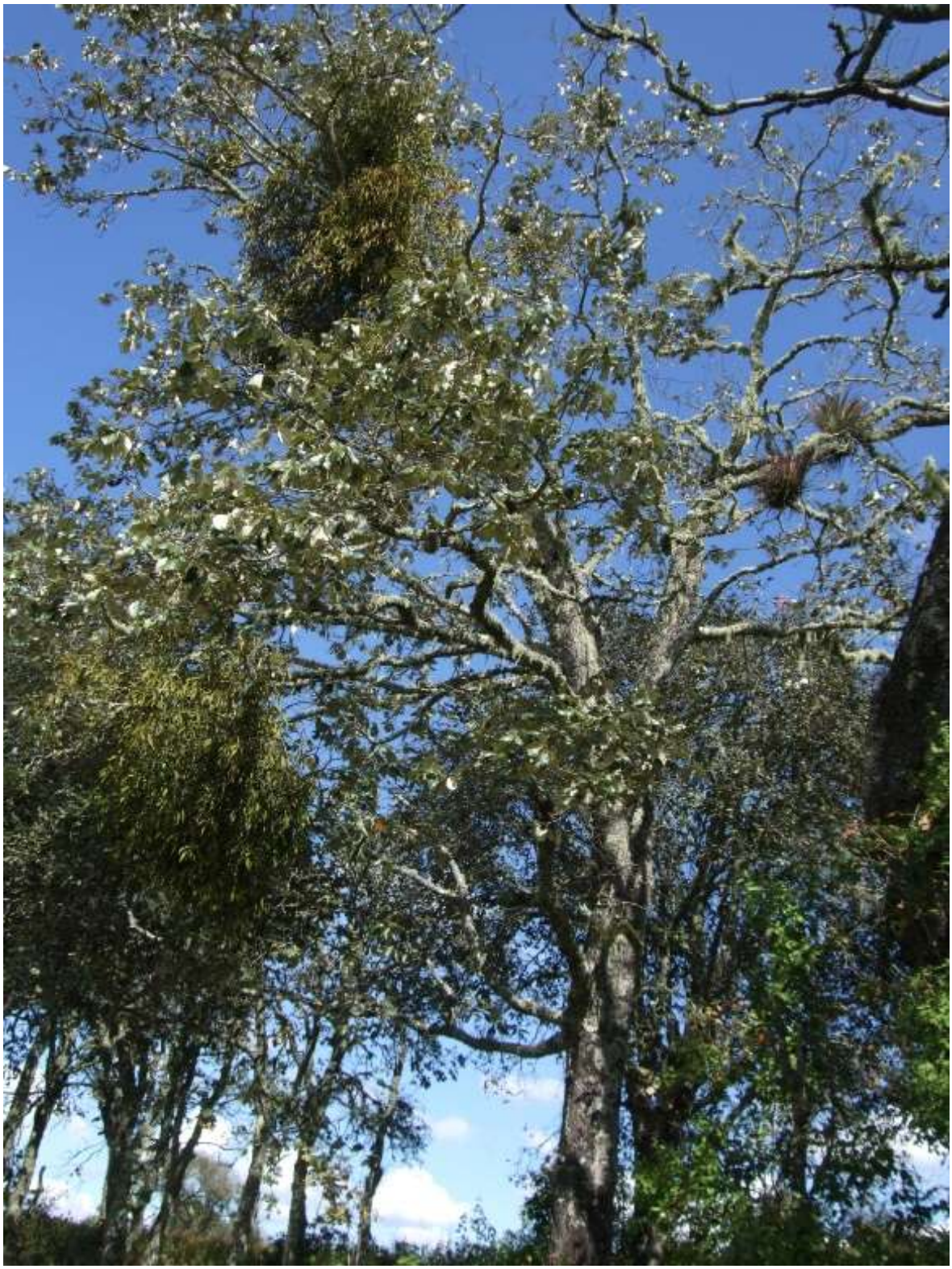
N 17° 16’ 04.8’’ 097° 21’ 20.5’’ 2596 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 15 metros. Hojas obovadas. Vegetación asociada: Crece en bosque de encino

tnu yaa kwii, cucharon verde. AP346

N 17° 16’ 04.6’’ 097° 21’ 18.5’’ 2626 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 10 metros. Hojas obovadas con el margen dentado. Vegetación asociada: Crece en bosque de encino.



Note the tnutka'a (injerto) and the dinu growing on the tree.

tnu yaa kwixi, cucharon blanco. AP355

N 17° 15’ 53.1’’ **097° 21’ 14.0’’** **2638 m.s.n.m.**

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol que crece hasta 20 metros con hojas ovales de un color blanquecino abajo. Vegetación asociada: crece al lado de los caminos.

tnutka'a vidi, laurel del monte. AP365

N 17° 15’ 42.6’’ 097° 21’ 10.2’’ 2883 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un árbol con hojas lanceoladas, blanquecinas abajo. Flor en racimos. Vegetación asociada: Crece en bosque de encino

yuku anis yuku, pariente de anís. AP252: ASTERACEAE

N 17° 12’ 20.7’’ 097° 24’ 20.5’’ 2159 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con flores solitarias amarillas, hojas lineares de 1 mm ancho. Vegetación asociada: crece al lado de la milpa.

yuku arnika kwixi, arnika blanca. AP163: ASTERACEAE

N 17° 16’ 07.0’’ 097° 19’ 06.0’’ 1997 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas elípticas, alternas. Tiene flor blanca solitaria. Vegetación asociada: Crece al lado del rio.

yuku arnika ndee, arnika morada. AP300: ASTERACEAE

N 17° 15’ 43.6’’ 097° 19’ 12.3’’ 2104 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas lineares, alternas. Tiene flor blanca que crece en capítulos. Se llama morada porque cuando apenas está creciendo su flor está de color morado. Vegetación asociada: crece en el campo, al lado de la milpa

AP199

AP329

yuku arnika/arnika, arnika. AP199, AP329: ASTERACEAE

N 17° 17’ 19.8’’ 097° 21’ 05.7’’ 2170 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba con hojas entre elípticas y lanceoladas. El tallo y las hojas están cubiertos en una pelusa blanca minúscula

y son de un color verde blanquecino. La flor es de color amarillo y crece en capítulos. Vegetación asociada: crece en el campo.

yuku chaa da’ya ndute, da’ya chaa yuku, helecho, cría de agua. AP138

N 17° 15’ 46.0’’ 097° 21’ 08.6’’ 2687 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un helecho con hojas alternas con el margen sinuado de color verde oscuro. Vegetación asociada: Crece en la sombra de las rocas.

yuku chanda, hierba la cabezona. AP264: ASTERACEAE

N 17° 15’ 49.7’’ 097° 22’ 32.9’’ 2580 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 1 metro con hojas lanceoladas con el margen sinuado. Su flor crece en capítulos de color amarillo. Vegetación asociada: crece en campo abierto, tierra rocosa.

AP120

AP175

yuku chɨ'ɨ, hierba de zorrillo, mostazon de zorrillo. AP120, AP175: BRASSICACEAE

N 17° 18’ 54.9’’ 097° 20’ 15.2’’ 2348 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba que crece hasta 80-90 cm. Flor blanca, hojas lobuladas, alternas. Vegetación asociada: Crece en la milpa y al lado de los caminos.

AP39

yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua, hierba de coyote. AP39, AP290

N 17° 14’ 11.8’’ 097° 18’ 08.7’’ 2190 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es un arbusto que crece hasta 2 metros. Tiene hojas eliptícas/ovadas con el margen dentado. Flor blanca en umbelas. Es un

arbusto que crece hasta 2 metros. Es una planta caliente. También es amarga y picosa como el olor del coyote. Vegetación asociada: Crece en el campo, alrededor de otras hierba y arbustos y en tierra rocosa, alrededor bosque de coníferas y de Quercus en un clima templado.

AP177

AP183

AP311

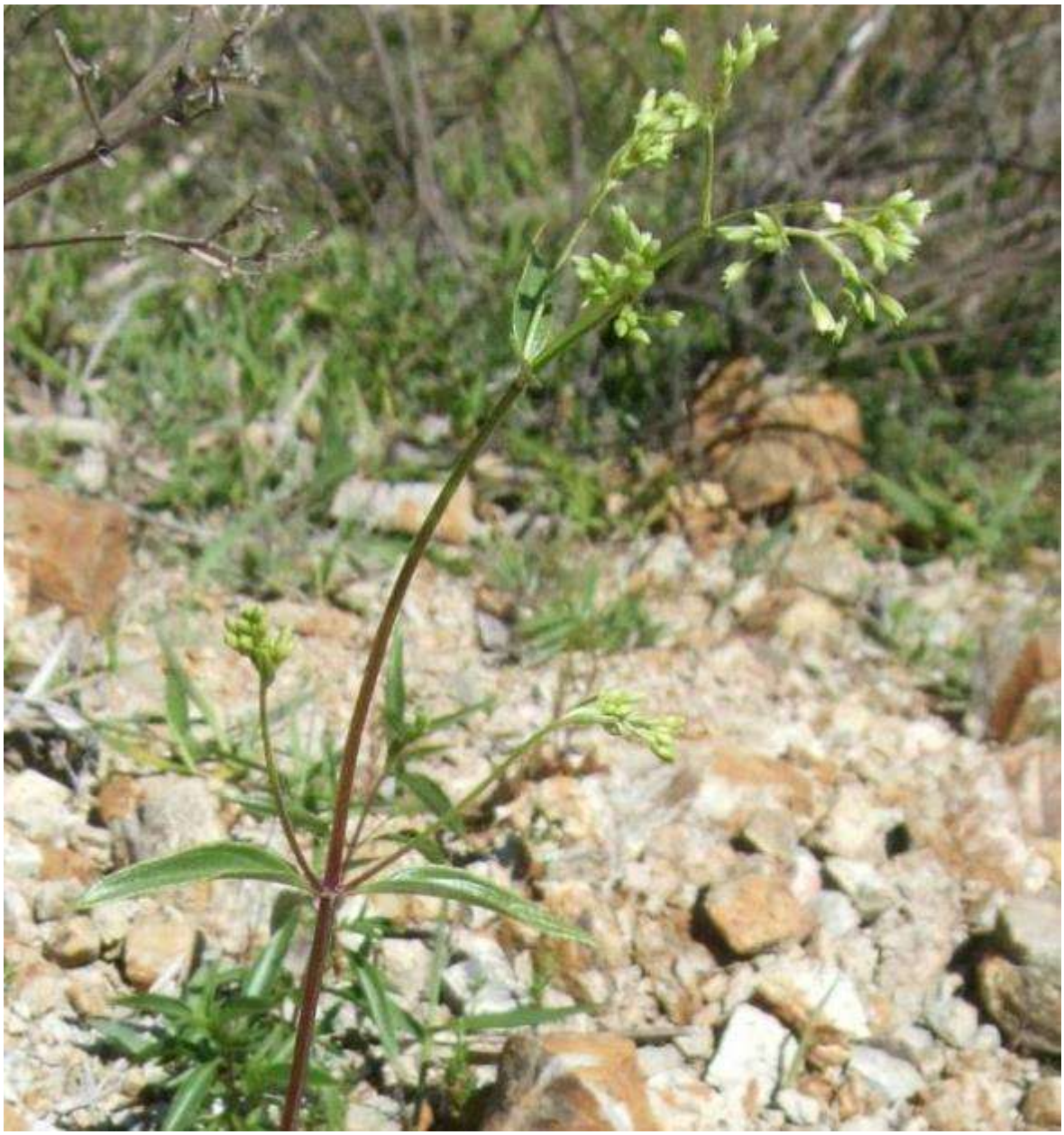
yuku kwiña, yuku yɨkɨ, yuku disipela. AP177, AP183, AP311

N 17° 15’ 58.6’’ 097° 19’ 03.0’’ 2048 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba que crece hasta un metro. Tiene hojas cordadas/ deltoideas con el borde crenado, opuestas. flor purpurea que crece

en conglomeraciones. Vegetación asociada: crece en la milpa, al lado de los caminos en tierra rocosa.

AP111



AP313
yuku nduku da’ya. AP111, AP313: ASTERACEAE

N 17° 15’ 35.9’’ 097° 21’ 17.2’’ 2681 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba. Hoja lanceolada con el margen aserrado, opuesta. Flor blanca chiquita en corimbo de corimbos. Vegetación asociada: crece al lado de camino.

AP281

yuku santa maria, santa maría/flor de santa maría. AP192, AP281: ASTERACEAE

N 17° 15’ 56.9’’ 097° 21’ 17.1’’ 2655 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba, tiene hojas partidas con el margen dentado. Flores solitarias blancas. Vegetación asociada: es una planta cultivada, alrededor de las casas.

AP263

AP285

yuku tachi tnuu, samarrial. AP263, AP285: ASTERACEAE

N 17° 14’ 11.9’’ 097° 18’ 08.7’’ 2190 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba leñosa. Su flor es blanca y crece en corimbo de corimbos. Tiene hoja elíptica con el margen dentado. Vegetación asociada: Crece en el campo, alrededor de pasto, arbustos pero también crece en bosque de encino.

AP106

AP130

yuku tɨtnɨñɨ kwaa, ita kwaa kwechi, hierba de ratón. AP106, AP130: ASTERACEAE

N 17° 18’ 54.8’’ 097° 20’ 16.2’’ 2350 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: es una hierba, con flor solitario de color naranja. Hojas con el margen aserrado, compuestas. Crece hasta 60-100 cm. Vegetación asociada: Crece en la milpa y al lado de los caminos.

yuku tnama, la progresa. AP364

17° 15’ 39.9’’ 097° 21’ 11.1’’ 2671 m.s.n.m.

Municipio: **Santiago Tilantongo.**Características de Planta: Es un enredadera con un tallo de color naranja. Tiene flores pequeñas blancas en conglomeraciones en la forma de una bola. dicen que cuando crece va a dar hambre. Vegetación asociada: Crece encima de hierbas y arbustos.

AP68

yuku tnani ñu'u. AP68, AP319: ASTERACEAE

N 17° 18’ 54.0’’ 097° 20’ 14.0’’ 2353 m.s.n.m.

Municipio: Santiago Tilantongo. Características de Planta: Es un arbusto. Tiene hojas triangulares opuestas de un color verde claro con el margen aserrado. Tiene flor blanca que crece en corimbos. Sirve para tratar la inflamación y caldearse. Es muy caliente. Vegetación asociada: Crece en tierra normal en un clima templado, al lado de otros arbustos, pasto y hierbas.

yuku tuchi, altamisa. AP1

N 17°16.963 W097°20.414 Elevación 7075 ft.

Es una planta cultivada, crece en los huertos de las casas. Es un arbusto, crece hasta medio metro. La temporada del florecimiento dura todo el año. Si hay agua, hay flor. La temporada frutal también se prolonga durante todo el año. La naturaleza de la planta es caliente. Tiene flores parecidas a las de la manzanilla, pero más grandes. Las hojas son palmatipartidas y tienen borde crenado; son lobuladas. Sirve contra los cólicos menstruales. Crece en tierra seca y rocosa en un clima templado.

yuku tuchi. amola de monterrey? AP360

N 17° 15’ 45.0’’ 097° 21’ 07.4’’ 2681 m.s.n.m.

Municipio: **Santiago Tilantongo.** Características de Planta: Es una hierba con hojas muy chiquitas, lobadas de un color gris/verde/azul. Tiene racimos de flor blanca como pelusa. Es una planta muy amarga, para el latido se hace té o se pone en aguardiente. Vegetación asociada: Alrededor otras hierbas y arbusto, crece en el campo abierto en el monte

Appendix 3 – Mixtec plant names that refer to multiple plant species

da'ya ndute

da'ya ndute, el helecho acuático/cola de pájaro. AP164.

da’ya ndute, silantru da’ya ndute

silantru da’ya ndute/ da’ya ndute, cilantro del monte/cilantro acuático. AP166: PTERIDACEAE Adiantum sp.

Iñu chaa

iñu chaa, espino de burro. AP353

iñu chaa, lechuguilla. AP229: ASTERACEAE Cirsium sp.

Iñu kɨu

iñu kɨu, hierba de sapo. AP58: APIACEAE Eryngium montanum J.M.Coult. & Rose

iñu kɨu, cardo santo, hierba de burro, cardo de burro. AP168: APIACEAE Eryngium carlinae F.Delaroche

iñu ta'a

iñu ta'a, pata de cabra, espino de abrojo. AP233[129]: SOLANACEAE Solanum grayi Rose, SOLANACEAE Solanum sp.

[129] Specimen AP233 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

iñu ta'a, pata de cabra, espino de abrojo. AP265[130]: SOLANACEAE Solanum rostratum Dunal, SOLANACEAE Solanum sp.

[130] Specimen AP265 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

ita kuwa

Ita kuwa, yuku kanserde, yuku yɨjɨ kwechi, hierba de cáncer. AP119, AP125, AP134: ONAGRACEAE Oenothera tetraptera Cav.

ita kuwa, flor de mariposa. AP78, AP113: ONAGRACEAE Oenothera rosea L`Hér. ex Aiton

ita kuwa, ita dini, ita xa niñi, bella atardecer. AP241: ONAGRACEAE Gaura coccinea Nutt. ex Pursh, ONAGRACEAE Oenothera tetraptera Cav.[131]

ita kuwa, ita dini, ita xa niñi, bella atardecer. AP303[132]

[131] Specimen AP241 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

[132] Specimen AP303 has been listed as missing in the list with identifications received from the Ethnobotanical Garden of Oaxaca.

ita kuwa, ita dini, ita xa niñi. AP317: ONAGRACEAE Gaura mutabilis Cav.

ita dini, ita kwaa, pericón . AP 60, AP259: ASTERACEAE Tagetes lucida Cav.

ita ndɨyɨ

ita ndɨyɨ, flor de muerto. AP96: ASTERACEAE

ita ndɨyɨ, flor de muerto. AP 99: ASTERACEAE, PLANTAGINACEAE Penstemon sp., SCROPHULARIACEAE Lamourouxia dasyantha (Cham. & Schltdl.) W.R.Ernst[133]

[133] Specimen AP99 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

ita ndɨyɨ, flor de muerto. AP 268

ita ndɨyɨ, floripondio. AP203: SOLANACEAE Brugmansia candida Pers

ita ndɨyɨ, hierba de muerto. AP257: ASTERACEAE

ita nuungandii

ita nuungandii, do'o tɨtnɨñɨ yuku, do'o tnɨñɨ yuku, oreja del ratón silvestre, cara del sol. AP57, AP160: POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.

ita nuungandii, cara del sol. AP 114, AP142: VERBENACEAE *Verbena canescens* Kunth

kɨndɨ[134]

yuku kɨndɨ, hierba clara. AP104: ASTERACEAE

[134] I have included photos of all the kɨndɨ specimens collected that have been identified as LAMIACEAE Salvia sp. This doesn't mean that some of them couldn't be the same species.

kɨndɨ. AP112: LAMIACEAE Salvia sp.

kɨndɨ, hierba clara. AP126: LAMIACEAE Salvia sp.

kɨndɨ, verbena. AP151: LAMIACEAE Salvia sp.

kɨndɨ, verbena. AP162: LAMIACEAE Salvia sp.

kɨndɨ kwechi (por sus semillas), yuku kɨndɨ, verbena. AP170: BORAGINACEAE Antiphytum caespitosum I.M.Johnst., LAMIACEAE Salvia sp.[135]

[135] Specimen AP170 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

kɨndɨ yuku. AP95: LAMIACEAE Salvia mexicana

kɨndɨ yuku, tnu ndɨu yuku. AP103: SOLANACEAE Solanum pubigerum Dunal, SOLANACEAE Cestrum sp.[136]

[136] Specimen AP103 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

kɨndɨ yuku, tnu ndɨu yuku. AP359[137]

[137] specimen AP359 went missing from the ethnobotanical garden of Oaxaca.

Silantru idu

silantru idu, yuku idu, yuku xaxi idu, la lengua de venado/cilantro de venado. AP146.

silantru idu, yuku idu, yuku xaxi idu, la lengua de venado/cilantro de venado. AP260.

silantru idu, yuku idu, yuku xaxi idu, la lengua de venado/cilantro de venado. AP 267[138]

[138] Specimen AP267 went missing from the ethnobotanical garden of Oaxaca.

silantru idu, cilantro del venado. AP348[139]

[139] specimen AP348 went missing from the ethnobotanical garden of Oaxaca.

tnu ndɨu

tnu ndɨu, sanalotodo. AP3: Cestrum sp. 1, SOLANACEAE[140]

tnu ndɨu, sanalotodo. AP12: Cestrum sp. 2, SOLANACEAE[141]

[140] specimen AP3 was collected during my Mphil fieldwork.

[141] specimen AP12 was collected during my Mphil fieldwork.

tnu ndɨu, huele de noche. AP92: SOLANACEAE Cestrum laxum Benth.

tnu ndɨu, sanalotodo, huele de noche. AP143: SOLANACEAE Cestrum oblongifolium Schltdl., SOLANACEAE Cestrum sp.[142]

[142] Specimen AP143 received two different identifications from the Ethnobotanical Garden of Oaxaca on the two different occasions that a list with identifications was received.

Yuku kaja

yuku kaja, makaxani yuku. AP226: LYTHRACEAE Cuphea angustifolia Jacq. ex Koehne

yuku kaja, makaxani yuku. AP336: LYTHRACEAE Cuphea angustifolia Jacq. ex Koehne

Yuku kaja, makaxani yuku. AP298: LYTHRACEAE Cuphea aequipetala Cav.

Yuku kidi

Yuku kidi, escobilla. AP9[143],AP61, AP100: ASTERACEAE Gymosperma glutinosum (Spreng.) Less

[143] specimen AP9 was collected during my Mphil fieldwork.

yuku kidi, yuku cha'u, pegajosa. AP79, AP250: FABACEAE Desmodium subsessile Schltdl.

yuku kwedayu

yuku kwedayu, estafiate. AP35[144], AP330: ASTERACEAE Artemisia ludoviciana Nutt.

[144] specimen AP35 was collected during my Mphil fieldwork.

yuku kwedayu, gordolobo. AP110, AP136, AP178: ASTERACEAE Gnaphalium sp.

yuku tatna ruda, ruda

yuku tatna ruda, ruda. AP5[145]: RUTACEAE Ruta chalepensis L.

No photo

ruda. AP305: RUTACEAE Ruta graveolens L.

[145] specimen AP5 was collected during my Mphil fieldwork.

Yuku tuchi

yuku tuchi, altamisa. AP1[146].

yuku tuchi. AP360[147]

[146] specimen AP1 was collected during my Mphil fieldwork, it could not be identified unfortunately because it went missing.

[147] Specimen AP360 went missing from the ethnobotanical garden of Oaxaca.

yuku yɨkɨ

kɨ'u yuku, yuku yɨkɨ, hierba de tinta, hierba de hueso. AP152.

yuku yɨkɨ, yuku kwiña, yuku disipela, hierba de calavera, disípela, hierba de pasma. AP177, AP183[148], AP311.

[148] Specimen AP183 went missing from the ethnobotanical garden of Oaxaca.

Yuku yuu

AP69

AP144

yuku yuu, hierba de san pablo, tabacón. AP69[149]. AP144: HYDROPHYLLACEAE Wigandia urens (Ruiz & Pav.) Kunth

[149] Specimen AP69 went missing from the ethnobotanical garden of Oaxaca.

yuku nu toto/yuku yuu, hierba mata gusano. AP158: APOCYNACEAE Asclepias linaria Cav.

Yuku nu toto

hierba de estrellita, yuku nu toto. AP139: CARYOPHYLLACEAE Sagina saginioides (L.) H.Karst.

hierba de estrellita, yuku nu toto. AP172.

Appendix 4 – Spanish plant names that refer to several plant species

cara del sol

ita nuungandii, do'o tɨtnɨñɨ yuku, do'o tnɨñɨ yuku, oreja del ratón silvestre, cara del sol. AP57, AP160: POLEMONIACEAE *Loeselia pumila* (M.Martens & Galeotti) Walp.

ita nuungandii, cara del sol. AP 114, AP142: VERBENACEAE *Verbena canescens* Kunth

Chepil

chepil. AP333: FABACEAE Crotalaria sp.

chepil, tronadora chiquita. AP339: FABACEAE Crotalaria sp.

Hierba de estrella

Yuku chudini, hierba de estrella, oreja de ratón, orejita de ratón, hierba de lucero. AP29, AP70, AP101: ASTERACEAE Brickellia veronicifolia (Kunth) A. Gray

hierba de estrella. AP248.

Hierba de pasma

yuku kwiña, yuku yɨkɨ, yuku disipela, hierba de calavera, disípela, hierba de pasma. AP177, AP183, AP311

AP 177

hierba de pasma, yuku pasma kwechi. AP87, AP131: PRIMULACEAE Anagallis arvensis L.

Hierba de pasma, yuku pasma kwechi, AP89: PRIMULACEAE Anagallis arvensis L.

Hierba de sapo

iñu kɨu, hierba de sapo. AP58: APIACEAE Eryngium montanum J.M.Coult. & Rose

yuku dłku, hierba de sapo. AP81: EUPHORBIACEAE Euphorbia postrata.

yuku dɨku, hierba de sapo. AP118 EUPHORBIACEAE Euphorbia sp.

yuku dɨku, hierba de sapo. AP169: EUPHORBIACEAE Euphorbia sp.

yuku yawa, hierba de sapo. AP293: EUPHORBIACEAE Euphorbia hispida

Somaque

tnu nde'e, somaque. AP16[150]: ANACARDIACEAE Rhus standleyi F.A. Barkley

[150] Specimen AP16 was collected during my Mphil fieldwork. Note the name was given as tnu nde'e instead of tnu ndee.

tnu ndee, somaque (tnu ndee nda'a na'nu). AP64: ANACARDIACEAE Rhus oaxacana Loes.

tnu ndee nda'a tkadɨ, somaque. AP310: ANACARDIACEAE Rhus standleyi F.A.Barkley

tnu ndee nda'a na'nu, somaque. AP318[151].

[151] Specimen 318 went missing from the ethnobotanical garden of Oaxaca.

té de limón

Missing photo. It is a type of setillo.

chɨ'ɨ ita kwaa yuku, té de limón. AP93: ASTERACEAE

ita kwendɨu yuku, té de limón. AP326: FABACEAE Dalea sp.

Appendix 5 – Plants that were identified as the same species but with different Mixtec names

ONAGRACEAE Oenothera rosea L`Hér. ex Aiton:

Ita ngandii, hierba de golpe. AP240: ONAGRACEAE Oenothera rosea L`Hér. ex Aiton

ita kuwa, flor de mariposa. AP78, AP113: ONAGRACEAE Oenothera rosea L`Hér. ex Aiton

Appendix 6 – Hot Cold classification tables

Appendix 6.1: Possible guiding principles of the hot-cold classification system in Mexico

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
1. cold and hot are qualities (not merely temp. related)	yes[152]	yes[153]	yes[154]	yes[155]	yes[156]	yes[157]	yes[158]	[159]	yes[160]	yes[161]	yes[162]	yes[163]

[152] López Austin, 1980: 52, 256; López Austin, 1975: 17
[153] Chevalier and Sánchez Bain, 2003: 30
[154] Chevalier and Sánchez Bain, 2003: 23
[155] Katz, 1992: 101
[156] Madsen, 1955: 125
[157] Matthews, 1983: 827
[158] Messer, 1981: 135
[159] It is implied (Tedlock, 1987: 1074-1075).
[160] Currier, 1966: 251
[161] Foster, 1987: 355
[162] Ingham, 1970
[163] Neuenswander and Souder, 1977: 98-99

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
2. hot and cold dichotomy or a spectrum of qualities	dichotomy[164] [165]	dichotomy[166]	dichotomy[167]	dichotomy[168]	[169]	dichotomy[170]	[171]	[172]	dichotomy[173]	[174]	dichotomy[175]	[176]

[164] López Austin, 1980: 52
[165] López Austin writes that other peoples in Mexico do possess other qualities within this system, such as temperate (*fresco o medio*) (López Austin, 1975: 18).
[166] Chevalier and Sánchez Bain, 2003
[167] Chevalier and Sánchez Bain, 2003
[168] Although wet is cold, dry is hot (Katz, 1992: 101).
[169] 7 qualities: 4 degrees of cold and 2 degrees of hot, but also temperate (Madsen, 1955: 125).
[170] Matthews, 1983: 827
[171] 8 qualities: very hot, hot, warm, temperate, cool, very cool, cold, very cold (Messer, 1981: 135).
[172] The hot-cold continuum has 8 terms: fiery hot (*k'ak'*), very hot (*xu'w c'atän*), hot (*c'atän*), warm (*mïk'in*), lukewarm (*sakliloj*), cool (*joron*), cold (*tew*), and very cold (*xu'w tew*) (Tedlock, 1987: 1074).
[173] Hot (*caliente*) and cold (*frío/fresco*) (Currier, 1966: 251).
[174] In Tzintzuntzan there are five qualities: hot and very hot, neutral, cold and very cold (Foster, 1987: 368). In an earlier article Foster writes that there are four variables distinguishable in the hot-cold system: cold, hot, temperate and don't know. He writes that it is better to ignore very hot and very cold as the magnitude of intensity cannot be elicited accurately (Foster, 1979: 180).
[175] Ingham, 1970
[176] Illnesses are classified as hot or cold and wet or dry while body states, environmental factors and foods and herbs which relate to treatment and etiology are classified as hot or cold (Neuenswander and Souder, 1977: 96). Some foods are an intermediate state (*fresco*) (Neuenswander and Souder, 1977: 111).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
3. principle of opposites is used	yes[177], although there are exceptions	yes[178]	yes[179] [180] in theory	yes[181]	yes[182]	yes[183]	yes[184]	yes[185]	[186]	[187]	yes[188]	yes[189]
4. treatment based on efficacy						yes[190]		yes[191]		yes[192]		yes[193]

[177] López Austin, 1975: 17
[178] Ortiz de Montellano, 1990: 155
[179] Chevalier and Sánchez Bain, 2003: 24, 57, 77-78, 102, 108, 125
[180] Chevalier and Sánchez Bain, 2003: 60
[181] Katz, 1992: 110-111
[182] Madsen, 1955: 131, yet there are exceptions.
[183] Matthews, 1983: 833-834
[184] Messer, 1981: 135-136; Messer, 1978: 65, 73
[185] Tedlock, 1987: 1076-1077, yet there are exceptions.
[186] It is implied (Currier, 1966: 253-254).
[187] Foster, 1987: 355. Yet there are many exceptions (Foster, 1988: 120, 126-127). Foster, 1988: 124-125
[188] Ingham, 1970: 79, there are exceptions (Ingham, 1970: 80).
[189] Neuenswander and Souder, 1977: 98, 100, 103-105
[190] Matthews, 1983: 835
[191] Tedlock, 1987: 1076
[192] Foster, 1988: 127-128
[193] Neuenswander and Souder, 1977: 105

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
5. quality determined by looking at the effect the item has on the body	yes[194]				yes[195]	yes[196]	yes[197]	yes[198]	yes[199]			[200]
6. quality determined by looking at the nature of the item (when and where obtained)	yes[201]		yes[202]	yes[203]	yes[204]		yes[205]	yes[206]			yes[207]	yes[208]

[194] López Austin, 1975: 22
[195] Madsen, 1955: 125
[196] Matthews, 1983: 832
[197] Messer, 1981: 136
[198] Tedlock, 1987: 1075
[199] Currier, 1966: 251, 253
[200] The quality of the disease is determined by looking at the effect the item (of which the quality is known) has on the body (Neuenswander and Souder, 1977:98).
[201] The amount of humidity or sun an item receives determines it's cold or hot quality (López Austin, 1975: 21).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
7. hot and cold as qualities are distinguished linguistically							yes[209]	yes[210]				[211]

[202] Chevalier and Sánchez Bain, 2003: 27
[203] Katz, 1992: 100, 101
[204] Madsen, 1955: 125-126
[205] Messer, 1981: 136; Messer, 1978: 73
[206] Tedlock, 1987: 1075
[207] Ingham, 1970: 78
[208] Neuenswander and Souder, 1977: 107
[209] *NaNla duš* (*muy caliente*/very hot), *naNla* (*caliente*/hot), *naǰaˀ* (*caliente*/warm), *templad* (*templado*/temperate), *nyel yuh* (*fresco*/cool), *nahl* (*muy fresco*/*frío*/ very cool/cold), *nahl duš* (very cold). Zapotec has 2 words for heat or warm. *Naǰaˀ* is used to denote intrinsic warmth, like the warmth of fire while *naNla* is used to denote outward sources that produce heat like the sun or the air. Both can be used to describe the quality of herbs or body states. The Zapotecs are used to translate both words as *caliente* in Spanish. *Nyel yuh* is the most used term to denote cold qualities, translated as *fresco* into Spanish (Messer, 1981: 135).
[210] The extreme terms (fiery hot, very hot, cold and very cold) are generally reserved to indicate negative reactions to a particular substance.
[211] *'A'/m'an* (hot)and *tew/hron* (cold) are not defined exclusively in terms of temperature (Neuenswander and Souder, 1977: 98-99). *'A'*: hot/fire/fever used for diseases is differentiated from *m'an* which denotes the hot side of the hot-cold continuum. *Hron* is used to classify body states, environment, food and medications while *tew* (cold/air/chill) is used for diseases (Neuenswander and Souder, 1977: 103).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
8. the dual opposition of contrary elements divides and explains the universe (or parts of it)	yes[212]	yes[213]	yes[214]	yes[215]	yes[216]		yes[217]		[218]	yes[219]	yes[220]	yes[221]
9. the hot-cold metaphor extends to the land	yes[222]			yes[223]	yes[224]		yes[225]					

[212] López Austin, 1980: 52; Tedlock, 1987: 1075.
[213] Ortiz de Montellano, 1990: 36-37
[214] Chevalier and Sánchez Bain, 2003: 31, 43
[215] Katz, 1992: 103
[216] Madsen, 1955: 124, 130
[217] Messer, 1981: 135 (although on page 142 Messer writes hot-cold is not part of the intrinsic cultural symbolism). This is in disagreement with Messer 1978 where she wrote that relating to medicine and the binary opposition there are principles ordering plant life, human life, and the rest of the natural and social environment (Messer, 1978: 11, 73).
[218] Currier, 1966: 256-257, 261
[219] Foster, 1979: 180
[220] Ingham, 1970: 78, 83
[221] Neuenswander and Souder, 1977: 99
[222] Humid land is considered cold, lowlands are hot (López Austin, 1975: 22).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
10. wind, water and earth are cold		yes[226]	yes[227]	[228]	[229]		[230]	[231]	[232]		[233]	[234]
11. wind, water and earth are personified	yes[235]	yes[236]	yes[237]		[238]			[239]			[240]	

[223] Katz, 1992: 100; Katz, 1990: 157
[224] Hot lowlands (Madsen, 1955: 126).
[225] Land is classified according to general and specific geographical locations, soil depth, color and consistency. The most general contrast is between *tierra caliente* and *tierra fría*. *Tierra caliente* refer to the Tehuantepec coast and cold lands indicate the land in the Valley of Oaxaca. Mitla is called *tierra fría* to denote vegetation associated with temperate land, rather than tropical land (Messer, 1978: 93).
[226] Ortiz de Montellano, 1990: 131
[227] Water is related to cold (Chevalier and Sánchez Bain, 2003: 24, 32, 58, 64, 99, 123).
[228] Humid is cold (Katz, 1992: 101).
[229] Water is cold (Madsen, 1955: 125).
[230] Water is associated with coolness (Messer, 1981: 136, 140).
[231] Cold winds (Tedlock, 1987: 1074). Water is cool (Tedlock, 1987: 1075).
[232] 'The coolness of mist or of the night air' (Currier, 1966: 253). 'Cold can enter from the air or from a body of water' (Currier, 1966: 254, 256).
[233] Water is cold (Ingham, 1970: 78). Cold *aire* (Ingham, 1970: 79).
[234] Water is cold, air is cold (Neuenswander and Souder, 1977: 99).
[235] López Austin, 1980: 335, 346
[236] Ortiz de Montellano, 1990: 65, 130, 213
[237] Evil (*naual/ehegat*) wind (Chevalier and Sánchez Bain, 2003: 58, 67). *Chaneque* (Chevalier and Sánchez Bain, 2003: 110-111, 121, 125-126, 133).
[238] Madsen, 1955: 128-129

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
12. A state of idealized balance in the human being is recognized	yes[241] [242]	yes[243]	yes[244]	yes[245]	[246]	yes[247]	yes[248]	yes[249]		yes[250]	yes[251]	yes[252]

[239] Earth (mountain) is personified (Tedlock, 1987: 1079).
[240] It is implied by *señores aires* (Ingham, 1970: 79).
[241] López Austin, 1980: 255
[242] López Austin, 1975: 20
[243] Ortiz de Montellano, 1990: 55
[244] The body goes through normal healthy cycles, alternating on a daily base between hot and cold equilibrium states (Chevalier and Sánchez Bain, 2003: 18, 41). (Chevalier and Sánchez Bain, 2003: 155).
[245] It is implied (Katz, 1992: 102-113).
[246] The temperate state (Madsen, 1955: 127).
[247] It is implied (Matthews, 1983: 833).
[248] Messer, 1981: 135
[249] The ideal body temperature is on the hot end of the continuum (Tedlock, 1987: 1074).
[250] Foster, 1987: 355
[251] Ingham, 1970: 81
[252] Neuenswander and Souder, 1977: 100

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
13. the human body is in constant flux, hot and cold are never truly balanced	yes[253] [254]	yes[255]	yes[256]	yes[257]	[258]	[259]	yes[260]		yes[261]			yes[262]
14. death is a cold state			no[263]	yes[264]	yes[265]							yes[266]

[253] López Austin, 1980: 255
[254] López Austin, 1975: 20
[255] Ortiz de Montellano, 1990: 55-57
[256] Chevalier and Sánchez Bain, 2003: 18, 22, 41
[257] It is implied (Katz 1992: 103-113).
[258] It is implied, work overheats the human body (Madsen, 1955: 127).
[259] It is implied (Matthews, 1983: 833).
[260] Messer, 1981: 135, 137
[261] Currier, 1966: 256-257
[262] The healthy body leads towards the hot side of the hot-cold continuum (Neuenswander and Souder, 1977: 101-102). A body at rest is in a cool state (Neuenswander and Souder, 1977: 111, 114).
[263] Chevalier and Sánchez Bain, 2003: 23-24

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
15. blood is hot	yes[267]		yes[268]		no[269]	yes[270]		yes[271]	yes[272]	[273]	[274]	
16. birth and blood loss conditions are cold	yes[275]		no[276]	yes[277]	yes[278]	yes[279]	[280]				[281]	[282]

[264] It is implied (Katz, 1992: 103).
[265] The corpse is cold, because all temperature leaves the body at death (Madsen, 1955: 128).
[266] Neuenswander and Souder, 1977: 102
[267] Menstrual blood (López Austin, 1975: 20); López Austin, 1980: 234-236
[268] Chevalier and Sánchez Bain, 2003: 22, 32, 43
[269] It is temperate, menstrual blood is hot (Madsen, 1955: 128).
[270] Matthews, 1983: 833
[271] Tedlock, 1987: 1074
[272] Currier, 1966: 254
[273] Blood is believed to be the source of body warmth (Foster, 1988: 126).
[274] Menstrual blood is extremely hot (Ingham, 1970: 83).
[275] López Austin, 1975: 20-21
[276] Pregnancy, birth, the post-partum condition and the menstruation period are hot (Chevalier and Sánchez Bain, 2003: 26, 56).
[277] Postpartum conditions are cold, but menstruation and pregnancy are considered very hot (Katz, 1992: 103, 107-108).
[278] Birth makes the mother cold (Madsen, 1955: 127).
[279] Menstruation is a cold condition; pregnancy is a very hot condition (Matthews, 1983: 833).
[280] Menstruation is cold and it is implied the womb is cold after giving birth (Messer, 1981: 136) pregnancy is hot (Messer, 1981: 136).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
17. gastrointestinal diseases are generally cold	yes[283]		no[284]	yes[285]	yes[286]	[287]	yes[288]	yes[289]	[290]	[291]	[292]	[293]

[281] Pregnancy is hot (Ingham, 1970: 84).
[282] Menstruation and pregnancy are hot (Neuenswander and Souder, 1977: 100). Postpartum condition associated with cold due to hemorrhage (Neuenswander and Souder, 1977: 115-116).
[283] The intestines are hot, so according to the principle of opposites diseases affecting them should be cold (López Austin, 1975: 20).
[284] Three kinds of diarrhea are mentioned; they burn and are considered hot (Chevalier and Sánchez Bain, 2003: 70-71, 77). Diarrhea and fever caused by a sudden change in temperature is considered a cold ailment (Chevalier and Sánchez Bain, 2003: 73).
[285] Diarrhea is cold, *empacho* is related to cold, constipation is hot however, vomit is considered cold (Katz, 1992: 105-106).
[286] White dysentery is cold, bloody dysentery is hot, stomachache is cold, constipation is hot, *tecacaxatsa* is cold, *hética* is hot, *hidropesía* is temperate, *empacho* is cold. It appears applied stomach cramps are cold. Worms are cold (Madsen, 1955: 132-134).
[287] Empacho is mentioned as cold (Matthews, 1983: 835).
[288] Bilis and bloody dysentery are hot, while green dysentery, *frialdad* (cold stomach, pain and flatulence) and *empacho* are cold (Messer, 1981: 137).
[289] Colic, intestinal worms, stomachache, indigestion, diarrhea and dysentery are cold (Tedlock, 1987: 1074). Blood dysentery is hot (Tedlock, 1987: 1077).
[290] Stomach cramps are caused by cold, bloody dysentery is hot, diarrhea is usually cold, but it may be hot, enteritis is hot when streaked with blood, while it is cold when white and covered with mucous (Currier, 1966: 254).
[291] Mild stomach discomfort is usually attributed to cold, but can also come from heat (Foster, 1988: 128).
[292] Diarrhea may be either hot or cold, *empacho* is caused by hot dirty food (Ingham, 1970: 80, 81).
[293] Dysentery from hot (bloody), mucoid dysentery is cold. Diarrhea with vomiting may be either hot or cold. Worm infestation is hot (Neuenswander and Souder, 1977: 122).

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18. skin afflictions are generally hot	yes[294]				[295]	[296]			yes[297]	yes[298]	[299]	[300]
19. rheumatism or other incapacitating ailments are cold	yes[301]	yes[302]			yes[303]				yes[304]	yes[305]		[306]

[294] López Austin, 1975: 18
[295] Measles and *ronchas* are cold, burns, cuts and wounds are hot (Madsen, 1955: 131-137).
[296] Fungus is mentioned as being hot (Matthews, 1983: 835).
[297] Currier, 1966: 254-255
[298] Foster, 1988: 126 Bruises are thought to be a hot condition (Foster, 1988: 128).
[299] Smallpox and measles are hot (Ingham, 1970: 80).
[300] *Sarampión* (measles) is cold and wet (Neuenswander and Souder, 1977: 100).
[301] López Austin, 1975: 18
[302] Ortiz de Montellano, 1990: 132
[303] Madsen, 1955: 129
[304] Currier, 1966: 254
[305] Foster, 1988: 125
[306] Neuenswander and Souder, 1977: 122

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
20. cough is (generally) cold			cold[307]		cold[308]	cold[309]			[310]	[311]	cold[312]	[313]
28. fever is (generally) hot	yes[314]	yes[315]			yes[316]	yes[317]			yes[318]	yes[319]		

[307] Chevalier and Sánchez Bain, 2003: 24
[308] Madsen, 1955: 134
[309] Matthews, 1983: 835
[310] Chest cramp and tuberculosis are both caused by cold entering the body (Currier, 1966: 253-254).
[311] Hot or cold (Foster, 1988: 127), coughs are more often said to be due to cold (Foster, 1988: 128).
[312] Ingham, 1970: 79
[313] Either hot or cold (Neuenswander and Souder, 1977: 122).
[314] López Austin, 1975: 18
[315] Ortiz de Montellano, 1990: 54
[316] Madsen, 1955: 135
[317] Matthews, 1983: 835
[318] Currier, 1966: 255
[319] Foster, 1988: 125

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
23. *mal aire* is			hot[320]		cold[321]		[322]				[323]	
32. *mal de ojo*		hot[324]	hot[325]				hot[326]	cold [327]			hot[328]	hot[329]
24. *espanto* is	cold[330]		cold[331]		cold[332]		hot[333]				cold[334]	

[320] Heat of the dead (Chevalier and Sánchez Bain, 2003: 100-101).
[321] *Aire de noche* (one of the three soul's left after death) (Madsen, 1955: 128) *aire de cuevas* is also cold (Madsen, 1955: 136).
[322] *Congrena:* infection from a corpse, is hot (Messer, 1981: 137).
[323] Ingham writes *aires* are cold, but that they generate in anthills and caves inhabited by the devil; the devil and ants are hot (Ingham, 1970: 80).
[324] Ortiz de Montellano, 1990: 223
[325] Chevalier and Sánchez Bain, 2003: 82-84
[326] Messer, 1981: 137
[327] It is caused by an adult with hot or fiery blood (Tedlock, 1987: 1074).
[328] Caused by hot vision (Ingham, 1970: 80-81).
[329] Neuenswander and Souder, 1977: 115
[330] López Austin, 1975: 19
[331] Chevalier and Sánchez Bain, 2003: 56, 116-117

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
29. *chaneque* is cold		yes[335]	yes[336]									
25. twins are cold	yes[337]	yes[338]			yes[339]							
26. people gain heat with age and office	yes[340]	yes[341]	yes[342]	yes[343]	[344]		[345]	[346]				[347]

[332] Madsen, 1955: 136
[333] Messer, 1981: 137
[334] Ingham, 1970: 81
[335] Ortiz de Montellano, 1990: 131, 140-141
[336] Serpents, which are cold, may be *chaneque*, because they too are spirits of the earth (Chevalier and Sánchez Bain, 2003: 110-111, 117, 118, 121).
[337] López Austin, 1980: 256
[338] Ortiz de Montellano, 1990: 60
[339] Madsen, 1955: 128
[340] López Austin, 1980: 257-258
[341] Ortiz de Montellano, 1990: 53, 59
[342] Chevalier and Sánchez Bain, 2003: 22, 42
[343] People gain heat with age (Katz, 1992: 103).

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
27. metaphors used to connect the human body to the universe	yes[348]	yes[349]	yes[350]	yes[351]								
30. disease is caused by an imbalance related to hot-cold	yes[352]	yes[353]	yes[354]	yes[355]	yes[356]	yes[357]	yes[358]	yes[359]	yes[360]	yes[361]	yes[362]	yes[363]

[344] Old age is seen as a cooler period (Matthews, 1983: 833).
[345] Children are generally classified as cool, adults are warmer, old people are either judged cold or hot depending on their occupation (traditional occupations produced predominantly hot bodies) (Messer, 1981: 137).
[346] It is implied that young age is classified as cold, while old age is classified as hot (Tedlock, 1987: 1076).
[347] Certain items gain heat with age, old people are considered to be cold though (Neuenswander and Souder, 1977: 107, 116).
[348] López Austin, 1980: 346-349
[349] Ortiz de Montellano, 1990: 36-44, 134
[350] Chevalier and Sánchez Bain, 2003: 27, 45, 63, 68, 122
[351] Katz, 1992: 104
[352] López Austin, 1975: 17
[353] Ortiz de Montellano, 1990: 155

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
31. disease is caused by supernatural agents	yes[364]	yes[365]	yes[366]		yes[367]		yes[368]	yes[369]				yes[370]

[354] Chevalier and Sánchez Bain, 2003: 16, 46-47; although they also write that it is actually the threat of for example cold when one is going through a necessary phase of heat (Chevalier and Sánchez Bain, 2003: 25).
[355] Katz, 1992: 104
[356] Madsen, 1955
[357] Matthews, 1983: 829
[358] Messer, 1981: 135
[359] Health depends on the warmth of the blood, sickness results from cold blood (Tedlock, 1987: 1074).
[360] Currier, 1966: 251, 255
[361] Foster, 1987: 355
[362] Ingham, 1970: 79
[363] Neuenswander and Souder, 1977: 100
[364] López Austin, 1975: 19
[365] Ortiz de Montellano, 1990: 132, 159
[366] Chevalier and Sánchez Bain, 2003: 32, 110-111, 116-121, 125, 129, 133
[367] Madsen, 1955: 129
[368] Messer, 1981: 141; Messer, 1978: 65
[369] Tedlock, 1987: 1078-1079
[370] Neuenswander and Souder, 1977: 113, 115

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
32. preparation affects the quality of an item				yes[371]	yes[372]				yes[373]	yes[374]		
33. different plant parts and different growth stages of a plant have different qualities				yes[375]								

[371] Katz, 1992: 101
[372] Madsen, 1955: 127
[373] Currier, 1966: 256
[374] Foster, 1988: 121; Foster, 1979: 181-182
[375] Katz, 1992: 101-102

Principles	López Austin (the Nahuas)	Ortiz de Montellano (the Nahuas)	Chevalier and Sánchez Bain (Popolucas and the Nahuas	Katz (Mixtec)	Madsen (Nahuas)	Matthews (Oaxaca)	Messer (Zapotec Mitla)	Tedlock (Quiché Maya)	Currier (Michoacán)	Foster (Tzintzuntzan)	Ingham (Tlayocapan)	Souder and Neuenswander (Quiche Maya)
34. hot-cold is an Indigenous system	yes	yes[376]	yes[377]	yes[378]	yes[379]	no[380]	[381]	[382]	no[383]	no[384]	no[385]	[386]

[376] Syncretism.
[377] Although syncretism is not denied (Chevalier and Sánchez Bain, 2003: xiv).
[378] Katz, 1992: 103-104
[379] Syncretism (Madsen, 1955: 123).
[380] Matthews follows Foster (Matthews, 1983: 827).
[381] Although Messer writes that most scholars follow Foster, she also points to the fact how in different parts of the world humoral pathology systems developed independently, she does not propose any theory for the providence of the hot-cold system among the Zapotec of Mitla (Messer, 1981: 133-134).
[382] Tedlock seems to argue for syncretism; although she does point out that it is unclear what kind of process syncretism is. She writes that Latin American medical systems have combined and continue combining Indigenous, colonial and modern medical beliefs, values and institutions in various complementary and contradictory patterns (Tedlock, 1987: 1069-1071).
[383] Curier, 1966: 251
[384] Foster, 1987: 356
[385] Ingham, 1970: 76
[386] Syncretism (Neuenswander and Souder, 1977: 79).

Appendix 6.2: Principles of hot-cold disease classification

Disease category	Individual diseases	Generally classified as
Gastrointestinal	Stomachache, diarrhea, worms, *empacho*	Cold
	Constipation, bloody diarrhea/dysentery	Hot
Skin afflictions	Rashes, pimples, sores	Hot
Bodily aches and pains	Rheumatism, bone break	Cold
Fever		Hot
Folk afflictions (due to supernatural or magical agents)	*Mal de ojo*	Hot
	Espanto/chaneque	Cold
	Bilis	Hot
	Mal aire	?
Birth related	Pregnancy	Hot
	Post-partum conditions	Cold

Appendix 6.3: Hot cold classification of medicinal plant uses in Tilantongo

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
Teeth problems	Loose teeth,	Dientes aflojados	T[387]
	Toothache	Dolor de muelas, dolor de dientes	T[388]
	Strengthen the teeth, bind the teeth	Fortalecer los dientes, amarrar los dientes	T
Bodily aches and pains	Having taken a hit, bruise	Golpes	T c h[389]
	Having taken a hit which causes internal bleeding or bruising	Golpe interno	T c h
	Inflammation, swelling	Inflamación	C h[390]
	Broken bone	Fractura, hueso quebrado,	C[391]

[387] *Templado, lo puede controlar con algo frío o con algo caliente. Hay personas que les gusta tomar las cosas muy calientes y esto les provoca que los dientes se vayan debilitando. Ya ve que también dicen que lo frío es caliente, por ejemplo, el hielo se siente frío pero es demasiado caliente* (Sra Adelina). In accordance with this, López Austin references Oscar Lewis, 1968: 61 that ice is perceived to be hot (López Austin, 1975: 17).

[388] Toothache is cold (Mak, 1959: 138).

[389] I was told the following: *los golpes son templados. Como se debilita el cuerpo aquí es donde se apodera el aire, el aire frío, puede dar de las dos maneras frío o caliente. Golpe interno también* (Sra Adelina). Foster writes bruises are hot (Foster, 1988: 128).

[390] Neck abscesses and other swellings are hot (Mak, 1959: 138).

[391] *El hueso quebrado es frío, se enfría porque ya no hay buena circulación* (Señor Noe). Classified as cold (Piestrzynska, 2010). Mak writes that broken limbs and sprains are considered cold (Mak, 1959: 135).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
		quebraduras, quebradura de animal, quebrahueso, quebradura de pie o de mano	
	Sprain	Troncha el pie, torcedura, falsear el pie o el mano, luxación	C[392]
	Rheumatism	Reumatismo	C[393]
	Backpain, knee pain, pain of the feet, hand, ribs	Dolor de espalda, rodilla, los pies dolor de pie, de mano, dolor de costillas	C[394]
	Knee pains, knee pains because of the cold	Dolores de rodilla dolor de la rodilla por el frío	C[395]
	Bone ache	Dolor de hueso, dolor de huesos	C[396]
	Pain, for the cold	Dolor, para el frío	C[397]
	Cold of the body	Frío del cuerpo	C
	For the cold (rheumatism)	Para el frío (reuma)	C
	Muscle pains, muscle pains of the foot	Dolores musculares, dolor muscular de pie	C[398]
	Cold of the bones,	Frío de los huesos,	C
	Swelling of the knee	Hinchazón de la rodilla	C
	Swelling, swelling of the body	Hinchazón, hinchazón del cuerpo	C

[392] Mak writes that broken limbs and sprains are considered cold (Mak, 1959: 135).
[393] Classified as cold (Piestrzynska, 2010). Rheumatism is either cold or hot (Mak, 1959: 138). Ascribing the hot quality to rheumatism is unusual – see Appendix 6.2.
[394] Classified as cold (Piestrzynska, 2010).
[395] Classified as cold (Piestrzynska, 2010).
[396] Classified as cold (Piestrzynska, 2010).
[397] Classified as cold (Piestrzynska, 2010).
[398] Classified as cold (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	Swelling of the feet	Hinchazón de los pies	C
	Pain of the body, pain	Dolor del cuerpo, dolor	C[399]
	Coldness in the navel, coldness in children	La frialdad en el ombligo (cuando el niño no deja de hacer pipi), la frialdad en los niños frialdad	C
	Coldness (pain of the body that comes from cold)	Frialdad (dolor del cuerpo que viene de frío), frialdad (Frío)	C
	Pain when breathing	Dolor de respiración	C[400]
Eye, ear, throat and head afflictions	Earache	Dolor de oído, mal de oído el oído para el oído	H c[401]
	Infection of the head	Infección en la cabeza infecciones en la cabeza	H c
	Headache	Dolor de cabeza	H[402]
	Tonsilitis	Anginas	H c
	Asthma	Asma	T[403]
	Cough	Toz	C h
	Whooping cough	Toz ferina	H
	Chronic cough	Toz crónica	C
	Flu	Gripe	C h[404]
	The common cold	Resfriados	C h[405]
	Mouth sores	Fuegos en la boca, contra los	H

[399] Classified as cold (Piestrzynska, 2010).
[400] Classified as cold (Piestrzynska, 2010).
[401] Classified as hot (Piestrzynska, 2010). Mak writes that earache is neither hot nor cold (Mak, 1959: 136).
[402] Headache is hot (Mak, 1959: 138).
[403] Classified as cold (Piestrzynska, 2010).
[404] Classified as hot and cold (Piestrzynska, 2010).
[405] Classified as hot and cold (Piestrzynska, 2010). Colds and sore throats are usually hot, but may be cold during the rainy season (Mak, 1959: 136).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
		fuegos en la boca	
	Mouth pimples	Granos en la boca, en la garganta, los granos en la boca	H
	Sore throat	Garganta irritada	H[406]
	Cataracts	Nubes en los ojos	H
	Eye irritation	Los ojos ojos irritados, la vista, vista enferma, mala vista, ojo irritado, ojos irritados	H[407]
	Eye infection, conjunctivitis	Infección de los ojos, conjuntivitis	H[408]
Treatments	Control varicose veins	Controlar varices	H
	To remove the cold illness	Sacar la enfermedad fría	H
	Removes the cold, to heat up the stomach	Saca el frío, caldear el estómago	H
	Removes the cold, to heat up the foot when there is pain because of cold	Saca el frío, caldear el pie cuando hay dolor por frío	H
	To heat up (rub) when the body aches	Para caldearse cuando duele el cuerpo	H
	To rub the stomach, the back	Caldear el estómago, la espalda,	H
	Baths[409]	Baños	H
	To calm muscle pains, sprains	Calmar dolores musculares, torceduras	H

[406] Colds and sore throats are usually hot, but may be cold during the rainy season (Mak, 1959: 136).
[407] Classified as hot (Piestrzynska, 2010).
[408] Classified as hot (Piestrzynska, 2010). Mak writes that eye infections are hot (Mak, 1959: 136).
[409] I was told that baths with herbs are hot, while baths with pure water even when hot are considered to be cold. As this list deals with medicinal plant uses, by default the baths are hot.

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	To hit the foot, the hand, the bone inside[410]	Para pegar el pie, el mano, el hueso al dentro	H
	To remove inflammation	Para desinflamar	H c
	Eye wash	Se lava los ojos, lavar los ojos, limpiar los ojos	C
	To strengthen the vision	Fortalecer la vista	C
	To close a wound, to cause it to scar	Cicatrizar cerrar la herida	T
	To wash wounds	Lavar heridas	T c h
	To wash infected wounds	Lavar heridas con infección	H
	Control vaginal hemorrhage and menstruation cramps	Controlar la hemorragia vaginal y los cólicos menstruales	H
	Remove parasites	Desparasitar	H
	To remove inflammation of the intestines	Desinflamar los intestinos	H
	Avoid intestinal gasses	Evitar gases intestinales	H
	To remove inflammation of the stomach	Desinflamar el estómago	H
	To cleanse the stomach	Limpiar el estómago	H
		Lavar los intestinos	T
		Purga	H[411]
	Stomach stimulant, for the appetite, augment the appetite, stimulant, helps with digestive problems	Estimulante estomacal, para el apetito, aumentar el apetito, estimulante, ayuda en los problemas digestivos, abrir el apetito, para dar	H

[410] This is a treatment used for aching body parts, whether because of rheumatism, a sprain or even a broken bone. See Chapter six for the Mixtec terms related to this treatment and a full explanation of what it involves.

[411] Classified as cold (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
		apetito	
	To clean the kidneys, diuretic	Lavar los riñones, diurético	C
	Insecticide, repellant	Insecticida, repelente	C
	To lower fever, to remove fever	Bajar la calentura, quitar la fiebre	C
	To remove *aire*, See Chapters six and seven for a description	Sacar el aire	C
	Cleansing, See Chapters six and seven for a description	Limpias	C
	Control epileptic attacks	Controla de epilepsia	C
	Control the nerves	Controlar los nervios	C
	Control blood pressure	Controlar presión,	C
	Refreshing	Refrescante	C
	Calming, relaxing, refreshing for the body	Calmante, relajar, refrescar el cuerpo	C
	To strengthen, to strengthen the body	Fortalece, fortalecer el cuerpo	H
	Purification of the blood	Purificar la sangre	C
	Strengthen the bones	Endurecer los huesos	H
	Dietetic, lose weight	Dietética, bajar de peso	C
	Against poison	Contra veneno	H c
	To control cancer	Controlar el cáncer	H c[412]
	To prevent cancer	Prevenir el cáncer	H c[413]
	Stimulant, cerebral stimulant	Estimulante, activar el cerebro	H

[412] Classified as hot and cold (Piestrzynska, 2010).
[413] Cancer was classified as hot in my MPhil thesis (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	To stabilize the body	Estabilizar todo	H c
	Patches	Parches	H
	Stomach patches	Parches estomacales	H
	Stimulate with the herb	Hacer plasmas, fomento de hierba	H
	To lower blood pressure	Bajar la presión	C
Blood loss related	Wounds (superficial and interior)	Heridas (superficiales y al interior)	C
	Wounds	Herida cuerpo cortado	C[414]
	Menstruation cramps, menstruation pain	Cólicos de la regla, dolores menstruales	C[415]
	Menstruation	Menstruación	C[416]
	To provoke menstruation, abortion	Provocar la menstruación, abortivo	C
	Vaginal hemorrhage	Hemorragia vaginal	C
	Hemorrhage	Hemorragia	C
Birth related	Accelerate birth, when the baby doesn't want to be born	Para que nazca el bebe, mujer embarazada, nacer bebe, provocar el parto, cuando no quiere nacer el bebe, para acelerar el parto, para dar a luz, parto[417]	H[418]
	Pain when the baby is being born	Dolor a la hora que nazca el bebe (cuando viene el dolor	H

[414] Classified as cold (Piestrzynska, 2010). Mak writes that wounds and skin eruption are neither cold nor hot (Mak, 1959: 139). However, according to the principles of hot cold classification, wounds and skin eruptions are separate categories.
[415] Classified as cold (Piestrzynska, 2010).
[416] Classified as cold (Piestrzynska, 2010).
[417] López García writes that in Apoala the midwife carries herbs that she prepares so the woman in labor can drink them so she can relax her body and give birth faster (López García, 2007: 27-28).
[418] Classified as cold (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
		de bebe	
	Healing after giving birth, cleaning inside after giving birth	Sanar después de dar a luz, después del parto, después de alivio, para el alivio, limpiar al dentro después de dar a luz	H
	Baths for women who have just given birth	Baños de partos, baño cuando una mujer da a luz, baño de asiento	H
	When the placenta doesn't fall, to drop the placenta	Cuando no cae la placenta de los bebes, tirar la placenta	H[419]
	For a woman who is breast feeding	Para dar a una mujer que está dando leche a su bebe	H
	To nurse, suckle	Amamantar	T
Gastrointestinal	Parasites in the stomach	Parásitos y las lombrices, bichos en el estómago, parásitos en el estómago	C[420]
	Stomach pain, stomach problems	Dolor de estómago, dolor de barriga, molestias de estómago, mal estar del estómago, problemas estomacales	C[421]
	Cold in the stomach	Frío, frío del estómago, para el frío	C[422]
	Intestinal problems,	Problemas intestinales	H c
	Pain of the intestines	Dolor de intestinos	C

[419] Classified as cold (Piestrzynska, 2010).
[420] Classified as cold (Piestrzynska, 2010).
[421] Classified as cold (Piestrzynska, 2010). Stomach aches and digestive ailments are cold when the stomach feels like a hard ball, hot when accompanied by fever and diarrhea (Mak, 1959: 138).
[422] Classified as cold (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	Delicate stomach	Estómago delicado	H c
	Diarrhea	Diarrea	C[423]
	Babies with diarrhea	Bebes con diarrea	C
	Stomach pain and diarrhea	Dolor del estómago y diarrea	C
	Indigestion, bloated stomach	Empacho	C[424]
	Vomit	Vómito	C h
	Rumbling stomach	Ruido de estómago	C
	Inflammation of the intestines	Inflamación de los intestinos	C
	Cramps	Cólicos	C
	Bad digestion	Mala digestión	C
	Stomach inflammation	Inflamación del estómago, inflamación estomacal, el frío, inflamación del estómago	C
	Infection of the stomach	Infección del estómago	C
	Dysentery	Disentería	C[425]
	Bloody dysentery	Disentería con sangre	H
	Gastritis	Gastritis	H[426]
	Constipation	Estreñimiento de los intestinos, estreñimiento	H
	Hot stomach, fever of the stomach (constipation)	Temperatura del estómago, No va uno al baño	H
Liver, kidney and	Gallbladder inflammation	Inflamación de la vesícula	H

[423] Classified as cold (Piestrzynska, 2010).
[424] Classified as cold (Piestrzynska, 2010).
[425] Classified as cold (Piestrzynska, 2010).
[426] Classified as hot (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
gallbladder problems			
	Liver inflammation	Inflamación del hígado	H
	Kidneys	Los riñones	H
	Kidney stones	Piedra en los riñones	H
	Kidney infection	Infección de los riñones,	H
	Problems urinating	Mal de orina	C[427]
	Kidney problems	Problemas de los riñones	C h
Ovary and vaginal problems	Female infertility	Infertilidad de mujer	C
	Lowering of the ovaries	Bajaron los ovarios, con manguera se lava al dentro	C
	Cysts of the ovaries	Quistes en los ovarios	C
	Vaginal infection	Infección vaginal	C
Skin afflictions	Mange, scabies	La sarna	H c
	Smallpox	Viruela	H
	Warts	Verrugas	H
	Measles	Sarampión	H[428]
	Chickenpox	Varicela granos de la varicela	H
	Welts	Ronchas	H c
	Rash	Salpullido	H
	Pimples	Barros, granos	H[429]
	Treating a type of pimple	Madurar el clavillo	H
	Acne	Acné	H
	Allergy, skin allergies	Alergia, alergias en la piel	H

[427] Classified as cold (Piestrzynska, 2010).
[428] Classified as hot (Piestrzynska, 2010).
[429] Classified as hot and cold (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	Mosquito bites, animal bites	Granitos de los moscos, picadura de animal	H
	Abrasion, chafing	Rozadura, rozaduras	H[430]
	Sunburn	Quemaduras de sol	H
	Burns	Quemaduras	H
	Black spots on the skin (liver spots)	Manchas negras en la piel	H
	Itching	Comezón	C h
	To kill the parasites where the flesh of the animal is rotting	Matamos el gusanito en animales donde tienen podrido	H
	Lice	Piojos	H[431]
	Foot fungi	Para los hongos de los pies	H[432]
	Foot infection	Infecciones de los pies	H
	Dandruff	Caspa	H c
	Scalp infection	Infección del cuero cabelludo	H
Fever	Fever	Fiebre, calentura, temperatura	H[433]
Mesoamerican illnesses	See Chapters six and seven for a description	Espinilla	H
	See Chapter six for a description	*Yɨkɨ* (hueso)	H
	See Chapters six and seven for a description	Mal aire, aire	H[434]

[430] Classified as hot (Piestrzynska, 2010).
[431] Classified as hot (Piestrzynska, 2010).
[432] Fungus is hot (Matthews, 1983: 835).
[433] Classified as hot (Piestrzynska, 2010). Fevers are hot (Mak, 1959: 137).
[434] Classified as hot (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	See Chapter six for a description	Mal de ojo, el ojo	H[435]
	Fright, see Chapter six for a description	Espanto	H
	See Chapter six for a description	Bilis, enojo, derrame de bilis	H[436]
	See Chapter six for a description	Envidia	H
	Tantrum, see Chapter six for a description	Coraje, berrinchudos	H
	See Chapter six for a description	Enojo o sentimiento, enojo/tristeza, coraje, tristeza, sentimientos, para los sentimientos	H[437]
	Throbbing, see Chapter six for a description	Latido, la cuerda, las cuerdas, el latido	H
	Anxiety, nerves, see Chapter six for a description	Ansiedad, nervios	H
Tristeza group	Epilepsy or epileptic attacks	Alferecía	H[438]
	See Chapter six for a description	Tristeza, perecía	H
	Stress	Estrés	H
	Insomnia	Insomnio	H
Temazcal	*Temazcal*, see Chapter six for a description	Baños de temazcal, frío del cuerpo después de parto, para que deje de sangrar. temazcal, *ñɨˈɨ*	H
Heart problems	High blood pressure	Presión alta	H

[435] Classified as hot (Piestrzynska, 2010).
[436] Classified as hot (Piestrzynska, 2010).
[437] *El enojo es caliente, no se combina con el caliente del temazcal como el sol* **(**Katz, 1993: 181).
[438] Classified as hot (Piestrzynska, 2010).

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	Low blood pressure	Presión baja	C
	Blood pressure	Presión	Hh
	Heartache	Golpe de corazón	H
	Heart pain, heart problems	Dolor del corazón, molestias de corazón	H
	Heart murmur, lack of air because of sadness	Dolor de corazón, soplos, falta de aire por tristeza	H
	Chest pains	Dolor de pecho	H[439]
Hair	For the hair, shampoo	Cabello**,** champú	C
	To grow, strengthen the hair	Crecer el cabello, fortalecer el cabello	H
	To dye the hair	Teñir el cabello, pintar el cabello	H c
	Baldness	Calvicie	H
Bites, sting	Dog bites, snakebites, animal bites	Para mordeduras del perro o víbora, mordeduras de animales	H c H[440]
	Sting, bee sting	Picadura, picadura de abeja	H[441]
Food	It is used in food preparation, it is eaten	Se echa en la comida, para la comida, se come	H
	For bean preparation, for black bean preparation, for	Para comer los frijoles, para frijoles negros, caldo de	H

[439] Mak writes that chest ailments can be either cold or hot depending on the type and cause. Caused especially by spirits of the cornfields and fires, usually described as 'it does our heart' or 'it eats our heart', expressions difficult to comprehend, seeming to refer to severe cold and pneumonia to digestive ailments and illness associated with sorrow or unhappiness (Mak, 1959: 135-136). I think it is necessary to differentiate between chest ailments related to flu or the common cold, which can be either hot or cold, and chest ailments related to the *tristeza* illness group. The Mixtec translations Mak gives seem to refer to the latter, as well as the heart problem related chest pain entry above.

[440] *Hay animales, por ejemplo lo del perro es caliente, las víboras tambien. Pero hay animales que son muy fríos, por ejemplo la araña capulina, la chitatlahua es muy fría entonces hay que buscar tratamiento caliente* (Sra Adelina).

[441] *Picadura de abeja es caliente, es caliente la abeja porque por ejemplo cuando alguien se enferma del reuma con la picadura del abeja se controla.*

Category	Use in English	Use in Spanish	Sr Noe, Sra Adelina
	chicken soup	pollo	T c
	To make tea from	Para tomar en té	C h
	Animal feed	Lo comen los animales	
?	Infection	Infección	H
	Rotting wound	Herida podrida	H
	Diabetes, to control diabetes	Diabetes, controlar la diabetes, controlar el azúcar	H[442]
	Hotness on the inside	Calor al dentro	H
	Anxiety of the donkey	Ansia de burros	H
	Hangover, for drunk people, drunkards	Cruda, la resaca, para el borracho, contra la cruda para los borrachos	H
	Anemia	Anemia	C
	Tiredness, listlessness	Desanimo, cansancio	C
	Cerebral problems	Problemas del cerebro	C
	Spasms	Espasmos	H
	Ornamental	Adorno	H c
	Hemorrhoids	Hemorroides	H c
	Allergies	Las alergias	H[443]
	Cramp	Calambre	H
	Hard labor	Trabajos pesados	T
	Hernia	Hernia	H

Appendix 6.4: Freelisting results

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-

[442] Classified as hot (Piestrzynska, 2010).
[443] Classified as hot (Piestrzynska, 2010).

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
alkamfor	5	3	2	0	0	0	0	0	0	0	0	0
chate itu	4	1	1	0	0	0	0	1	0	0	0	1
chiki dini	1	0	1	0	0	0	0	0	0	0	0	0
chɨyɨ	1	0	1	0	0	0	0	0	0	0	0	0
dalia	2	0	0	0	0	0	2	0	0	0	0	0
du'a cabayu	11	2	3	0	0	0	2	0	0	0	0	4
eucalipto	9	9	0	0	0	0	0	0	0	0	0	0
iñu kɨu	3	0	2	0	1	0	0	0	0	0	0	0
iñu leu	7	2	1	0	2	0	0	0	0	0	0	2
iñu tndu	1	0	0	0	0	0	0	0	0	0	0	1
ita bombil	6	5	0	0	0	0	1	0	0	0	0	0
ita daa	10	0	5	0	0	0	1	0	0	0	0	4
ita daa yuku/ita xiti ko'o	1	1	0	0	0	0	0	0	0	0	0	0
ita ii	2	0	1	0	0	0	1	0	0	0	0	0
ita kwaa, ita dini	8	6	0	0	0	0	1	0	0	0	0	1
ita mitu/yuku mirtu	12	10	1	0	0	0	0	0	0	0	0	1
ita nuni	2	1	0	0	0	0	0	0	0	0	0	1
ita roxa kwixi	6	0	4	0	0	0	2	0	0	0	0	0
ita san jose	1	0	1	0	0	0	0	0	0	0	0	0
ita seriw, ita inu	4	3	1	0	0	0	0	0	0	0	0	0
ita yaa	1	0	0	0	0	0	0	0	0	0	0	1
ita yɨdɨ	16	16	0	0	0	0	0	0	0	0	0	0
ita yɨdɨ kwechi	7	6	0	0	0	1	0	0	0	0	0	0
ita yɨdɨ na'nu	4	4	0	0	0	0	0	0	0	0	0	0
kɨndɨ kidi	2	1	1	0	0	0	0	0	0	0	0	0
kɨ'u/yuku alfaresia	12	3	5	0	1	0	0	0	0	0	0	3
kwendɨjɨ	13	9	1	0	0	0	1	0	0	0	0	2
manzaniya	15	9	0	1	0	0	2	0	0	0	0	3
mino/mino ñuu dau	17	14	2	0	0	0	0	0	0	0	0	1
mino kastila	33	25	3	1	0	0	1	0	0	0	0	3
mino ngutu	2	2	0	0	0	0	0	0	0	0	0	0
ña'u (camote tamorial)	15	7	2	1	1	0	2	0	0	0	0	2
ndewa	13	10	0	1	0	0	1	0	0	0	0	1
ndewa buru	3	3	0	0	0	0	0	0	0	0	0	0
ndewa ngutu	4	4	0	0	0	0	0	0	0	0	0	0
ndewa tata	5	5	0	0	0	0	0	0	0	0	0	0
ndewa tɨtnɨñɨ	1	1	0	0	0	0	0	0	0	0	0	0
nduwa ndoo	8	2	4	0	0	0	1	0	0	0	0	1
nduwa ditu	1	0	1	0	0	0	0	0	0	0	0	0
nduwa ditu ndute	2	0	2	0	0	0	0	0	0	0	0	0
nduwa yaa	1	0	1	0	0	0	0	0	0	0	0	0
nduxa	5	1	4	0	0	0	0	0	0	0	0	0
nduyu/te'e nduyu	5	0	5	0	0	0	0	0	0	0	0	0

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
nispero	6	4	0	0	0	0	2	0	0	0	0	0
orejano	9	7	0	0	0	0	0	0	0	0	0	2
ruda	31	27	0	0	0	0	0	0	0	0	0	4
ruta	8	5	0	0	1	0	0	0	0	1	0	1
ruta kuchi	1	1	0	0	0	0	0	0	0	0	0	0
ruta ua	8	6	0	0	0	0	0	0	0	0	0	2
ruta vidi	4	3	0	0	0	0	1	0	0	0	0	0
silantru idu	1	0	0	0	0	0	1	0	0	0	0	0
sp: abrojo negro	1	0	1	0	0	0	0	0	0	0	0	0
sp: ajo	2	2	0	0	0	0	0	0	0	0	0	0
sp: ajo chino	1	1	0	0	0	0	0	0	0	0	0	0
sp: akawal	1	0	0	0	0	0	1	0	0	0	0	0
sp: albahaca	3	0	2	0	0	0	1	0	0	0	0	0
sp: alfalfa	1	0	1	0	0	0	0	0	0	0	0	0
sp: alpiste	1	0	0	0	0	0	0	0	0	0	0	1
sp: aniz	3	1	0	0	0	0	0	1	0	0	0	1
sp: anona	1	1	0	0	0	0	0	0	0	0	0	0
sp: árnica de burro	1	0	0	0	0	0	1	0	0	0	0	0
sp: árnica de casa/árnica de castilla	3	2	0	1	0	0	0	0	0	0	0	0
sp: azares (flores de plantas cítricas, como limón, naranja, mandarina, toronja)	1	0	0	0	0	0	1	0	0	0	0	0
sp: bretónica	1	1	0	0	0	0	0	0	0	0	0	0
sp: cacaya de maguey papalomé/flor de manita	1	0	0	0	0	0	1	0	0	0	0	0
sp: canahuala	1	0	1	0	0	0	0	0	0	0	0	0
sp: capitaneja	1	0	0	0	0	0	1	0	0	0	0	0
sp: cascara de nuez	1	1	0	0	0	0	0	0	0	0	0	0
sp: cebolla	1	0	0	0	0	0	0	0	0	0	0	1
sp: cebolla morada	1	1	0	0	0	0	0	0	0	0	0	0
sp: cedro	1	1	0	0	0	0	0	0	0	0	0	0
sp: cedrón	2	1	0	0	0	0	1	0	0	0	0	0
sp: cempasúchil	1	1	0	0	0	0	0	0	0	0	0	0
sp: chaya	1	0	0	0	0	0	1	0	0	0	0	0
sp: cilantro	2	0	1	0	0	0	1	0	0	0	0	0
sp: cilantro de venado	1	0	0	0	0	0	1	0	0	0	0	0
sp: ciruela pasa	1	0	0	0	0	0	1	0	0	0	0	0
sp: cola de rata	2	0	0	0	0	0	1	0	0	0	0	1
sp: copa de oro	1	0	1	0	0	0	0	0	0	0	0	0
sp: coyul de víbora	1	0	1	0	0	0	0	0	0	0	0	0
sp: cresta de gallo	1	0	0	0	0	0	0	0	0	0	0	1
sp: dátil silvestre	1	0	0	0	0	0	1	0	0	0	0	0
sp: dedo de dios	1	0	0	0	0	0	1	0	0	0	0	0

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
sp: doradilla	2	1	1	0	0	0	0	0	0	0	0	0
sp: encino amarillo	1	0	0	0	0	0	1	0	0	0	0	0
sp: encino blanco	1	1	0	0	0	0	0	0	0	0	0	0
sp: encino rojo	1	0	0	0	0	0	1	0	0	0	0	0
sp: espinal amarillo	1	1	0	0	0	0	0	0	0	0	0	0
sp: espinosilla verde	1	0	0	0	0	0	1	0	0	0	0	0
sp: flor de la siempreviva	1	0	0	0	0	0	0	0	0	0	0	1
sp: flor de naranja	1	0	1	0	0	0	0	0	0	0	0	0
sp: flor de piedra	1	0	0	0	0	0	1	0	0	0	0	0
sp: geranio	3	2	1	0	0	0	0	0	0	0	0	0
sp: gordolobo silvestre	1	1	0	0	0	0	0	0	0	0	0	0
sp: helecho	1	0	1	0	0	0	0	0	0	0	0	0
sp: hierba de canela	1	1	0	0	0	0	0	0	0	0	0	0
sp: hierba de estrella	1	0	0	0	0	0	0	0	0	1	0	0
sp: hierba de gusanito	1	0	1	0	0	0	0	0	0	0	0	0
sp: hierba de la rozadura	1	0	0	0	0	0	1	0	0	0	0	0
sp: hierba de uva	1	1	0	0	0	0	0	0	0	0	0	0
sp: hierba negra	1	1	0	0	0	0	0	0	0	0	0	0
sp: jitomate	1	0	0	0	0	0	0	0	0	0	0	1
sp: la consuelta	1	1	0	0	0	0	0	0	0	0	0	0
sp: las pasas	1	0	0	0	0	0	1	0	0	0	0	0
sp: laurel	2	1	0	0	0	0	0	0	0	0	0	1
sp: lengua de venado	1	0	0	0	0	0	1	0	0	0	0	0
sp: llantén blanco	1	1	0	0	0	0	0	0	0	0	0	0
sp: maguey blanco	1	0	0	0	0	0	0	0	0	0	0	1
sp: makaxani	1	1	0	0	0	0	0	0	0	0	0	0
sp: manita de león	1	0	0	0	0	0	1	0	0	0	0	0
sp: manzana	2	0	0	0	0	0	1	0	0	0	0	1
sp: marihuana	2	2	0	0	0	0	0	0	0	0	0	0
sp: melón	1	0	1	0	0	0	0	0	0	0	0	0
sp: miltomate	2	0	0	0	0	0	0	0	0	0	0	2
sp: naranja	1	1	0	0	0	0	0	0	0	0	0	0
sp: nariz de guajolote	1	0	0	0	0	0	1	0	0	0	0	0
sp: nildo	1	0	0	0	1	0	0	0	0	0	0	0
sp: nogal	1	0	0	0	0	0	1	0	0	0	0	0
sp: órgano (de 4 rajitas)	1	1	0	0	0	0	0	0	0	0	0	0
sp: órgano (de 6 rajitas)	1	1	0	0	0	0	0	0	0	0	0	0
sp: palmar	1	0	1	0	0	0	0	0	0	0	0	0
sp: palo de mulato	1	0	1	0	0	0	0	0	0	0	0	0
sp: papaloquelite	1	0	1	0	0	0	0	0	0	0	0	0
sp: papaya	1	0	0	0	0	0	1	0	0	0	0	0
sp: pasto de gusanito	1	0	0	0	0	0	1	0	0	0	0	0
sp: pasto de mosquito	1	0	1	0	0	0	0	0	0	0	0	0

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
sp: quebradero	2	1	0	0	0	0	0	1	0	0	0	0
sp: rábano morado	1	0	0	0	0	0	1	0	0	0	0	0
sp: rosa de castilla	3	0	1	1	0	0	0	0	0	0	0	1
sp: rosa laurel	1	0	0	0	0	0	0	0	0	0	0	1
sp: sábila amarilla	1	0	0	0	0	0	1	0	0	0	0	0
sp: sábila roja/morada	1	1	0	0	0	0	0	0	0	0	0	0
sp: sábila verde	1	0	1	0	0	0	0	0	0	0	0	0
sp: sabino	1	0	0	0	0	0	1	0	0	0	0	0
sp: siempreviva dedo de niño	1	0	0	0	0	0	0	0	0	0	0	1
sp: tamorial blanco	3	0	0	0	1	0	1	0	0	0	0	1
sp: tamorial morado/tamorial rojo	4	1	0	0	1	0	0	0	0	0	0	2
sp: té limón	2	2	0	0	0	0	0	0	0	0	0	0
sp: té naranja	1	1	0	0	0	0	0	0	0	0	0	0
sp: toloache blanco	1	0	1	0	0	0	0	0	0	0	0	0
sp: toloache morado	1	0	1	0	0	0	0	0	0	0	0	0
sp: tomillo	2	2	0	0	0	0	0	0	0	0	0	0
sp: toronja	1	0	1	0	0	0	0	0	0	0	0	0
sp: toronjil	2	1	0	0	0	0	1	0	0	0	0	0
sp: tronco de chivo	1	0	0	0	1	0	0	0	0	0	0	0
sp: uacatillo	1	0	1	0	0	0	0	0	0	0	0	0
sp: vaporu	2	1	1	0	0	0	0	0	0	0	0	0
sp: zanahoria	1	0	1	0	0	0	0	0	0	0	0	0
tanaña/tnuta naña	7	0	6	0	1	0	0	0	0	0	0	0
tayoo kuchi	6	0	5	0	0	0	0	0	0	0	0	1
tɨ te'e	4	1	0	0	0	0	1	0	0	0	0	2
tiko	2	1	0	0	1	0	0	0	0	0	0	0
titi te’yu	5	3	0	1	0	0	0	0	0	0	0	1
tkwiti	1	1	0	0	0	0	0	0	0	0	0	0
tndu'u	4	2	1	0	0	0	1	0	0	0	0	0
tnu de'ñu	20	10	4	0	1	0	1	0	0	0	0	4
tnu dichi	2	1	0	0	0	0	1	0	0	0	0	0
tnu duñu	3	2	0	0	0	0	0	0	1	0	0	0
tnu granada	14	10	2	0	0	0	0	0	0	0	0	2
tnu kawa kwaa	23	21	0	0	0	1	0	0	0	1	0	0
tnu kwendɨu	2	1	0	0	0	0	1	0	0	0	0	0
tnu nde'a drasnu	4	0	3	0	1	0	0	0	0	0	0	0
tnu nde'a kuxi	4	0	3	0	0	0	1	0	0	0	0	0
tnu nde'a yo'o, yuku chaa?	2	0	1	0	0	0	1	0	0	0	0	0
tnu ndee	9	5	0	0	0	0	2	0	0	0	0	2
tnu ndete	3	2	0	0	0	0	1	0	0	0	0	0
tnu ndete koo	2	2	0	0	0	0	0	0	0	0	0	0

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
tnu ndido	7	2	1	0	0	0	1	0	0	0	0	3
tnu ndɨu/tnu tndɨu	6	1	4	0	0	0	0	0	0	0	0	1
tnu ndoko	8	5	2	1	0	0	0	0	0	0	0	0
tnu ndoko lingu	6	3	2	1	0	0	0	0	0	0	0	0
tnu nduchi idu	6	4	2	0	0	0	0	0	0	0	0	0
tnu nduchi nde'e	4	1	3	0	0	0	0	0	0	0	0	0
tnu nduchi nde'e kwe'e	2	2	0	0	0	0	0	0	0	0	0	0
tnu nduchi nde'e kwixi	10	0	9	0	1	0	0	0	0	0	0	0
tnu neñu kolo	2	0	1	0	0	0	0	0	0	0	0	1
tnu nii	2	0	0	0	1	0	0	0	0	0	0	1
tnu ñuu	5	2	1	0	0	0	0	0	0	0	0	2
tnu ñuu chi	5	0	1	0	0	0	2	0	0	0	0	2
tnu ñuu kwe'e	1	1	0	0	0	0	0	0	0	0	0	0
tnu ñuu kwixi	1	0	1	0	0	0	0	0	0	0	0	0
tnu piru	5	4	1	0	0	0	0	0	0	0	0	0
tnu ta'u	1	0	0	0	0	0	0	0	0	0	0	1
tnu tau tnuu	1	1	0	0	0	0	0	0	0	0	0	0
tnu tau/tnu tau yute	9	9	0	0	0	0	0	0	0	0	0	0
tnu tɨchɨ	9	7	1	0	0	0	1	0	0	0	0	0
tnu titnu	12	10	0	0	0	0	1	0	0	0	0	1
tnu tka'a	5	1	2	0	0	0	2	0	0	0	0	0
tnu tkee	2	1	1	0	0	0	0	0	0	0	0	0
tnu tna'nu	2	1	0	0	0	0	0	1	0	0	0	0
tnu tndɨdɨ	1	0	0	0	0	0	0	0	0	0	0	1
tnu tnu'a	10	7	1	0	0	0	2	0	0	0	0	0
tnu tnuu	6	4	0	0	0	0	0	0	0	0	0	2
tnu yaka	2	0	2	0	0	0	0	0	0	0	0	0
tnu yɨkɨ nda'a vilu	1	0	0	1	0	0	0	0	0	0	0	0
tnu yɨkɨ tnuu	1	0	0	0	0	0	1	0	0	0	0	0
tnu yoo	5	1	1	0	0	0	3	0	0	0	0	0
tnu yuku kawa	9	8	0	0	0	0	0	0	0	0	0	1
tnu yuku ñama	8	5	2	0	0	0	1	0	0	0	0	0
tnu yundu	1	0	0	0	0	0	1	0	0	0	0	0
tnu yuxa	16	14	0	0	0	0	0	0	0	0	0	2
tnundee	2	1	0	0	0	0	0	1	0	0	0	0
tnundido	9	5	1	0	1	0	2	0	0	0	0	0
tnuta duxa	4	3	0	0	0	0	0	1	0	0	0	0
tnuta ndeka	1	0	0	0	0	0	1	0	0	0	0	0
tnuta ve’yu, ita chiki rio'o, ita dyoryo	5	4	0	0	0	0	0	0	0	0	0	1
tnutayatu	10	6	3	0	0	0	1	0	0	0	0	0
tnutayuxi	34	5	24	0	0	0	3	0	0	0	0	2
tnutka'a	1	1	0	0	0	0	0	0	0	0	0	0

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
tnutka'a vidi	1	1	0	0	0	0	0	0	0	0	0	0
tutitnu	10	10	0	0	0	0	0	0	0	0	0	0
tutitnu kwixi	4	1	2	0	0	0	0	0	0	0	0	1
vi'inde	6	0	3	0	1	0	1	0	0	0	0	1
vi'inde chiki ko'o	1	0	1	0	0	0	0	0	0	0	0	0
vi'inde ñuu vidi	1	0	1	0	0	0	0	0	0	0	0	0
yau kastila	26	11	6	0	1	0	4	0	0	0	0	4
yau nduxa	18	7	6	0	0	1	2	0	0	0	0	2
yau ngichi	9	4	2	0	1	0	2	0	0	0	0	0
yau twixi	1	0	1	0	0	0	0	0	0	0	0	0
yudi yutnu	1	0	1	0	0	0	0	0	0	0	0	0
yuku arnika	12	5	1	0	0	0	2	2	0	0	0	2
yuku arnika ndee	1	0	0	0	0	0	1	0	0	0	0	0
yuku arnika yuku	1	0	0	1	0	0	0	0	0	0	0	0
yuku chaa	1	1	0	0	0	0	0	0	0	0	0	0
yuku chanda	1	0	0	0	0	0	1	0	0	0	0	0
yuku ch꞉'꞉ ñaña	1	1	0	0	0	0	0	0	0	0	0	0
yuku chudini	22	18	1	0	0	0	1	0	1	1	0	0
yuku chuwa/yuwa chuwa	9	0	8	0	1	0	0	0	0	0	0	0
yuku da’ya	1	1	0	0	0	0	0	0	0	0	0	0
yuku daxi	1	0	0	0	0	0	0	0	0	0	0	1
yuku disipela	1	1	0	0	0	0	0	0	0	0	0	0
yuku hierba nuestra	1	1	0	0	0	0	0	0	0	0	0	0
yuku ii	2	0	0	0	0	0	1	0	0	0	0	1
yuku iñu chaa	1	0	0	0	0	0	1	0	0	0	0	0
yuku iñu tndu	1	1	0	0	0	0	0	0	0	0	0	0
yuku ita dini	1	1	0	0	0	0	0	0	0	0	0	0
yuku kaja	1	1	0	0	0	0	0	0	0	0	0	0
yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua	25	19	0	0	0	0	0	1	1	4	0	0
yuku kaxi	1	0	1	0	0	0	0	0	0	0	0	0
yuku kidi	35	34	0	0	0	0	0	0	0	0	0	1
yuku kwedayu	11	9	0	0	0	0	1	0	0	0	0	1
yuku kweyido	6	2	2	0	0	0	0	2	0	0	0	0
yuku mansu	2	2	0	0	0	0	0	0	0	0	0	0
yuku na tna'a	18	9	0	1	1	0	0	2	0	0	0	5
yuku ndo'o	2	2	0	0	0	0	0	0	0	0	0	0
yuku nga'a	2	0	0	0	1	0	0	0	0	0	0	1
yuku nu toto	1	0	0	0	0	0	0	0	0	0	0	1
yuku nu toto/yuku yuu	1	1	0	0	0	0	0	0	0	0	0	0
yuku pasma	8	6	0	0	0	1	1	0	0	0	0	0
yuku romeru	18	17	0	0	0	0	0	0	0	0	0	1

Mixtec Name (Standardized)	TOTAL	c	F	c?	f?	mc	t	t?	a	Ac	af	-
yuku santa maria	15	11	0	1	0	0	2	0	1	0	0	0
yuku tachi	9	5	2	0	0	0	0	0	0	0	0	2
yuku tachi kwixi/yuku tachi	6	0	2	2	0	0	1	0	0	0	0	1
yuku tachi tnuu	2	0	0	0	0	0	1	0	0	0	0	1
yuku tita	1	0	0	0	0	0	1	0	0	0	0	0
yuku tnani ñu'u	3	3	0	0	0	0	0	0	0	0	0	0
yuku tuchi	2	1	0	0	0	0	1	0	0	0	0	0
yuku ua/yuku kawa/yuku hierba maestra	23	12	3	1	0	0	1	0	1	4	0	1
yuku yaa	24	3	16	0	2	0	1	0	0	0	1	1
yuku yɨjɨ kwechi	2	0	2	0	0	0	0	0	0	0	0	0
yuku yɨkɨ	2	0	1	0	0	0	1	0	0	0	0	0
yuku yɨkɨ kwechi	1	0	1	0	0	0	0	0	0	0	0	0
yuku yuu	7	5	1	0	0	0	0	0	0	0	0	1
yuwa taka kolo/yuwa taka ñu'u	1	1	0	0	0	0	0	0	0	0	0	0
Total	**1193**	**647**	**236**	**16**	**25**	**4**	**113**	**13**	**5**	**12**	**1**	**121**

Appendix 6.5: Standardized freelisting results

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
alkamfor	5	3	2	0	0	3	2	0
chate itu	4	1	1	1	1	1	1	2
chiki dini	1	0	1	0	0	1	0	0
chɨyɨ	1	0	1	0	0	1	0	0
dalia	2	0	0	2	0	0	0	2
du'a cabayu	11	2	3	2	4	3	2	6
eucalipto	9	9	0	0	0	9	0	0
iñu kɨu	3	0	3	0	0	3	0	0
iñu leu	7	2	3	0	2	3	2	2
iñu tndu	1	0	0	0	1	0	0	1
ita bombil	6	5	0	1	0	5	0	1
ita daa	10	0	5	1	4	5	0	5
ita daa yuku/ita xiti ko'o	1	1	0	0	0	1	0	0
ita ii	2	0	1	1	0	1	0	1
ita kwaa, ita dini	8	6	0	1	1	6	0	2
ita mitu/yuku mirtu	12	10	1	0	1	10	1	1
ita nuni	2	1	0	0	1	1	0	1
ita roxa kwixi	6	0	4	2	0	4	0	2
ita san jose	1	0	1	0	0	1	0	0
ita seriw, ita inu	4	3	1	0	0	3	1	0
ita yaa	1	0	0	0	1	0	0	1
ita yɨdɨ	16	16	0	0	0	16	0	0

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
ita yɨdɨ kwechi	7	7	0	0	0	7	0	0
ita yɨdɨ na'nu	4	4	0	0	0	4	0	0
kɨndɨ kidi	2	1	1	0	0	1	1	0
kɨ'u/yuku alfaresia	12	3	6	0	3	6	3	3
kwendɨjɨ	13	9	1	1	2	9	1	3
manzaniya	15	10	0	2	3	10	0	5
mino/mino ñuu dau	17	14	2	0	1	14	2	1
mino kastila	33	26	3	1	3	26	3	4
mino ngutu	2	2	0	0	0	2	0	0
ña'u (camote tamorial)	15	8	3	2	2	8	3	4
ndewa	13	11	0	1	1	11	0	2
ndewa buru	3	3	0	0	0	3	0	0
ndewa ngutu	4	4	0	0	0	4	0	0
ndewa tata	5	5	0	0	0	5	0	0
ndewa tɨtnɨñɨ	1	1	0	0	0	1	0	0
nduwa ndoo	8	2	4	1	1	4	2	2
nduwa ditu	1	0	1	0	0	1	0	0
nduwa ditu ndute	2	0	2	0	0	2	0	0
nduwa yaa	1	0	1	0	0	1	0	0
nduxa	5	1	4	0	0	4	1	0
nduyu/te'e nduyu	5	0	5	0	0	5	0	0
nispero	6	4	0	2	0	4	0	2
orejano	9	7	0	0	2	7	0	2
ruda	31	27	0	0	4	27	0	4
ruta	8	6	1	0	1	6	1	1
ruta kuchi	1	1	0	0	0	1	0	0
ruta ua	8	6	0	0	2	6	0	2
ruta vidi	4	3	0	1	0	3	0	1
silantru idu	1	0	0	1	0	0	0	1
sp: abrojo negro	1	0	1	0	0	1	0	0
sp: ajo	2	2	0	0	0	2	0	0
sp: ajo chino	1	1	0	0	0	1	0	0
sp: akawal	1	0	0	1	0	0	0	1
sp: albahaca	3	0	2	1	0	2	0	1
sp: alfalfa	1	0	1	0	0	1	0	0
sp: alpiste	1	0	0	0	1	0	0	1
sp: aniz	3	1	0	1	1	1	0	2
sp: anona	1	1	0	0	0	1	0	0
sp: árnica de burro	1	0	0	1	0	0	0	1
sp: árnica de casa/árnica de castilla	3	3	0	0	0	3	0	0
sp: azares (flores de plantas	1	0	0	1	0	0	0	1

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
cítricas, como limón, naranja, mandarina, toronja)								
sp: bretónica	1	1	0	0	0	1	0	0
sp: cacaya de maguey papalomé/flor de manita	1	0	0	1	0	0	0	1
sp: canahuala	1	0	1	0	0	1	0	0
sp: capitaneja	1	0	0	1	0	0	0	1
sp: cascara de nuez	1	1	0	0	0	1	0	0
sp: cebolla	1	0	0	0	1	0	0	1
sp: cebolla morada	1	1	0	0	0	1	0	0
sp: cedro	1	1	0	0	0	1	0	0
sp: cedrón	2	1	0	1	0	1	0	1
sp: cempasúchil	1	1	0	0	0	1	0	0
sp: chaya	1	0	0	1	0	0	0	1
sp: cilantro	2	0	1	1	0	1	0	1
sp: cilantro de venado	1	0	0	1	0	0	0	1
sp: ciruela pasa	1	0	0	1	0	0	0	1
sp: cola de rata	2	0	0	1	1	0	0	2
sp: copa de oro	1	0	1	0	0	1	0	0
sp: coyul de víbora	1	0	1	0	0	1	0	0
sp: cresta de gallo	1	0	0	0	1	0	0	1
sp: dátil silvestre	1	0	0	1	0	0	0	1
sp: dedo de dios	1	0	0	1	0	0	0	1
sp: doradilla	2	1	1	0	0	1	1	0
sp: encino amarillo	1	0	0	1	0	0	0	1
sp: encino blanco	1	1	0	0	0	1	0	0
sp: encino rojo	1	0	0	1	0	0	0	1
sp: espinal amarillo	1	1	0	0	0	1	0	0
sp: espinosilla verde	1	0	0	1	0	0	0	1
sp: flor de la siempreviva	1	0	0	0	1	0	0	1
sp: flor de naranja	1	0	1	0	0	1	0	0
sp: flor de piedra	1	0	0	1	0	0	0	1
sp: geranio	3	2	1	0	0	2	1	0
sp: gordolobo silvestre	1	1	0	0	0	1	0	0
sp: helecho	1	0	1	0	0	1	0	0
sp: hierba de canela	1	1	0	0	0	1	0	0
sp: hierba de estrella	1	1	0	0	0	1	0	0
sp: hierba de gusanito	1	0	1	0	0	1	0	0
sp: hierba de la rozadura	1	0	0	1	0	0	0	1
sp: hierba de uva	1	1	0	0	0	1	0	0
sp: hierba negra	1	1	0	0	0	1	0	0
sp: jitomate	1	0	0	0	1	0	0	1

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
sp: la consuelta	1	1	0	0	0	1	0	0
sp: las pasas	1	0	0	1	0	0	0	1
sp: laurel	2	1	0	0	1	1	0	1
sp: lengua de venado	1	0	0	1	0	0	0	1
sp: llantén blanco	1	1	0	0	0	1	0	0
sp: maguey blanco	1	0	0	0	1	0	0	1
sp: makaxani	1	1	0	0	0	1	0	0
sp: manita de león	1	0	0	1	0	0	0	1
sp: manzana	2	0	0	1	1	0	0	2
sp: marihuana	2	2	0	0	0	2	0	0
sp: melón	1	0	1	0	0	1	0	0
sp: miltomate	2	0	0	0	2	0	0	2
sp: naranja	1	1	0	0	0	1	0	0
sp: nariz de guajolote	1	0	0	1	0	0	0	1
sp: nildo	1	0	1	0	0	1	0	0
sp: nogal	1	0	0	1	0	0	0	1
sp: órgano (de 4 rajitas)	1	1	0	0	0	1	0	0
sp: órgano (de 6 rajitas)	1	1	0	0	0	1	0	0
sp: palmar	1	0	1	0	0	1	0	0
sp: palo de mulato	1	0	1	0	0	1	0	0
sp: papaloquelite	1	0	1	0	0	1	0	0
sp: papaya	1	0	0	1	0	0	0	1
sp: pasto de gusanito	1	0	0	1	0	0	0	1
sp: pasto de mosquito	1	0	1	0	0	1	0	0
sp: quebradero	2	1	0	1	0	1	0	1
sp: rábano morado	1	0	0	1	0	0	0	1
sp: rosa de castilla	3	1	1	0	1	1	1	1
sp: rosa laurel	1	0	0	0	1	0	0	1
sp: sábila amarilla	1	0	0	1	0	0	0	1
sp: sábila roja/morada	1	1	0	0	0	1	0	0
sp: sábila verde	1	0	1	0	0	1	0	0
sp: sabino	1	0	0	1	0	0	0	1
sp: siempreviva dedo de niño	1	0	0	0	1	0	0	1
sp: tamorial blanco	3	0	1	1	1	1	0	2
sp: tamorial morado/tamorial rojo	4	1	1	0	2	1	1	2
sp: té limón	2	2	0	0	0	2	0	0
sp: té naranja	1	1	0	0	0	1	0	0
sp: toloache blanco	1	0	1	0	0	1	0	0
sp: toloache morado	1	0	1	0	0	1	0	0
sp: tomillo	2	2	0	0	0	2	0	0

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
sp: toronja	1	0	1	0	0	1	0	0
sp: toronjil	2	1	0	1	0	1	0	1
sp: tronco de chivo	1	0	1	0	0	1	0	0
sp: uacatillo	1	0	1	0	0	1	0	0
sp: vaporu	2	1	1	0	0	1	1	0
sp: zanahoria	1	0	1	0	0	1	0	0
tanaña/tnuta naña	7	0	7	0	0	7	0	0
tayoo kuchi	6	0	5	0	1	5	0	1
tɨ te'e	4	1	0	1	2	1	0	3
tiko	2	1	1	0	0	1	1	0
titi te’yu	5	4	0	0	1	4	0	1
tkwiti	1	1	0	0	0	1	0	0
tndu'u	4	2	1	1	0	2	1	1
tnu de'ñu	20	10	5	1	4	10	5	5
tnu dichi	2	1	0	1	0	1	0	1
tnu duñu	3	2	0	0	1	2	0	1
tnu granada	14	10	2	0	2	10	2	2
tnu kawa kwaa	23	23	0	0	0	23	0	0
tnu kwendɨu	2	1	0	1	0	1	0	1
tnu nde'a drasnu	4	0	4	0	0	4	0	0
tnu nde'a kuxi	4	0	3	1	0	3	0	1
tnu nde'a yo'o, yuku chaa?	2	0	1	1	0	1	0	1
tnu ndee	9	5	0	2	2	5	0	4
tnu ndete	3	2	0	1	0	2	0	1
tnu ndete koo	2	2	0	0	0	2	0	0
tnu ndido	7	2	1	1	3	2	1	4
tnu ndɨu/tnu tndɨu	6	1	4	0	1	4	1	1
tnu ndoko	8	6	2	0	0	6	2	0
tnu ndoko lingu	6	4	2	0	0	4	2	0
tnu nduchi idu	6	4	2	0	0	4	2	0
tnu nduchi nde'e	4	1	3	0	0	3	1	0
tnu nduchi nde'e kwe'e	2	2	0	0	0	2	0	0
tnu nduchi nde'e kwixi	10	0	10	0	0	10	0	0
tnu neñu kolo	2	0	1	0	1	1	0	1
tnu nii	2	0	1	0	1	1	0	1
tnu ñuu	5	2	1	0	2	2	1	2
tnu ñuu chi	5	0	1	2	2	1	0	4
tnu ñuu kwe'e	1	1	0	0	0	1	0	0
tnu ñuu kwixi	1	0	1	0	0	1	0	0
tnu piru	5	4	1	0	0	4	1	0
tnu ta'u	1	0	0	0	1	0	0	1
tnu tau tnuu	1	1	0	0	0	1	0	0

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
tnu tau/tnu tau yute	9	9	0	0	0	9	0	0
tnu tɨchɨ	9	7	1	1	0	7	1	1
tnu titnu	12	10	0	1	1	10	0	2
tnu tka'a	5	1	2	2	0	2	1	2
tnu tkee	2	1	1	0	0	1	1	0
tnu tna'nu	2	1	0	1	0	1	0	1
tnu tndɨdɨ	1	0	0	0	1	0	0	1
tnu tnu'a	10	7	1	2	0	7	1	2
tnu tnuu	6	4	0	0	2	4	0	2
tnu yaka	2	0	2	0	0	2	0	0
tnu yɨkɨ nda'a vilu	1	1	0	0	0	1	0	0
tnu yɨkɨ tnuu	1	0	0	1	0	0	0	1
tnu yoo	5	1	1	3	0	1	1	3
tnu yuku kawa	9	8	0	0	1	8	0	1
tnu yuku ñama	8	5	2	1	0	5	2	1
tnu yundu	1	0	0	1	0	0	0	1
tnu yuxa	16	14	0	0	2	14	0	2
Tnundee	2	1	0	1	0	1	0	1
tnundido	9	5	2	2	0	5	2	2
tnuta duxa	4	3	0	1	0	3	0	1
tnuta ndeka	1	0	0	1	0	0	0	1
tnuta ve’yu, ita chiki rio'o, ita dyoryo	5	4	0	0	1	4	0	1
tnutayatu	10	6	3	1	0	6	3	1
tnutayuxi	34	5	24	3	2	24	5	5
tnutka'a	1	1	0	0	0	1	0	0
tnutka'a vidi	1	1	0	0	0	1	0	0
tutitnu	10	10	0	0	0	10	0	0
tutitnu kwixi	4	1	2	0	1	2	1	1
vi'inde	6	0	4	1	1	4	0	2
vi'inde chiki ko'o	1	0	1	0	0	1	0	0
vi'inde ñuu vidi	1	0	1	0	0	1	0	0
yau kastila	26	11	7	4	4	11	7	8
yau nduxa	18	8	6	2	2	8	6	4
yau ngichi	9	4	3	2	0	4	3	2
yau twixi	1	0	1	0	0	1	0	0
yudi yutnu	1	0	1	0	0	1	0	0
yuku arnika	12	5	1	4	2	5	1	6
yuku arnika ndee	1	0	0	1	0	0	0	1
yuku arnika yuku	1	1	0	0	0	1	0	0
yuku chaa	1	1	0	0	0	1	0	0
yuku chanda	1	0	0	1	0	0	0	1

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
yuku chɨ'ɨ ñaña	1	1	0	0	0	1	0	0
yuku chudini	22	19	1	1	1	19	1	2
yuku chuwa/yuwa chuwa	9	0	9	0	0	9	0	0
yuku da'ya	1	1	0	0	0	1	0	0
yuku daxi	1	0	0	0	1	0	0	1
yuku disipela	1	1	0	0	0	1	0	0
yuku hierba nuestra	1	1	0	0	0	1	0	0
yuku ii	2	0	0	1	1	0	0	2
yuku iñu chaa	1	0	0	1	0	0	0	1
yuku iñu tndu	1	1	0	0	0	1	0	0
yuku ita dini	1	1	0	0	0	1	0	0
yuku kaja	1	1	0	0	0	1	0	0
yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua	25	23	0	1	1	23	0	2
yuku kaxi	1	0	1	0	0	1	0	0
yuku kidi	35	34	0	0	1	34	0	1
yuku kwedayu	11	9	0	1	1	9	0	2
yuku kweyido	6	2	2	2	0	2	2	2
yuku mansu	2	2	0	0	0	2	0	0
yuku na tna'a	18	10	1	2	5	10	1	7
yuku ndo'o	2	2	0	0	0	2	0	0
yuku nga'a	2	0	1	0	1	1	0	1
yuku nu toto	1	0	0	0	1	0	0	1
yuku nu toto/yuku yuu	1	1	0	0	0	1	0	0
yuku pasma	8	7	0	1	0	7	0	1
yuku romeru	18	17	0	0	1	17	0	1
yuku santa maria	15	12	0	2	1	12	0	3
yuku tachi	9	5	2	0	2	5	2	2
yuku tachi kwixi/yuku tachi	6	2	2	1	1	2	2	2
yuku tachi tnuu	2	0	0	1	1	0	0	2
yuku tita	1	0	0	1	0	0	0	1
yuku tnani ñu'u	3	3	0	0	0	3	0	0
yuku tuchi	2	1	0	1	0	1	0	1
yuku ua/yuku kawa/yuku hierba maestra	23	17	3	1	2	17	3	3
yuku yaa	24	3	19	1	1	19	3	2
yuku yɨjɨ kwechi	2	0	2	0	0	2	0	0
yuku yɨkɨ	2	0	1	1	0	1	0	1
yuku yɨkɨ kwechi	1	0	1	0	0	1	0	0
yuku yuu	7	5	1	0	1	5	1	1
yuwa taka kolo/yuwa taka ñu'u	1	1	0	0	0	1	0	0

Mixtec Name (Standardized)	TOTAL	Cal	Frío	Temp	Nada	# Agree	# Don't Agree	# Ambiv
Total	**1193**	**679**	**262**	**126**	**126**	**840**	**101**	**252**

Appendix 6.6: Freelisting probability calculations

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
alkamfor	5	3	2	0,03	0,16	0,31	0,00	0,00	0,00	0,00	0,00	100%
chate itu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
chiki dini	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
chɨyɨ	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
dalia	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
du'a cabayu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
eucalipto	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
iñu kɨu	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
iñu leu	5	3	2	0,03	0,16	0,31	0,00	0,00	0,00	0,00	0,00	100%
iñu tndu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita bombil	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
ita daa	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
ita daa yuku/ita xiti ko'o	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita ii	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita kwaa, ita dini	6	6	0	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3%
ita mitu/yuku mirtu	11	10	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	1%
ita nuni	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita roxa kwixi	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
ita san jose	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita seriw, ita inu	4	3	1	0,06	0,25	0,00	0,00	0,00	0,00	0,00	0,00	63%
ita yaa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita yɨdɨ	16	16	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita yɨdɨ kwechi	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
ita yɨdɨ na'nu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
kɨndɨ kidi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
kɨ'u/yuku alfaresia	9	6	3	0,00	0,02	0,07	0,16	0,00	0,00	0,00	0,00	51%
kwendɨjɨ	10	9	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	2%
manzaniya	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
mino/mino ñuu dau	16	14	2	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
mino kastila	29	26	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
mino ngutu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ña'u (camote tamorial)	11	8	3	0,00	0,01	0,03	0,08	0,00	0,00	0,00	0,00	23%
ndewa	11	11	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ndewa buru	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
ndewa ngutu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
ndewa tata	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
ndewa tɨtnɨñɨ	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
nduwa ndoo	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
nduwa ditu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
nduwa ditu ndute	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
nduwa yaa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
nduxa	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
nduyu/te'e nduyu	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
nispero	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
orejano	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
ruda	27	27	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ruta	7	6	1	0,01	0,05	0,00	0,00	0,00	0,00	0,00	0,00	13%
ruta kuchi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ruta ua	6	6	0	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3%
ruta vidi	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
silantru idu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: abrojo negro	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: ajo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: ajo chino	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: akawal	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: albahaca	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: alfalfa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: alpiste	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: aniz	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: anona	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: árnica de burro	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: árnica de casa/árnica de castilla	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
sp: azares (flores de plantas cítricas, como limón, naranja, mandarina, toronja)	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: bretónica	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cacaya de maguey papalomé/flor de manita	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: canahuala	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: capitaneja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cascara de nuez	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cebolla	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cebolla morada	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cedro	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cedrón	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cempasúchil	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: chaya	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
sp: cilantro	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cilantro de venado	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: ciruela pasa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cola de rata	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: copa de oro	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: coyul de víbora	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: cresta de gallo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: dátil silvestre	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: dedo de dios	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: doradilla	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: encino amarillo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: encino blanco	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: encino rojo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: espinal amarillo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: espinosilla verde	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: flor de la siempreviva	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: flor de naranja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: flor de piedra	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: geranio	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
sp: gordolobo silvestre	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: helecho	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba de canela	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba de estrella	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba de gusanito	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba de la rozadura	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba de uva	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: hierba negra	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: jitomate	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: la consuelta	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: las pasas	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: laurel	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: lengua de venado	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: llantén blanco	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: maguey blanco	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: makaxani	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: manita de león	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: manzana	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: marihuana	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: melón	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: miltomate	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: naranja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
sp: nariz de guajolote	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: nildo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: nogal	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: órgano (de 4 rajitas)	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: órgano (de 6 rajitas)	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: palmar	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: palo de mulato	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: papaloquelite	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: papaya	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: pasto de gusanito	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: pasto de mosquito	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: quebradero	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: rábano morado	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: rosa de castilla	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: rosa laurel	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: sábila amarilla	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: sábila roja/morada	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: sábila verde	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: sabino	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: siempreviva dedo de niño	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: tamorial blanco	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: tamorial morado/tamorial rojo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: té limón	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: té naranja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: toloache blanco	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: toloache morado	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: tomillo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: toronja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: toronjil	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: tronco de chivo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: uacatillo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: vaporu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
sp: zanahoria	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tanaña/tnuta naña	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
tayoo kuchi	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
tɨ te'e	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tiko	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
titi te’yu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tkwiti	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tndu'u	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
tnu de'ñu	15	10	5	0,00	0,00	0,00	0,01	0,04	0,09	0,00	0,00	30%
tnu dichi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu duñu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu granada	12	10	2	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	4%
tnu kawa kwaa	23	23	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu kwendɨu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu nde'a drasnu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnu nde'a kuxi	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
tnu nde'a yo'o, yuku chaa?	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ndee	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
tnu ndete	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ndete koo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ndido	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ndɨu/tnu tndɨu	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
tnu ndoko	8	6	2	0,00	0,03	0,11	0,00	0,00	0,00	0,00	0,00	29%
tnu ndoko lingu	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
tnu nduchi idu	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
tnu nduchi nde'e	4	3	1	0,06	0,25	0,00	0,00	0,00	0,00	0,00	0,00	63%
tnu nduchi nde'e kwe'e	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu nduchi nde'e kwixi	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu neñu kolo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu nii	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ñuu	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tnu ñuu chi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ñuu kwe'e	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ñuu kwixi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu piru	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
tnu ta'u	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tau tnuu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tau/tnu tau yute	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tɨchɨ	8	7	1	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	7%
tnu titnu	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tka'a	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tnu tkee	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tna'nu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tndɨdɨ	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tnu'a	8	7	1	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	7%
tnu tnuu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnu yaka	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu yɨkɨ nda'a vilu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu yɨkɨ tnuu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
tnu yoo	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu yuku kawa	8	8	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1%
tnu yuku ñama	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
tnu yundu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu yuxa	14	14	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnundee	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnundido	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
tnuta duxa	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
tnuta ndeka	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnuta ve’yu, ita chiki rio'o, ita dyoryo	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnutayatu	9	6	3	0,00	0,02	0,07	0,16	0,00	0,00	0,00	0,00	51%
tnutayuxi	29	24	5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnutka'a	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnutka'a vidi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tutitnu	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tutitnu kwixi	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
vi'inde	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
Vi'inde chiki ko'o	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
vi'inde ñuu vidi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yau kastila	18	11	7	0,00	0,00	0,00	0,00	0,01	0,03	0,07	0,12	48%
yau nduxa	14	8	6	0,00	0,00	0,01	0,02	0,06	0,12	0,18	0,00	79%
yau ngichi	7	4	3	0,01	0,05	0,16	0,27	0,00	0,00	0,00	0,00	100%
yau twixi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yudi yutnu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku arnika	6	5	1	0,02	0,09	0,00	0,00	0,00	0,00	0,00	0,00	22%
yuku arnika ndee	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku arnika yuku	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chaa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chanda	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chɨ'ɨ ñaña	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chudini	20	19	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chuwa/yuwa chuwa	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku da’ya	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku daxi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku disipela	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku hierba nuestra	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku ii	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku iñu chaa	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku iñu tndu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku ita dini	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
yuku kaja	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua	23	23	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kaxi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kidi	34	34	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kwedayu	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kweyido	4	2	2	0,06	0,25	0,38	0,00	0,00	0,00	0,00	0,00	100%
yuku mansu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku na tna'a	11	10	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	1%
yuku ndo'o	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku nga'a	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku nu toto	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku nu toto/yuku yuu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku pasma	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
yuku romeru	17	17	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku santa maria	12	12	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku tachi	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
yuku tachi kwixi/yuku tachi	4	2	2	0,06	0,25	0,38	0,00	0,00	0,00	0,00	0,00	100%
yuku tachi tnuu	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku tita	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku tnani ñu'u	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
yuku tuchi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku ua/yuku kawa/yuku hierba maestra	20	17	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yaa	22	19	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yɨjɨ kwechi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yɨkɨ	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yɨkɨ kwechi	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yuu	6	5	1	0,02	0,09	0,00	0,00	0,00	0,00	0,00	0,00	22%
yuwa taka kolo/yuwa taka ñu'u	0	1	-1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Appendix 6.7: Freelisting probability calculations (useful results)

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
alkamfor	5	3	2	0,03	0,16	0,31	0,00	0,00	0,00	0,00	0,00	100%
eucalipto	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
iñu kɨu	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
iñu leu	5	3	2	0,03	0,16	0,31	0,00	0,00	0,00	0,00	0,00	100%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
ita bombil	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
ita daa	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
ita kwaa, ita dini	6	6	0	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3%
ita mitu/yuku mirtu	11	10	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	1%
ita roxa kwixi	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
ita seriw, ita inu	4	3	1	0,06	0,25	0,00	0,00	0,00	0,00	0,00	0,00	63%
ita yɨdɨ	16	16	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ita yɨdɨ kwechi	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
ita yɨdɨ na'nu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
kɨ'u/yuku alfaresia	9	6	3	0,00	0,02	0,07	0,16	0,00	0,00	0,00	0,00	51%
kwendɨjɨ	10	9	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	2%
manzaniya	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
mino/mino ñuu dau	16	14	2	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
mino kastila	29	26	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ña'u (camote tamorial)	11	8	3	0,00	0,01	0,03	0,08	0,00	0,00	0,00	0,00	23%
ndewa	11	11	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ndewa buru	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
ndewa ngutu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
ndewa tata	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
nduwa ndoo	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
nduxa	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
nduyu/te'e nduyu	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
nispero	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
orejano	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
ruda	27	27	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
ruta	7	6	1	0,01	0,05	0,00	0,00	0,00	0,00	0,00	0,00	13%
ruta ua	6	6	0	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	3%
ruta vidi	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
sp: árnica de casa/árnica de castilla	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
sp: geranio	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tanaña/tnuta naña	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
tayoo kuchi	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%
titi te’yu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tndu'u	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tnu de'ñu	15	10	5	0,00	0,00	0,00	0,01	0,04	0,09	0,00	0,00	30%
tnu granada	12	10	2	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	4%
tnu kawa kwaa	23	23	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu nde'a drasnu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnu nde'a kuxi	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
tnu ndee	5	5	0	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
tnu ndɨu/tnu tndɨu	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
tnu ndoko	8	6	2	0,00	0,03	0,11	0,00	0,00	0,00	0,00	0,00	29%
tnu ndoko lingu	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
tnu nduchi idu	6	4	2	0,02	0,09	0,23	0,00	0,00	0,00	0,00	0,00	69%
tnu nduchi nde'e	4	3	1	0,06	0,25	0,00	0,00	0,00	0,00	0,00	0,00	63%
tnu nduchi nde'e kwixi	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu ñuu	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tnu piru	5	4	1	0,03	0,16	0,00	0,00	0,00	0,00	0,00	0,00	38%
tnu tau/tnu tau yute	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tɨchɨ	8	7	1	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	7%
tnu titnu	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnu tka'a	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
tnu tnu'a	8	7	1	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	7%
tnu tnuu	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnu yuku kawa	8	8	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1%
tnu yuku ñama	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
tnu yuxa	14	14	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tnundido	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
tnuta duxa	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
tnuta ve’yu, ita chiki rio'o, ita dyoryo	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
tnutayatu	9	6	3	0,00	0,02	0,07	0,16	0,00	0,00	0,00	0,00	51%
tnutayuxi	29	24	5	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tutitnu	10	10	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
tutitnu kwixi	3	2	1	0,13	0,38	0,00	0,00	0,00	0,00	0,00	0,00	100%
vi'inde	4	4	0	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13%
yau kastila	18	11	7	0,00	0,00	0,00	0,00	0,01	0,03	0,07	0,12	48%
yau nduxa	14	8	6	0,00	0,00	0,01	0,02	0,06	0,12	0,18	0,00	79%
yau ngichi	7	4	3	0,01	0,05	0,16	0,27	0,00	0,00	0,00	0,00	100%
yuku arnika	6	5	1	0,02	0,09	0,00	0,00	0,00	0,00	0,00	0,00	22%
yuku chudini	20	19	1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku chuwa/yuwa chuwa	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua	23	23	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kidi	34	34	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kwedayu	9	9	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku kweyido	4	2	2	0,06	0,25	0,38	0,00	0,00	0,00	0,00	0,00	100%
yuku na tna'a	11	10	1	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	1%
yuku pasma	7	7	0	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2%
yuku romeru	17	17	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku santa maria	12	12	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%

Mixtec Name (Standardized)	n	r	n-r	P[n.n]	P[n.(n-1)]	P[n.(n-2)]	P[n.(n-3)]	P[n.(n-4)]	P[n.(n-5)]	P[n.(n-6)]	P[n.(n-7)]	P (random chance)
yuku tachi	7	5	2	0,01	0,05	0,16	0,00	0,00	0,00	0,00	0,00	45%
yuku tachi kwixi/yuku tachi	4	2	2	0,06	0,25	0,38	0,00	0,00	0,00	0,00	0,00	100%
yuku tnani ñu'u	3	3	0	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	25%
yuku ua/yuku kawa/yuku hierba maestra	20	17	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yaa	22	19	3	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0%
yuku yuu	6	5	1	0,02	0,09	0,00	0,00	0,00	0,00	0,00	0,00	22%

Appendix 6.8: Principle of opposites results by plant

Mixtec Name (Standardized)	P (random chance)	Uses	Plant Classification				Opposites?				Including FC			Excluding FC		
			c	f	t	-	Yes	No	Both	N/a	Yes%	No%	P (random chance)	Yes%	No%	P (random chance)
alkamfor	100%	9	4	5	0	0	6	1	2	0	88.9%	11.1%	4%	85.7%	14.3%	13%
eucalipto	0%	10	10	0	0	0	0	0	10	0	100.0%	0.0%	0%	N/a	N/a	100%
iñu kɨu	25%	3	0	3	0	0	1	1	1	0	66.7%	33.3%	100%	50.0%	50.0%	100%
iñu leu	100%	9	3	3	0	3	4	1	1	3	83.3%	16.7%	22%	80.0%	20.0%	38%
ita bombil	6%	6	5	0	1	0	0	0	5	1	100.0%	0.0%	6%	N/a	N/a	100%
ita daa	6%	11	0	5	2	4	4	0	1	6	100.0%	0.0%	6%	100.0%	0.0%	13%
ita kwaa, ita dini	3%	12	10	0	1	1	7	1	1	3	88.9%	11.1%	4%	87.5%	12.5%	7%
ita mitu/yuku mirtu	1%	17	15	1	0	1	9	5	2	1	68.8%	31.3%	21%	64.3%	35.7%	42%
ita roxa kwixi	13%	7	0	4	3	0	3	1	0	3	75.0%	25.0%	63%	75.0%	25.0%	63%
ita seriw, ita inu	63%	4	3	1	0	0	1	1	2	0	75.0%	25.0%	63%	50.0%	50.0%	100%
ita yɨdɨ	0%	26	26	0	0	0	24	1	1	0	96.2%	3.8%	0%	96.0%	4.0%	0%
ita yɨdɨ kwechi	2%	10	10	0	0	0	10	0	0	0	100.0%	0.0%	0%	100.0%	0.0%	0%
ita yɨdɨ na'nu	13%	6	6	0	0	0	6	0	0	0	100.0%	0.0%	3%	100.0%	0.0%	3%
kɨ'u/yuku alfaresia	51%	18	6	8	0	4	9	5	0	4	64.3%	35.7%	42%	64.3%	35.7%	42%
kwendɨjɨ	2%	13	9	1	1	2	9	1	0	3	90.0%	10.0%	2%	90.0%	10.0%	2%
manzaniya	0%	22	13	0	5	4	10	2	0	10	83.3%	16.7%	4%	83.3%	16.7%	4%
mino/mino ñuu dau	0%	19	16	2	0	1	16	2	0	1	88.9%	11.1%	0%	88.9%	11.1%	0%
mino kastila	0%	39	31	4	1	3	29	4	2	4	88.6%	11.4%	0%	87.9%	12.1%	0%
ña'u (camote tamorial)	23%	17	9	3	2	3	7	3	2	5	75.0%	25.0%	15%	70.0%	30.0%	34%
ndewa	0%	18	16	0	1	1	13	3	0	2	81.3%	18.8%	2%	81.3%	18.8%	2%
ndewa buru	25%	3	3	0	0	0	2	1	0	0	66.7%	33.3%	100%	66.7%	33.3%	100%
ndewa ngutu	13%	5	5	0	0	0	5	0	0	0	100.0%	0.0%	6%	100.0%	0.0%	6%
ndewa tata	6%	5	5	0	0	0	4	1	0	0	80.0%	20.0%	38%	80.0%	20.0%	38%

Mixtec Name (Standardized)	P (random chance)	Uses	Plant Classification				Opposites?				Including FC			Excluding FC		
			c	f	t	-	Yes	No	Both	N/a	Yes%	No%	P (random chance)	Yes%	No%	P (random chance)
nduwa ndoo	69%	9	3	4	1	1	4	1	0	4	80.0%	20.0%	38%	80.0%	20.0%	38%
nduxa	38%	5	1	4	0	0	1	4	0	0	20.0%	80.0%	38%	20.0%	80.0%	38%
nduyu/te'e nduyu	6%	6	0	6	0	0	5	1	0	0	83.3%	16.7%	22%	83.3%	16.7%	22%
nispero	13%	8	4	0	4	0	2	2	0	4	50.0%	50.0%	100%	50.0%	50.0%	100%
orejano	2%	11	9	0	0	2	7	0	2	2	100.0%	0.0%	0%	100.0%	0.0%	2%
ruda	0%	49	45	0	0	4	8	30	6	5	31.8%	68.2%	0%	21.1%	78.9%	0%
ruta	13%	11	9	1	0	1	4	6	0	1	40.0%	60.0%	75%	40.0%	60.0%	75%
ruta ua	3%	11	9	0	0	2	8	0	1	2	100.0%	0.0%	0%	100.0%	0.0%	1%
ruta vidi	25%	5	4	0	1	0	2	2	0	1	50.0%	50.0%	100%	50.0%	50.0%	100%
sp: árnica de casa/árnica de castilla	25%	5	5	0	0	0	4	0	1	0	100.0%	0.0%	6%	100.0%	0.0%	13%
sp: geranio	100%	4	2	2	0	0	4	0	0	0	100.0%	0.0%	13%	100.0%	0.0%	13%
tanaña/tnuta naña	2%	7	0	7	0	0	4	1	2	0	85.7%	14.3%	13%	80.0%	20.0%	38%
tayoo kuchi	6%	7	0	6	0	1	2	4	0	1	33.3%	66.7%	69%	33.3%	66.7%	69%
titi te’yu	13%	5	4	0	0	1	4	0	0	1	100.0%	0.0%	13%	100.0%	0.0%	13%
tndu'u	100%	5	3	1	1	0	1	1	2	1	75.0%	25.0%	63%	50.0%	50.0%	100%
tnu de'ñu	30%	25	11	7	3	4	8	10	0	7	44.4%	55.6%	81%	44.4%	55.6%	81%
tnu granada	4%	16	11	2	0	3	8	3	1	4	75.0%	25.0%	15%	72.7%	27.3%	23%
tnu kawa kwaa	0%	30	30	0	0	0	25	5	0	0	83.3%	16.7%	0%	83.3%	16.7%	0%
tnu nde'a drasnu	13%	5	0	5	0	0	4	0	0	1	100.0%	0.0%	13%	100.0%	0.0%	13%
tnu nde'a kuxi	25%	4	0	3	1	0	2	0	1	1	100.0%	0.0%	25%	100.0%	0.0%	100%
tnu ndee	6%	12	6	0	3	3	3	2	0	7	60.0%	40.0%	100%	60.0%	40.0%	100%
tnu ndɨu/tnu tndɨu	38%	6	1	4	0	1	3	2	0	1	60.0%	40.0%	100%	60.0%	40.0%	100%
tnu ndoko	29%	9	7	2	0	0	2	7	0	0	22.2%	77.8%	18%	22.2%	77.8%	18%

Mixtec Name (Standardized)	P (random chance)	Uses	Plant Classification				Opposites?				Including FC			Excluding FC		
			c	f	t	-	Yes	No	Both	N/a	Yes%	No%	P (random chance)	Yes%	No%	P (random chance)
tnu ndoko lingu	69%	9	6	3	0	0	5	4	0	0	55.6%	44.4%	100%	55.6%	44.4%	100%
tnu nduchi idu	69%	7	5	2	0	0	5	2	0	0	71.4%	28.6%	45%	71.4%	28.6%	45%
tnu nduchi nde'e	63%	4	1	3	0	0	3	1	0	0	75.0%	25.0%	63%	75.0%	25.0%	63%
tnu nduchi nde'e kwixi	0%	10	0	10	0	0	9	1	0	0	90.0%	10.0%	2%	90.0%	10.0%	2%
tnu ñuu	100%	6	2	1	0	3	2	1	0	3	66.7%	33.3%	100%	66.7%	33.3%	100%
tnu piru	38%	9	8	1	0	0	5	4	0	0	55.6%	44.4%	100%	55.6%	44.4%	100%
tnu tau/tnu tau yute	0%	12	12	0	0	0	11	1	0	0	91.7%	8.3%	1%	91.7%	8.3%	1%
tnu tɨchɨ	7%	11	9	1	1	0	7	0	3	1	100.0%	0.0%	0%	100.0%	0.0%	2%
tnu titnu	0%	17	14	0	2	1	11	2	1	3	85.7%	14.3%	1%	84.6%	15.4%	2%
tnu tka'a	100%	7	2	2	3	0	3	0	0	4	100.0%	0.0%	25%	100.0%	0.0%	25%
tnu tnu'a	7%	12	9	1	2	0	7	3	0	2	70.0%	30.0%	34%	70.0%	30.0%	34%
tnu tnuu	13%	7	5	0	0	2	1	1	3	2	80.0%	20.0%	38%	50.0%	50.0%	100%
tnu yuku kawa	1%	9	8	0	0	1	8	0	0	1	100.0%	0.0%	1%	100.0%	0.0%	1%
tnu yuku ñama	45%	9	5	2	2	0	4	3	0	2	57.1%	42.9%	100%	57.1%	42.9%	100%
tnu yuxa	0%	23	21	0	0	2	18	1	2	2	95.2%	4.8%	0%	94.7%	5.3%	0%
tnundido	45%	12	7	2	3	0	5	2	2	3	77.8%	22.2%	18%	71.4%	28.6%	45%
tnuta duxa	25%	8	6	0	2	0	4	2	0	2	66.7%	33.3%	69%	66.7%	33.3%	69%
tnuta ve’yu, ita chiki rio'o, ita dyoryo	13%	7	5	0	0	2	5	0	0	2	100.0%	0.0%	6%	100.0%	0.0%	6%
tnutayatu	51%	11	7	3	1	0	7	2	0	2	77.8%	22.2%	18%	77.8%	22.2%	18%
tnutayuxi	0%	49	6	36	5	2	39	3	0	7	92.9%	7.1%	0%	92.9%	7.1%	0%
tutitnu	0%	12	12	0	0	0	12	0	0	0	100.0%	0.0%	0%	100.0%	0.0%	0%
tutitnu kwixi	100%	8	2	5	0	1	2	5	0	1	28.6%	71.4%	45%	28.6%	71.4%	45%
vi'inde	13%	8	0	5	1	2	4	1	0	3	80.0%	20.0%	38%	80.0%	20.0%	38%

Mixtec Name (Standardized)	P (random chance)	Uses	Plant Classification				Opposites?				Including FC			Excluding FC		
			c	f	t	-	Yes	No	Both	N/a	Yes%	No%	P (random chance)	Yes%	No%	P (random chance)
yau kastila	48%	34	15	7	7	5	12	3	7	12	86.4%	13.6%	0%	80.0%	20.0%	4%
yau nduxa	79%	22	8	8	3	3	3	2	10	7	86.7%	13.3%	1%	60.0%	40.0%	100%
yau ngichi	100%	10	5	3	2	0	2	2	2	4	66.7%	33.3%	69%	50.0%	50.0%	100%
yuku arnika	22%	15	6	1	6	2	1	0	6	8	100.0%	0.0%	2%	100.0%	0.0%	100%
yuku chudini	0%	29	25	1	1	2	20	3	1	5	87.5%	12.5%	0%	87.0%	13.0%	0%
yuku chuwa/yuwa chuwa	0%	11	0	11	0	0	9	0	0	2	100.0%	0.0%	0%	100.0%	0.0%	0%
yuku kawa/yuku kawa kwechi/yuku ñaña/tnu kawa ua	0%	32	29	0	1	2	24	5	0	3	82.8%	17.2%	0%	82.8%	17.2%	0%
yuku kidi	0%	48	46	0	0	2	43	0	2	3	100.0%	0.0%	0%	100.0%	0.0%	0%
yuku kwedayu	0%	16	11	0	3	2	5	0	6	5	100.0%	0.0%	0%	100.0%	0.0%	6%
yuku kweyido	100%	7	2	3	2	0	4	1	0	2	80.0%	20.0%	38%	80.0%	20.0%	38%
yuku na tna'a	1%	22	12	2	2	6	10	1	1	10	91.7%	8.3%	1%	90.9%	9.1%	1%
yuku pasma	2%	10	9	0	1	0	6	3	0	1	66.7%	33.3%	51%	66.7%	33.3%	51%
yuku romeru	0%	27	26	0	0	1	19	6	1	1	76.9%	23.1%	1%	76.0%	24.0%	1%
yuku santa maria	0%	23	14	0	8	1	12	2	0	9	85.7%	14.3%	1%	85.7%	14.3%	1%
yuku tachi	45%	12	8	2	0	2	5	4	1	2	60.0%	40.0%	75%	55.6%	44.4%	100%
yuku tachi kwixi/yuku tachi	100%	7	2	2	2	1	1	3	0	3	25.0%	75.0%	63%	25.0%	75.0%	63%
yuku tnani ñu'u	25%	3	3	0	0	0	3	0	0	0	100.0%	0.0%	25%	100.0%	0.0%	25%
yuku ua/yuku kawa/yuku hierba maestra	0%	30	21	3	2	4	15	9	0	6	62.5%	37.5%	31%	62.5%	37.5%	31%
yuku yaa	0%	39	4	31	3	1	29	4	2	4	88.6%	11.4%	0%	87.9%	12.1%	0%
yuku yuu	22%	7	5	1	0	1	4	2	0	1	66.7%	33.3%	69%	66.7%	33.3%	69%
All plants		**1215**	**772**	**246**	**96**	**101**	**698**	**204**	**96**	**217**	**79.6%**	**20.4%**		**77.4%**	**22.6%**	

Appendix 7 – Mixtec sentences related to illness and treatment

Alfaresia (sp); enojo (sp); kwe’e nyi'i yɨ'ɨ; Peresia (sp); nyi'i yɨ'ɨ; (sp) kiti ini; kiti iniro; ko’yo iniro, kwe'e ndu ini; tnikwe'e anuro

yuku yaa:

\tx yuku yaa: **xaxia'an**
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. con: to hurt (colics, strong pain)
\tx xiti -ro, xa kiti ini, ndɨ'ɨ i yaa:
\ge stomach -1p pl for, when bilis measles
\tx jwetniu -ro nda'a yɨ'ɨ, ndiko -ro te
\ge pot: to use -1p pl leaf tender pot: to grind -1p pl and
\tx ko'o -ro. Xa kiti ini ko'o -ro
\ge pot: to drink -1p pl for, when bilis pot: to drink -1p pl
\tx na ndva'a
\ge as pot: get better
\ft espule: dolor del estómago, para bilis, sarampión: vamos a usar las hojas tiernas, vamos a moler y tomar. para bilis vamos a tomar como se componga.

Yuku pasma:

\tx yuku pasma: **peresia, alfaresia: ija nga xa**
\ge PRIMULACEAE Anagalis arvensis perecía epilepsy that just for, when
\tx xetniu ñayiw, nga xa nakini idi dikɨ i
\ge con: to use human being just for, when pot: to wash hair head -its
\ft hierba de pasma: perecía, alferecía: solamente este para que está usando la persona para que solamente va lavar los cabellos de su cabeza.

kɨ'u:

\tx kɨ'u: **enojo, tristeza:**
\ge ACANTHACEAE Justicia spicigera Schltdl. sp: enojo sp: tristeza
\tx kɨ'u **ko'o -ro**
\ge ACANTHACEAE Justicia spicigera Schltdl. pot: to drink -1p pl
\tx ora kwe'e alfaresia
\ge when disease epilepsy
\ft hierba tinta: enojo, tristeza: vamos a tomar la hierba tinta cuando tenemos alferecía.

Chaku

tndu'u:

\tx tndu'u: Chaku: jwetniu -ro tndu'u xa nu
\ge amole dandruff pot: to use -1p pl amole for, when if
\tx nakini -ro dikɨ -ro nuu

\ge to wash -1p pl head -1p pl on, place
\tx kane chaku, ndiko -ro ña'u -i kwi
\ge there is dandruff pot: to grind -1p pl tuber -its fresh
\ft amole, la caspa: vamos a ocupar el amole para si vamos a lavar nuestras cabezas con la caspa, vamos a moler su camote verde.

chi dakwi'a; tnikwe'ero xi chi dakwi'a

ita kwaa:

\tx ita kwaa:
\ge ASTERACEAE *Tagetes lucida* Cav.
\tx tnikwe'e -ro xi chi dakwi'a: ndiko -ro
\ge wound -1p pl at/with/and gone bad pot: to grind -1p pl
\tx vixi te tenee -ro yuchi, kwi o yichi
\ge leaf and pot: to stick -1p pl powder fresh or dry
\ft pericón: herida podrida: vamos a moler las hojas y vamos a pegar el polvo fresco o seco.

chi'iro ditniro, kwe'e tna'aro

ruda:

\tx ruda
\ge RUTACEAE Ruta chalepensis L., RUTACEAE Ruta graveolens L.
\tx chi'i -ro ditni -ro, kwe'e tna'a -ro:
\ge pot: to blow -1p pl nose -1p pl disease con: struggle -1p pl
\tx ko'o -ro jota luchi.
\ge pot: to drink -1p pl sp: drop small singular
\tx Xa ku'u -ro,
\ge for, when con: to be ill/ to hurt in general -1p pl
\tx chi'i -ro ditni -ro
\ge pot: to blow -1p pl nose -1p pl
\tx nda'a ruda.
\ge leaf RUTACEAE Ruta chalepensis L., RUTACEAE Ruta graveolens L.
\tx Idi ni vuelta
\ge one, the first just sp: times
\ft ruda: vamos a sonar nuestra nariz (cuando) padecemos de una enfermedad: vamos a tomar una jota pequeña cuando estamos enfermos, vamos a sonar nuestra nariz, la hoja de la ruda. solamente una vez.

chitnɨɨ xitir; chitu xiti; Ndaa; ndaa tachi; ndaa xitiro; tnɨ'i; tnɨɨ ña'a; tnɨɨ xitir

tnu granada, guayaba:

\tx tnɨɨ ña'a, daxi: ko'o -ro
\ge con: to stick known object dysentery pot: to drink -1p pl water
\tx ndute granada xi guayaba.
\ge water granada at/with/and guayaba
\tx Jwetniu -ro doo granada, nda'a guayaba te
\ge pot: to use -1p pl cascara granada leaf guayaba and
\tx dakwido -ro. Uni vuelta.
\ge pot: make it boil -1p pl three sp: times
\ft empacho, dysentery: vamos a tomar agua de granada con guayaba. Vamos a usar la cascara de granada, las hojas de guayaba y vamos hacer hervir. tres veces.

Mino kastila:

\tx mino kastila: xaxia'an
\ge LAMIACEAE Mentha sp. con: to hurt (colics, strong pain)
\tx xiti -ro o chitu xiti:
\ge stomach -1p pl or empacho
\tx xa ko'o dichi kwechi ora
\ge for, when pot: to drink children when
\tx xaxia'an xiti -ro
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx o chitu xiti, ndiko nda'i yɨ'ɨ te
\ge or empacho pot: to grind its leaves tender and
\tx ko'o da'ya, uu a uni
\ge pot: to drink child two or three
\tx vuelta ntuku.
\ge sp: times again, another
\ft hierba buena: dolor de estómago o empacho: para que lo tomen los niños cuando tenemos dolor de estómago o empacho, se muele sus hojas tiernas y lo tome el niño dos a tres veces.

Tutitnu:

\tx ndaa: kɨ'ɨ -ro ka'nde -ro nda'a
\ge empacho pot: to go -1p pl pot: to cut -1p pl leaf
\tx tutitnu, dɨu ni,
\ge SOLANACEAE Solanum lanceolatum Cav. it is the same
\tx datete -ro nda'a tutitnu,
\ge pot: to heat -1p pl leaf SOLANACEAE Solanum lanceolatum Cav.
\tx jantu -ro xiti -ro yata ka'a -ro
\ge pot: to place -1p pl stomach -1p pl back cadera -1p pl
\ft hierba loca: empacho: vamos a ir a cortar las hojas de la hierba loca, también vamos a calentar las hojas de la hierba loca y lo vamos a poner en nuestro estómago, espalda, cadera.

da ndutei nɨñɨ xiti ñɨɨro; Golpe (sp); Nuu ñani; Nuungani; Tna'aro golpe (sp); xaxia'an nuunganiro

arnika:

\tx arnika: xaxia'an nuungani -ro:

\ge ASTERACEAE con: to hurt (colics, strong pain) golpe -1p pl
\tx arnika kwido- ro nda'a ɨɨn kɨdɨ
\ge ASTERACEAE pot: to boil -1p pl leaf one pot
\tx luchi te ko'o -ro ndute arnika
\ge small singular and pot: to drink -1p pl water ASTERACEAE
\tx kɨu xaxia'an nuungani -ro,
\ge day con: to hurt (colics, strong pain) golpe -1p pl
\tx ko'o -ro ɨɨn a uni taxa ɨɨn kɨu xa uni kɨu.
\ge pot: to drink -1p pl one or three cup one day for, when three day
\ft dolor donde nos pegamos (golpe): árnica, hervimos las hojas en una olla pequeña y tomamos el agua de árnica el día que duele donde nos pegamos, tomamos una o tres tazas, un día a tres días.

\tx na ku xa tna'a -ro golpe o
\ge when pot: to be for, when con: struggle -1p pl sp: bruise or
\tx tnikwe'e -ro: dandu'a -ro yutnu
\ge wound -1p pl pot: to boil a long time -1p pl branch, stem
\tx te ko'o -ro o
\ge and pot: to drink -1p pl or

\tx nakini -ro ndute nuu tnikwe'e
\ge pot: to wash -1p pl water on, place wound
\ft cuando tenemos golpe o heridas: hervimos un tiempo largo la rama y tomamos o lavamos con el agua donde hay herida

tnuta duxa:

\tx na ku xa tna'a -ro golpe o
\ge when pot: to be for, when con: struggle -1p pl sp: bruise or
\tx tni kwe'e -ro: dakwido -ro yutnu
\ge wound -1p pl pot: make it boil -1p pl branch, stem
\tx te ko'o -ro uu a uni vuelta
\ge and pot: to drink -1p pl two or three sp: times
\tx o dɨu ni nakini -ro nuu tnikwe'e
\ge or it is the same pot: to wash -1p pl on, place wound
\ft árnica amarilla, árnica chica: para cuando tenemos golpe o heridas: hervimos la rama y tomamos dos o tres veces o también lavamos donde hay herida.

yau nduxa:

\tx nuu ñani, xa da ndutei nɨñɨ xiti ñɨɨ-ro:kadiyuu-ro
\ge on, place pot: to be hit for, when golpe pot: to crush-1p pl
\tx nda'a te ki'ni -ro te ko'o -ro
\ge leaf and pot: squeeze -1p pl and pot: to drink -1p pl
\tx ndudi yau nde datne
\ge honey agave until morning
\ft maguey papalome: para pegar cuando tenemos golpe: vamos a machucar la hoja y la vamos a exprimir y vamos a tomar el miel de maguey todas las mañanas.

dachi kajaro; dɨña'i; dɨña'i xa dachiro

chɨyɨ:

\tx kuu tatna -ro ora xa dɨña'i xa
\ge con: to be medicine -1p pl when for, when it is blocked for, when
\tx dachi -ro, dachi dede -ro:
\ge con: to urinate -1p pl con: to urinate abdomen, womb -1p pl
\tx chɨyɨ xixa kaa ka'a ñayiw ñuu -ro
\ge cucharilla mature con: appears cadera human being town -1p pl
\tx xa kuu tatna -ro ora xa dɨña'i
\ge for, when con: to be medicine -1p pl when for, when it is blocked
\tx xa dachi -ro dachi dede -ro
\ge for, when con: to urinate -1p pl con: to urinate abdomen, womb-1p pl
\ft cucharilla: es nuestra medicina cuando está tapado que orinamos, hay orina en nuestro vientre: cucharilla madura aparece en la cadera de la persona del nuestro pueblo para ser medicina cuando está tapado que orinamos, hay orina en nuestro vientre.

chate itu:

\tx dachi kaja-ro: dakwido -ro chate itu
\ge problems urinating pot: make it boil -1p pl corn hair corn field **\tx de te ko'o ro xija**
\ge that and pot: to drink -1p pl that
\tx ku ndute -ro ndena ndu kani.
\ge hab water -1p pl until what pot become calm
\ft mal de orinia: vamos a hacer hervir el cabello de elote de la milpa y lo vamos a tomar como agua de tiempo hasta que se calme.

daxi; Tna'aro daxi

nduxa:

\tx nduxa: daxi:
\ge OXALIDACEAE Oxalis nelsonii (Small) Knuth dysentery
\tx dakwido -ro ta te dakeeni'ni -ro
\ge pot: make it boil -1p pl it flower and pot: to strain -1p pl
\tx te ko'o -ro datne xa ñini
\ge and pot: to drink -1p pl morning for, when con: be late
\ft coyul: dysentery: hervimos la flor y colemos y tomamos en la mañana cuando es tarde.

tnu granada:

\tx xa tna'a -ro daxi dakwido -ro
\ge for, when con: struggle -1p pl dysentery pot: make it boil -1p pl **\tx doo -i da te ko'o -ro**
\ge cascara -its then and pot: to drink -1p pl
\tx uu a uni datne ɨɨn yaxi luchi

\ge two or three morning one jícara small singular
\ft granada: cuando tenemos disentería vamos hacer hervir su cascara y vamos tomar dos o tres mañanas una jicara pequeña.

tnu granada, guayaba, nispero:

\tx daxi: dakwido- -ro yakwa -i granada,
\ge dysentery pot: make it boil -1p pl treebark -its granada
\tx guayaba xi vixi
\ge guayaba at/with/and leaf
\tx nispero te ko'o -ro uni datne
\ge níspero and pot: to drink -1p pl three morning
\ft granada, guayaba, níspero: disentería: vamos hacer hervir su cascara de granada, guayaba con hojas de nispero y vamos a tomar tres mañanas.

dolor (sp) de (sp) respiración (sp)

yuku tnani ñu'u:

\tx dolor de respiración: yuku tnani ñu'u:
\ge sp: pain sp: of sp: breathing ASTERACEAE
\tx kutatna xaxia'an -ro nda'i
\ge pot: to cure con: to hurt (colics, strong pain) -1p pl its leaves
\tx yɨ'ɨ dachi'o -ro nuu xiyo ñu'u
\ge tender pot: to cook -1p pl in, on, in front of comal fire
\tx da tenee -ro yata -ro. Nukani
\ge then pot: to stick -1p pl back -1p pl pot: to calm
\ft dolor de respiración: mxt: yuku tnani ñu'u: vamos a curar el dolor que tenemos con sus hojas tiernas que vamos cocer en el comal en la lumbre y pegar en nuestra espalda. Hasta que se calma.

Fraktura (sp); Quebrahueso (sp); Tna'nu yɨkɨ; Tna'nu yɨkɨro; Tna'nu yɨkɨ nda'aro; Tna'nu yɨkɨ xe'ero

ndewa buro xi ndewa tata xi ndewa tɨtnɨñɨ:

\tx nu tna'nu yɨkɨ -ro: kani -ro xi alkojol
\ge when broken bone -1p pl pot: to hit -1p pl at/with/and sp: alchohol
\ft chichicaxtle de burro, chichicaxtle de casa y chichicaxtle de ratón: cuando se quiebren nuestros huesos: vamos a pegar con alcohol.

yuku kidi, tnuta ve'yu:

\tx yuku kidi nda'a kwechi

\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less leaf small plural **\tx dataka -ro ndu xi tnuta ve'yu**
\ge pot: to bind -1p pl pot become at/with/and OROBANCHACEAE Lamourouxia sp.
\tx te jantu -ro nuu ku'u
\ge and pot: to place -1p pl on, place con: to be ill/ to hurt in general
\tx nde nu na ndva'a
\ge until if what pot: get better
\ft escobilla, chuparrosa: amarramos las hojas pequeñas de escobilla con chuparrosa y ponemos donde está afectado hasta que se sana.

yuku kidi:

\tx quebrahueso: yuku kidi
\ge sp: quebrahueso ASTERACEAE Gymosperma glutinosum (Spreng.) Less
\tx tau -ro xe'e -ro tna'nu yɨkɨ
\ge pot: make a poultice -1p pl foot -1p pl broken bone
\tx dani quebrahueso, tau -ro
\ge in the same manner sp: quebrahueso pot: make a poultice -1p pl
\tx te tenee -ro xe'e -ro, te kodo -ro
\ge and pot: to stick -1p pl foot -1p pl and pot: pour -1p pl
\tx alkojol. Duku -ro xe'e-ro royo tnu
\ge sp: alchohol pot: to tie -1p pl foot -1p pl bundle -tree
\tx chi'i -ro xe'e -ro.
\ge pot:to put in -1p pl foot -1p pl
\tx Na nde na ndva'a dada nando -r
\ge as until what pot: get better then pot: to leave -1p sg fam
\ft escobilla: quebrahueso: vamos a caldear con escobilla nuestro pie con el hueso quebrado lo mismo que quebrahueso, vamos a caldear y lo pegamos en nuestro pie y vamos a verter alcohol. Vamos a amarrar nuestro pie con un rollo de esta planta que vamos a echar en nuestro pie. Hasta que se componga lo vamos a dejar.

\tx nuu tna'nu yɨkɨ xe'e -ro o yɨkɨ nda'a -ro:
\ge if broken bone foot -1p pl or bone hand -1p pl
\tx jwetniu -ro nda'a
\ge pot: to use -1p pl leaf
\tx yuku kidi
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less
\tx tete -ro xe'e -ro te duku -ro
\ge pot: to heat up -1p pl foot -1p pl and pot: to tie -1p pl
\tx xi da'ma te dama -ro
\ge at/with/and clothes and pot: change -1p pl
\tx nde na ndva'a
\ge until as pot: get better
\ft escobilla: si se quebra el hueso de nuestro pie o mano: vamos a usar las hojas de escobilla que vamos a calentar en nuestro pie y vamos a amarrar con un trapo y lo vamos a cambiar hasta que so componga

\tx yɨkɨ xiti -ro xa vixi te fraktura:
\ge knee -1p pl for, when cold and sp: fractura
\tx jwetniu -ro nuu yuku xa yute
\ge pot: to use -1p pl end plant for, when tender

\tx tenee -ro yɨkɨ xiti -ro te
\ge pot: to stick -1p pl knee -1p pl and
\tx duku -ro nde na ndva'a,
\ge pot: to tie -1p pl until as pot: get better
\tx dakee -ro alkojol ntuku
\ge pot: put in -1p pl sp: alchohol again, another
\ft frío de rodilla y fractura: usamos la punta tierna, ponemos en la rodilla y amarramos hasta que se componga, ponemos alcohol también.

\tx nu tna'nu yɨkɨ -ro: kadava'a -ro
\ge when broken bone -1p pl pot: prepare -1p pl
\tx tabla luchi te
\ge sp: tabla small singular and
\tx duku -ro nde na ndva'a -ro
\ge pot: to tie -1p pl until as pot: get better -1p pl
\ft cuando quiebre nuestro hueso: usamos una tabla pequeña y amarramos hasta que se componga.

Infección (sp)

tayoo kuchi:

\tx tayoo kuchi, infección:
\ge MALVACEAE Malva parviflora L. sp: infección
\tx tayoo kuchi ñɨɨ -ro chi
\ge MALVACEAE Malva parviflora L. body -1p pl because
\tx dandu'a -ro te nakini -ro,
\ge pot: to boil a long time -1p pl and pot: to wash -1p pl
\tx kuchi -ro meero vichi va'a xa infección
\ge pot: to bathe -1p pl we very good for, when sp: infección
\ft malva, infección: malva nuestro cuerpo porque vamos a hervir un tiempo largo y vamos lavar, bañar nosotros, es muy bueno para infección.

i'ni xitiro; tna'aro kwe'e i'ni

Tutitnu kwixi:

\tx xaxia'an xiti -ro o
\ge con: to hurt (colics, strong pain) stomach -1p pl or
\tx yata -ro o i'ni xiti -ro:
\ge back -1p pl or hot stomach -1p pl
\tx chindee -ro nda'i yɨ'ɨ da
\ge pot: to remove, to peel off -1p pl its leaves tender then
\tx tenee -ro xiti -ro,
\ge pot: to stick -1p pl stomach -1p pl

\tx duku -ro da'ma uu a uni vuelta
\ge pot: to tie -1p pl clothes two or three sp: times

\ft dolor de estómago o espalda o estómago caliente: vamos a despegar sus hojas tiernas y los vamos a pegar en nuestro estómago, lo amarramos con una tela dos a tres veces.

ndɨ'i inir

tnu kawa:

\tx ndɨ'i: ora ndɨ'i ini -r ku'u -r
\ge pimples when pimples inside -1p sg fam pot:to rub -1p sg fam
\tx ñɨɨ -r tnu kawa -i
\ge skin -1p sg fam ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson -its
\tx ndena ku kwiñi ndɨ'jɨ. Jwetniu -ro nda'i.
\ge until what pot: to be thin pimple pot: to use -1p pl its leaves
\ft hierba de ángel: pimples: cuando hay granos al dentro voy a frotar mi cuerpo con su hierba de ángel hasta que va estar delgado el grano. Vamos a usar sus hojas.

iniro ka'ni

yuwa chuwa:

\tx yuwa chuwa xa ini -ro ka'ni:
\ge APOCYNACEAE Matelea sp. for, when inside -1p pl fever
\tx ndiko -ro yo'i yɨ'ɨ, ko'o -ro
\ge pot: to grind -1p pl its root tender pot: to drink -1p pl
\tx xa ñu'u ka'ni xiti -ro nde na ndva'a.
\ge for, when con: to have fever stomach -1p pl until as pot: get better
\ft la tika chola para fiebre al dentro de estómago: vamos a moler su raíz tierna, vamos a tomar para cuando tenemos fiebre de estómago hasta que se componga.

io ñu'u kaxi xitiu, kine'e ta kwe'e vixi; ndiko xiti; Tna'aro kaxi xe'ero o yɨkɨ xitiro; Tna'aro xa vixi; Vixi; Vixi ini; vixi ñɨɨro; Xaxia'an xa vixi; yɨkɨ xitiro xa vixi; kwe'e yɨkɨ

tnu kawa kwaa:

\tx tnu kawa kwaa:
\ge ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson
\tx nu tna'a -ro xa vixi: dandwidi -ro

\ge if con: struggle -1p pl for, when cold pot: to heat up -1p pl
\tx nda'a yuku nuu xiyo, tau -ro
\ge leaf plant in, on, in front of comal pot: to heat up -1p pl
\tx xiti -ro nuu xaxia'an
\ge stomach -1p pl on, place con: to hurt (colics, strong pain)
\tx dama -ro nde na ndva'a xitir -o.
\ge pot: change -1p pl until as pot: get better stomach -1p pl
\ft hierba de ángel: cuando tenemos frío: calentamos la hoja de la hierba en el comal, caldeamos el estómago donde duele, cambiamos hasta que se componga nuestro estómago.

ita yɨdɨ kwechi:

\tx xaxia'an xiti -ro, xa vixi
\ge con: to hurt (colics, strong pain) stomach -1p pl for, when cold **\tx ini: nde'a yutnu xi ita**
\ge inside fruit (round) branch, stem at/with/and flower
\tx dakwido -ro te ko'o -ro
\ge pot: make it boil -1p pl and pot: to drink -1p pl
\tx ndute tiempo
\ge agua de tiempo
\ft hierba de borracho chica: dolor de estómago, para frío al dentro: la fruta con la rama y flor vamos hacer hervir y vamos a tomar como agua de tiempo.

tnu tau, tnu kawa, tutitnu:

\tx saca el frío: kwido da te nani tau -ro
\ge sp: saca el frío pot: to boil also pot: to heat up -1p pl
\ft chamizo del río, hierba de ángel, hierba loca: vamos a hervir y también caldear.

yuku hierba maestra:

\tx xaxia'an xiti -ro, xa vixi:
\ge con: to hurt (colics, strong pain) stomach -1p pl for, when cold **\tx tau -ro o dakwido -ro nda'i**
\ge pot: to heat up -1p pl or pot: make it boil -1p pl its leaves
\tx te ko'o -ro uni vuelta
\ge and pot: to drink or -1p pl three sp: times
\ft ajenjo/hierba maestra: dolor de estómago, para el frío: vamos a calentar o hacemos hervir sus hojas y lo vamos a tomar tres veces.

yuku chudini:

\tx vixi ñɨɨ -ro: tnɨɨ -ro nge'e -ro
\ge cold body -1p pl pot: to grab -1p pl com: gather -1p sg fam or
\tx yuku chudini,
\ge ASTERACEAE Brickellia veronicifolia (Kunth) A. Gray
\tx dakwido -ro ndute i'ni te kuchi -ro

\ge pot: make it boil -1p pl water hot and pot: to bathe -1p pl
\tx idi ni a uu vuelta. I'ni
\ge one, the first just or two sp: times hot
\tx yuku chudini
\ge ASTERACEAE Brickellia veronicifolia (Kunth) A. Gray
\tx kuchi -ro na kee
\ge pot: to bathe -1p pl as pot: come out
\tx xa vixi ñɨɨ -ro.
\ge for, when cold body -1p pl
\ft oreja de ratón: frío del cuerpo: vamos a agarrar oreja de ratón que collectamos, hacemos hervir agua caliente y vamos a bañar nos solamente una o dos veces (depende) como va salir el frío del cuerpo.

June'i; Ku'u june'i; kwe'e xa kuu; Tna'aro june'i; xa kuun

Tnu piru:

\tx june'i: kaa -ro nuu -i yute xa nu
\ge diarrhea pot: to eat -1p pl end -its tender for, when if
\tx tna'a -ro june'i, nu xaxia'an
xiti -ro
\ge con: struggle -1p pl diarrhea if con: to hurt (colics, strong pain) stomach -1p pl
\ft pirul: diarrea: vamos comer sus puntas tiernas cuando tenemos diarrea, cuando duele nuestro estómago

tnu ndete koo:

\tx kwe'e xa kuu, june'i: dɨu ni ntuku
\ge diarrhea diarrhea it is the same again, another
\tx kwido te ko'o -ro nde na ndu
\ge pot: to boil and pot: to drink -1p pl until as pot: become
\tx kani uu a uni vuelta ko'o -ro
\ge calm two or three sp: times pot: to drink -1p pl
\tx ntuku. Jwetniu -ro yuku nda'a o yutnu.
\ge again, another pot: to use -1p pl plant leaf or branch, stem
\ft guaje de víbora: diarrea: también otra vez se hierve y vamos a tomar hasta que se calme dos o tres veces, vamos a tomar otra vez. Vamos a usar las hojas o la rama de la planta.

kwendɨjɨ:

\tx june'i: ndu'a te ko'o -ro xa
\ge diarrhea pot: to boil and pot: to drink -1p pl for, when
\tx tna'a -ro june'i. Jwetniu -ro
\ge con: struggle -1p pl diarrhea pot: to use -1p pl
\tx nda'a guayaba, dakwido -ro te ko'o -ro
\ge leaf guayaba pot: make it boil -1p pl and pot: to drink -1p pl
\tx na kwini -r xiti -ro chi
\ge as con: to want -1p sg fam stomach -1p pl because

\tx ku'u june'i. Nde na kwini -r.
\ge to be ill/ to hurt in general diarrhea until as con: to want -1p sg fam
\ft guayaba: diarrea: se hierve y tomamos cuando tenemos diarrea. Vamos a usar las hojas de guayaba, vamos hacer hervir y vamos tomar como quiero, porque está enfermo con diarrea nuestro estómago. hasta quiero.

\tx xa tna'a -ro june'i, jwetniu -ro
\ge for, when con: struggle -1p pl diarrhea pot: to use -1p pl
\tx nda'i te dakwido -ro te
\ge its leaves and pot: make it boil -1p pl and
\tx ko'o -ro na xa nde
\ge pot: to drink or -1p pl as for, when until
\tx kuna'i, vidi ntuku kaa -ro.
\ge pot: to be as planned fruit again, another pot: to eat -1p pl
\ft para cuando tenemos diarrea, vamos a usar sus hojas y vamos hacer hervir u vamos a tomar segun que nos corta, vamos a comer la fruta también.

mino kastila, tnu kawa:

\tx june'i: dakwido -ro vixi nuu
\ge diarrhea pot: make it boil -1p pl leaf in, on, in front of
\tx ndute te ko'o -ro
\ge water and pot: to drink -1p pl
\tx nu ku'u xiti -ro.
\ge if con: to be ill/ to hurt in general stomach -1p pl
\ft hierba buena, hierba de ángel: diarrea: vamos hacer hervir las hojas en agua y vamos a tomar si está enfermo nuestro estómago.

\tx june'i: dakwido -ro nui te
\ge diarrhea pot: make it boil -1p pl its ends and

\tx ko'o -ro uu a uni vuelta.
\ge pot: to drink -1p pl two or three sp: times
\ft diarrea: vamos a hacer hervir sus puntas y vamos a tomar dos o tres veces.

tnu kwendɨu:

\tx kwe'e xa kuu, june'i: dakwido -ro te
\ge diarrhea diarrhea pot: make it boil -1p pl and
\tx ko'o -ro, jwetniu -ro nda'a nuu kwendɨu,
\ge pot: to drink or -1p pl pot: to use -1p pl leaf end lemon
\tx uu a uni vuelta ko'o -ro nde xa nu
\ge two or three sp: times pot: to drink -1p pl until for, when when
\tx kani
\ge calm
\ft limón: diarrea, diarrea: vamos hacer hervir y vamos a tomar, vamos a usar las hojas y puntas de limón, dos o tres veces vamos a tomar hasta que se calme.

Kaaro; Kee ndeyu

Tnu ta'u:

\tx tnu ta'u: kaa -ro tnu ta'u:
\ge FABACEAE Erythrina sp. pot: to eat -1p pl FABACEAE Erythrina sp. **\tx na xa xetniu -ro tnu ta'u**
\ge as for, when con: to use -1p pl FABACEAE Erythrina sp.
\tx xa kaxi -ro ita -i. Dakee -ro
\ge for, when pot: to eat -1p pl flower -its pot: put in -1p pl
\tx nuu nduchi tnuu ija chi'o da te
\ge in, on, in front of bean (s) black that con: to cook then and
\tx kaa -ro
\ge pot: to eat -1p pl
\ft pipal: vamos a comer pipal: usamos pipa; para comer su flor. lo vamos a echar en frijol negro hirviendo y después lo vamos a comer.

Kaja nda'aro; xaxia'an nda'aro

yuku kidi:

\tx xa kaja nda'a -ro: dɨu
\ge for, when con: to hurt (slow pain) hand -1p pl also
\tx nuu ka'nde -ro te tenee -ro
\ge end pot: will cut -1p pl and pot: to stick -1p pl
\tx nda'a -ro nuu kaja, de
\ge hand -1p pl in, on, in front of con: to hurt (slow pain) that
\tx na nu kwini xa kaja
\ge what if con: to want for, when con: to hurt (slow pain)
\ft escobilla: cuando duelen nuestros manos: también vamos a cortar las puntas y vamos a pegar en nuestro mano donde duele, hasta que ya no quiere doler.

\tx jwetniu -ro ntuku nu
\ge pot: to use -1p pl again, another if
\tx xaxia'an xe'e -ro, nda'a -ro
\ge con: to hurt (colics, strong pain) foot -1p pl hand -1p pl
\tx nu nya'a. Kwido -ro nuu
\ge when com: to pass pot: to boil -1p pl end
\tx yuku kidi te
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less and
\tx na tɨtnɨ -ro xi ɨɨn da'ma nuu
\ge as several -1p pl at/with/and one clothes on, place
\tx xaxia'an. ɨɨn semana
\ge con: to hurt (colics, strong pain) one sp: week
\ft vamos a usar también si duele nuestro pie, mano, cuando pasó. vamos a hervir las puntas de escobilla y algunas veces amarramos con un trapo donde duele. una semana.

Kaja nu'uro; Xaxia'an nu'uro; Xaxia'anro nu'uro xi natna'a nu'uro; ndu kutu nu'uro; Ndu ni'i nu'uro; ntaya nu'uro

iñu tndu:

\tx iñu tndu: **xaxia'an**
\ge FABACEAE Medicago polymorpha L. con: to hurt (colics, strong pain) **\tx -ro** **nu'u -ro:** **ko'o** **-ro** **kwa'a**
\ge -1p pl tooth -1p pl pot: to drink -1p pl pot: to be able
\tx natna'a **nu'u -ro.** **jwetniu** **-ro** **yo'o**
\ge con: to close tooth -1p pl pot: to use -1p pl root
\tx iñu tndu **ndu** **ni'i** **nu'uro**
\ge FABACEAE Medicago polymorpha L. to press teeth that have become loose together
\tx chiyu'u **-ro** **ndute nde** **na**
\ge pot: to rinse -1p pl water until as
\tx ndva'a **-ro** **nu'u -ro.**
\ge pot: get better -1p pl tooth -1p pl
\ft carretilla: dolor de dientes: vamos a tomar para que se pueden juntar nuestros dientes. Vamos a usar la raíz de carretilla para apretar los dientes, vamos a enjuagar hasta que se compongan nuestros dientes.

tnu granada:

\tx tnu **granada:** **presión,**
\ge tree sp: pomegranate sp: bloodpressure
\tx xaxia'an **nu'u -ro:** **tnu** **granada**
\ge con: to hurt (colics, strong pain) tooth -1p pl tree sp: pomegranate
\tx ora kuu **xko** **presión** **yu'u -ro** **a** **nu'u**
\ge when con: to be always sp: bloodpressure mouth -1p pl or tooth
\tx -ro **te** **ndu'a** **kada** **enjuagar**
\ge -1p pl and pot: to boil pot: to make/to do sp: rinse
\tx te kida curar **ntuku.**
\ge and con: to do/make again, another
\ft la granada: presión, dolor de dientes: la granada siempre cuando hay presión en la boca o los dientes se hierve y se enjuaga para curarlo otra vez.

tnu duñu:

\tx tnu duñu **nani** **yuku**
\ge ASTERACEAE Baccharis pteronioides DC con: to be called plant
\tx vichi va'a yo'o tau **-ro** **xe**
\ge very good root pot: to heat up -1p pl goes (and returns)
\tx nu'u **ora kaja** **nu'u -ro**
\ge fireplace, stove when con: to hurt (slow pain) tooth -1p pl
\ft romerillo se llama la planta con una raíz muy buena para caldear en la lumbre cuando duelen nuestros dientes.

kaku da’ya ro; nu nya'a ngaku da’yaro; ña kwini da’yaro xa kakui; xa kakui; Xaxia'an ora xa ku da’yaro

tnu tɨchɨ:

\tx tnu tɨchɨ: Nda'a
\ge LAURACEAE Persea americana Mill leaf
\tx tnu tɨchɨ va'a xa ko'o ñadɨ'ɨ
\ge LAURACEAE Persea americana Mill good for, when pot: to drink woman
\tx ora kaku da’ya -i
\ge when pot: to be born child -its
\ft aguacate: las hojas de aguacate son buenas para que tome la mujer a la hora que nazca su bebe.

tnu piru:

\tx nu nya'a ngaku da’ya -ro:
\ge when com: to pass com: to be born child -1p pl
\tx dakwido -ro yutnu -de te kuchi -ro
\ge pot: make it boil -1p pl branch, stem -of and pot: to bathe -1p pl
\tx ndantuu ñɨɨ -ro uni vuelta
\ge the whole body -1p pl three sp: times
\ft pirul: cuando pasó (que) nació nuestro niño: vamos a hervir su rama y bañamos todo nuestro cuerpo tres veces.

ita yɨdɨ kwechi:

\tx kaku da’ya -ro: jwetniu -ro
\ge pot: to be born child -1p pl pot: to use -1p pl
\tx ita yɨdɨ kwechi kɨu kaku da’ya -ro,
\ge LAMIACEAE day pot: to be born child -1p pl
\tx kwido -ro nda'a ita yɨdɨ kwechi te ko'o -ro
\ge pot: to boil -1p pl leaf LAMIACEAE and pot: to drink-1p pl
\tx kɨu kaku da’ya -ro idi ni
\ge day pot: to be born child -1p pl one, the first just
\tx taxa uni datne.
\ge cup three morning
\ft hierba de borracho chica: nazca nuestro niño: vamos a usar la hierba de borracho chica el día que nazca nuestro niño, vamos a hervir las hojas de hierba de borracho chica y vamos a tomar el día que nazca nuestro niño, solamente una taza tres mañanas.

ita kwaa:

\tx xaxia'an xiti -ro te
\ge con: to hurt (colics, strong pain) stomach -1p pl and
\tx kaku da’ya -ro: jwetniu -ro yuku xi

\ge pot: to be born child -1p pl pot: to use -1p pl plant at/with/and
\tx nde ita, dakwido -ro te ko'o -ro
\ge until flower pot: make it boil -1p pl and pot: to drink -1p pl
\tx uni vuelta.
\ge three sp: times
\ft pericón: dolor de estómago y (para cuando) nazca nuestro niño: vamos a usar el tallo con flor, vamos hacer hervir y lo vamos a tomar tres veces.

Ka'ni; ditai xa ka'ni; Tna'aro ka'ni

tnu tnu'a:

\tx tnu tnu'a: ka'ni:
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult. fever
\tx tnu tnu'a
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult.
\tx ngee -ro kani -ro ñɨɨ -ro ka'ni.
\ge com: to gather -1p pl pot: to hit -1p pl body -1p pl fever
\tx Jwetniu -ro yutnu xi alkojol
\ge pot: to use -1p pl branch, stem at/with/and sp: alchohol
\tx idi ni a uni vuelta. Kɨ'ɨ -r
\ge one, the first just or three sp: times pot: to go -1p sg fam
\tx ngee -r tnu tnu'a
\ge com: to gather -1p sg fam CONVOLVULACEAE Ipomoea murucoides Roem. & Schult.
\tx nyee -r te kani -ro
\ge com: to arrive -1p sg fam and pot: to hit -1p pl
\tx dɨkɨ -r ndantu'u ña'a
\ge head -1p sg fam the whole known object
\ft casahuate: fiebre: fuimos a recolectar casahuate, vamos a pegar nuestro cuerpo con fiebre. vamos a usar la rama con alcohol una a tres veces. Voy a frotar. Fui a recolectar casahuate llegue y vamos a pegar mi cabeza toda.

tnutayuxi:

\tx ka'ni: jwetniu -ro tnutayuxi,
\ge fever pot: to use -1p pl ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx nuu tnutayuxi
\ge end ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx kwido -ro te ndiko -ro,
\ge pot: to boil -1p pl and pot: to grind -1p pl
\tx kuchi -ro ndute ndiko tnutayuxi,
\ge pot: to bathe -1p pl water cold ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx dɨkɨ -ro nu xa io
\ge head -1p pl if about to, already con: to exist
\tx ñu'u ka'ni. Idi ni vuelta
\ge fire fever one, the first just sp: times

\ft chamizo blanco: fiebre: vamos a usar chamizo blanco, las puntas de chamizo blanco hervimos y molemos, bañamos nuestras cabezas con el agua fría de chamizo blanco cuando hay fiebre. una sola vez.

\tx nge'e -ro nui tnutayuxi
\ge com: gather -1p pl its ends ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx naku'a -ro xi
\ge pot: to cleanse -1p pl at/with/and
\tx alkojol uu a uni vuelta
\ge sp: alchohol two or three sp: times
\ft fuimos a recolectar sus puntas de chamizo blanco, vamos a limpiar con alcohol dos a tres veces

tnu tndɨu:

\tx dita -i xa ka'ni: yojo -ro
\ge pot: stop -its for, when fever pot: to strip the leaves off -1p pl **\tx nda'a ta kajandi'i -ro, da'ya kwechi,**
\ge leaf it flower pot: to hang, to lay out -1p pl child small plural
\tx ñayiw xa'nu nde na ndva'a -ro.
\ge human being old (person) until as pot: get better -1p pl
\ft huele de noche: para quitar la fiebre: vamos a deshojar las hojas de la planta para tenderlos, los niños y la gente grande hasta que nos compongamos.

tayoo kuchi:

\tx ka'ni: kwido ndantu'u yuku nda'i xi nde
\ge fever pot: to boil the whole plant its leaves at/with/and until
\tx yo'i yɨ'ɨ da te kuchi -ro.
\ge its root tender then and pot: to bathe -1p pl
\ft malva: fiebre: vamos a hervir toda la planta las hojas hasta la raíz tierna y después nos vamos a bañar.

kata

tnu ndido:

\tx kata: tnu ndido:
\ge itch ERICACEAE Arctostaphylos pungens Kunth

\tx dakwido- ro ta yutnu -de te
\ge pot: make it boil -1p pl class it flower branch, stem -of and
\tx ko'o -ro uni vuelta ɨɨn kɨu
\ge pot: to drink -1p pl three sp: times one day
\ft comezón: manzanita, pingüica: vamos a hacer hervir la flor del tallo y vamos a tomar tres veces al día.

yau kastila:

\tx yau kastila: tnikwe'e -ro, kata: dachi'o -ro
\ge ASPHODELACEAE Aloe sp. wound -1p pl itch pot: to cook -1p pl
\tx nuu nu'u da tenee -ro
\ge in, on, in front of fireplace, stove then pot: to stick -1p pl
\tx nuu xaxia'an. Uni
\ge on, place con: to hurt (colics, strong pain) three
\tx vuelta. xa ku tatna -ro xa
\ge sp: times for, when pot: to be medicine -1p pl for, when
\tx tnikwe'e -ro o ndɨ'i te tau -ro.
\ge wound -1p pl or pimples and pot: make a poultice -1p pl
\tx Nda'a yau kastila dachi'o -ro nuu
\ge leaf ASPHODELACEAE Aloe sp. pot: to cook -1p pl in, on, in front of
\tx nu'u te tau -ro nuu
\ge fireplace, stove and pot: make a poultice -1p pl on, place
\tx xaxia'an, nuu kata nde na ndva'a
\ge con: to hurt (colics, strong pain) on, place itch until as pot: get better
\ft maguey de sábila: herida: vamos a cocinar en la lumbre y vamos a pegar donde duele. tres veces. para curar la herida o las barras y vamos a hacer un fomento de las hojas de la maguey sábila. vamos a cocinar en la lumbre y vamos a hacer fomentos donde duele donde hay comezón hasta que se componga.

kawa ña'i

Tutitnu:

\tx tutitnu: tau xiti:
\ge SOLANACEAE Solanum lanceolatum Cav. pot: to heat up stomach
\tx tau -ro xiti -ro ora
\ge pot: to heat up -1p pl stomach -1p pl when
\tx xaxia'an kawa ña'i ña'a,
\ge con: to hurt (colics, strong pain) cramp known object
\tx dandwidi -r nuu xiyo te
\ge pot: to heat up -1p sg fam in, on, in front of comal and
\tx tau -r ñɨɨ -r ndena
\ge pot: to heat up -1p sg fam body -1p sg fam until what
\tx kuna'i. Ku'u -ro nda'i.
\ge pot: to be as planned pot:to rub -1p pl its leaves
\ft hierba loca: se caldea el estómago: vamos a caldear nuestro estómago cuando duele, tiene un calambre, voy a calentar en el comal y voy a caldear mi cuerpo hasta que se corte. vamos a frotar sus hojas.

Kaxi kuchi, ngutu; Kaxi kuchiro, tkachi yawaro; Xaxi kuchiro

yau ngichi:

\tx yau ngichi:
\ge agave
\tx xa kaxi kuchi, ngutu maguey vedo.
\ge for, when pot: to eat pig bull sp: maguey vedo
\ft maguey vedo: para que comen los puercos y toros.

yau twixi:

\tx xaxi kuchi -ro: yau twixi
\ge con: to eat pig -1p pl agave
\tx xixa xaxi kuchi -ro te nanda kuu
\ge mature con: to eat pig -1p pl and how con: to be
\tx ña'a -ro xa kaxi kuchi -ro,
\ge known object -1p pl for, when pot: to eat pig -1p pl

\tx tkachi yawa -ro.
\ge sheep thin -1p pl
\ft maguey lechuguilla: comen nuestros puercos: el maguey lechuguilla maduro comen nuestros puercos y como es para que lo van comer nuestros puercos, borregos delgados.

kayu xa xi'i; Kayu xitiro; ña'a ñayiw xi'i

vi'inde

\tx ña'a ñayiw xi'i: vi'inde xetniu -da
\ge hangover nopal con: to use -1p sg res
\tx xiti vi'inde kɨu kida ka'u
\ge in, inside nopal day con: to do/make con: to count/to read
\tx ña'a ñayiw xi'i. Idi ni vuelta, idi
\ge hangover one, the first just sp: times one, the first
\tx ni datne.
\ge just morning
\ft nopal: cruda: nopal, usamos el centro del nopal el día que éstamos estudiando la cruda. Solamente una vez, una mañana.

vi'inde ñuu vidi:

\tx vi'inde ñuu vidi: kayu xiti -ro:
\ge a type of nopal con: to burn (intransitive) stomach -1p pl
\tx vi'inde ñuu xiti ko'o -ro na ndiko
\ge abrev type of nopal navel pot: to drink -1p pl as pot: to grind
\tx xiti -ro te kayu xiti -ro,
\ge stomach -1p pl and con: to burn (intransitive) stomach -1p pl
\tx vi'inde tawa -ro xiti te ndiko -ro
\ge nopal pot: take out -1p pl in, inside and pot: to grind -1p pl
\tx te ko'o -ro idi ni vuelta

\ge and pot: to drink -1p pl one, the first just sp: times
\tx nyi'i loko aguardiente.
com: to drink a lot sp: a type of alcohol
\ft un typo de nopal: está ardiendo nuestro estómago: el centro de este typo de nopal vamos a tomar, asi que vamos a moler el centro y está ardiendo nuestro estómago vamos a sacar el centro y vamos a molerlo y
vamos a tomar una sola vez después de tomar mucho aguardiente.

tnu de'ñu:

\tx kuña'a -ro ndute tnu de'ñu
\ge pot: to give -1p pl water CUPRESSACEAE Juniperus flaccida Schltdl.
\tx ñayiw kayu xa xi'i; ɨɨn taxa ɨɨn kɨu. Idi
\ge human being hangover one cup one day one, the first
\tx ni vuelta kani -ro.
\ge just sp: times pot: to hit -1p pl
\ft enebro: vamos a dar agua de enebro a la persona con cruda, una taza un día: solamente una vez vamos a pegar.

Kida desinflamar(sp) i

yuku kidi:

\tx yuku kidi:
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less
\tx tau -ro xe'e -ro o nda'a -ro:
\ge pot: to heat up -1p pl foot -1p pl or hand -1p pl
\tx yuku kidi ora
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less when
\tx tau -ro xe'e -ro a nda'a -ro
\ge pot: to heat up -1p pl foot -1p pl or hand -1p pl
\tx te tee -ro yuku kidi
\ge and pot: to put -1p pl ASTERACEAE Gymosperma glutinosum (Spreng.) Less
\tx chi'i ita, vichi kida desinflamar i
\ge pot: to put in flower very con: to do/make sp:desinflamar -its
\tx te kuna'i dolor
\ge and pot: to be as planned sp: pain
\tx chi ndva'a -ro
\ge because pot: get better -1p pl
\ft escobilla: caldeamos nuestros pies o manos: escobilla la hora que vamos caldear nuestros pies o manos y vamos a echar escobilla vamos a echar la flor, hace desinflamar mucho y corte el dolor porque nos compongamos.

Kida falsear (sp?) ku nda'aro, ku xe'ero; na ku xa falsear xe'ero; Ngokodo xe'ero; ngukawa xe'ero

Ndewa:

\tx ndewa: ngukawa xe'e ro: ka'nde -ro yuku
\ge chichicaxtle sprain pot: will cut -1p pl plant
\tx ndewa te kani -ro xe'e -ro
\ge chichicaxtle and pot: to hit -1p pl foot -1p pl
\tx uu a uni vuelta kodo -ro
\ge two or three sp: times pot: pour -1p pl
\tx xaku alkojol nuu vixi kani -ro xe'e -ro
\ge few sp: alchohol on, place leaf pot: to hit -1p pl foot -1p pl
\ft chichicaxtle: torcedura: cortamos hierba de chichicaxtle y pegamos nuestros pies dos-tres veces, vertemos un poco de alcohol en la hoja con que vamos a pegar nuestros pies.

yuku kidi:

\tx kida falsear ku nda'a -ro
\ge con: to do/make sp: falsear? pot: to be hand -1p pl
\tx ku xe'e -ro kuu tatna: da
\ge pot: to be foot -1p pl con: to be medicine then
\tx tenee -ro te duku -ro nuu xaxia'an.
\ge pot: to stick -1p pl and pot: to tie -1p pl on, place con: to hurt (colics, strong pain)
\tx Jwetniu -ro nui. Ndena ndva'a -ro
\ge pot: to use -1p pl its ends until what pot: get better -1p pl
\ft escobilla: falsedura de nuestro manos, nuestro pie es medicina: ponemos y amarramos donde duele. usamos su punta. hasta que nos compongamos.

ndewa ngutu:

\tx ndewa ngutu: ngokodo xe'e -r:
\ge chichicaxtle silvestre com: to sprain foot -1p sg fam
\tx kani -ro nda'i ndewa ngutu xi
\ge pot: to hit -1p pl its leaves chichicaxtle silvestre at/with/and
\tx alkojol, duku -ro da'ma. Uni vuelta
\ge sp: alchohol pot: to tie -1p pl clothes three sp: times
\ft chichicaxtle silvestre: sprained foot: vamos a pegar con sus hojas de chichicaxtle silvestre con alcohol, vamos a amarrar con un trapo tres veces.

kɨtla vichi; kɨtla vichi nuu xitiro; kɨtla vichi ñu'u xitiro; kɨtla vichi xitiro; ñu'u kɨtɨ vichi nu xitiro; ñu'u xitiro kɨtla vichi; ñu'uro koo yɨkɨ

mino ñuu dau:

\tx mino ñuu dau:
\ge CHENOPODIACEAE Dysphania ambrosioides (L.) Mosyakin & Clemants
\tx ñu'u kɨtɨ vichi nu xitiro: mino jwetniu -ro kɨu

\ge parasites in the stomach abrev. epazote pot: to use -1p pl day
\tx ñu'u ɨtɨ vichi nu xitiro, a xiti dichi kwechi.
\ge parasites in the stomach or stomach children
\tx Kwido -ro mino te ko'o -i
\ge pot: to boil -1p pl abrev. epazote and pot: to drink -its
\tx ɨɨn a uu datne
\ge one or two morning
\ft epazote: parásitos en el estómago: vamos a usar epazote el día que hay parásitos en nuestros estómagos, o en los estómagos de niños pequeños. vamos a hervir epazote y va tomar una o dos mañanas.

\tx kɨtla vichi ñu'u xiti -ro: ndiko yɨ'ɨ -ro
\ge parasites stomach -1p pl pot: to grind tender -1p pl
\tx dakeeni'ni -ro da te ko'o -ro
\ge pot: to strain -1p pl then and pot: to drink -1p pl
\tx uni datne
\ge three morning
\ft parásitos en el estómago: vamos a moler (lo) tierno y vamos colar después, vamos a tomar tres mañanas.

\tx ñu'u xiti -ro kɨtla vichi: jwetniu -ro
\ge con: to have stomach -1p pl parasites pot: to use -1p pl
\tx yo'o yukude te dakwido -ro te
\ge root plant -of and pot: make it boil -1p pl and
\tx ko'o -ro ɨɨn taxa uni datne
\ge pot: to drink -1p pl one cup three morning
\ft parásitos en el estómago: vamos a usar la raíz de la hierba y vamos a hacer hervir y vamos a tomar una taza tres mañanas.

\tx xa ñu'u -ro koo yɨkɨ: xa
\ge for, when con: to have -1p pl worm for, when
\tx ñu'u -ro koo yɨkɨ xija ko'o -ro yo'o
\ge con: to have -1p pl worm that pot: to drink -1p pl root
\tx mino ñuu dau.
\ge CHENOPODIACEAE Dysphania ambrosioides (L.) Mosyakin & Clemants
\tx Uni datne ɨɨn taxa luchi, nditee -ro
\ge three morning one cup small singular pot: put it in -1p pl
\tx ko'o -ro. Ndikoro xi
\ge pot: to drink -1p pl pot: to grind -1p pl at/with/and
\tx ndute dakeeni'ni -ro da te ko'o
\ge water pot: to strain -1p pl then and pot: to drink
\tx -ro uni datne ɨɨn yaxi luchi
\ge -1p pl three morning one jícara small singular
\ft cuando tenemos lombrices: cuando tenemos lombrices este vamos a tomar el raíz de epazote. tres mañanas una taza pequeña, vamos a echarlo y lo vamos a tomar. Vamos a moler con agua y después lo vamos a colar y vamos a tomar tres manans una jicara pequeña.

\tx xa ko'o -ro naxku purga, xa kuun,
\ge for, when pot: to drink -1p pl what is sp: purge diarrhea
\tx kɨtla vichi xiti -ro: dani kwido
\ge parasites stomach -1p pl in the same manner pot: to boil
\tx da te ko'o -ro uu a uni vuelta.
\ge then and pot: to drink -1p pl two or three sp: times
\tx Jwetniu -ro ndantu'u nde yo'i
\ge pot: to use -1p pl the whole until its root
\ft para que vamos a tomar para purga, diarrea, parásitos en el estómago: en la misma manera se hierve y vamos a tomar dos o tres veces. Vamos a usar todo hasta la raíz.

\tx xaxia'an xiti -ro,
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx kɨtla vichi nuu xiti -ro: jwetniu -ro
\ge parasites in, on, in front of stomach -1p pl pot: to use -1p pl
\tx yo'i, dakwido -ro nuu kɨdɨ
\ge its root pot: make it boil -1p pl in, on, in front of pot
\tx te ko'o -ro uni datne.
\ge and pot: to drink -1p pl three morning
\ft dolor de estómago, parásitos en el estómago: vamos a usar su raíz, vamos a hacer hervir en una olla y vamos a tomar tres mañanas.

mino kastila:

\tx mino kastila dakwido -ro
\ge LAMIACEAE Mentha sp. pot: make it boil -1p pl
\tx ɨɨn kɨdɨ luchi o jwetniu -ro
\ge one pot small singular or pot: to use -1p pl
\tx nda'a mino uni kɨu ɨɨn taxa luchi,
\ge leaf epazote three day one cup small singular
\tx idi xa ɨɨn kɨu
\ge one, the first for, when one day
\ft hierba buena: vamos hacer hervir hierba buena en una olla pequeña o vamos a usar las hojas de epazote tres días una taza pequeña, a ver si otro día.

yuku kwedayu:

\tx ñu'u xiti -ro kɨtla vichi: jwetniu -ro
\ge con: to have stomach -1p pl parasites pot: to use -1p pl
\tx yutnu yuku kwedayu te
\ge branch, stem ASTERACEAE Artemisia ludoviciana Nutt. and
\tx dakwido -ro te ko'o -ro ɨɨn taxa
\ge pot: make it boil -1p pl and pot: to drink -1p pl one cup
\tx uni datne.
\ge three morning
\ft estafiate: tenemos parásitos en el estómago: vamos a usar la rama de estafiate y vamos hacer hervir y vamos a tomar una taza por tres mañanas.

kɨtɨ xitiro

romeru:

\tx romeru: kɨtɨ xitiro: xaxia'an
\ge rosemary rumbling stomach con: to hurt (colics, strong pain)
\tx xiti -ro: ko'o -ro ora
\ge stomach -1p pl pot: to drink -1p pl when
\tx xaxia'an xiti -ro, ka'nde -ro
\ge con: to hurt (colics, strong pain) stomach -1p pl pot: will cut-1p pl
\tx ɨɨn yutnu, dakee -ro na kwido.
\ge one branch, stem pot: put in -1p pl as pot: to boil
\tx Ko'o -ro ñadɨ'ɨ nya'a
\ge pot: to drink -1p pl woman com: to pass
\tx ngaku da’ya -i.
\ge com: to be born child -its
ft romero: ruido de estómago: dolor de estómago vamos a tomar cuando duele nuestro estómago, vamos a cortar una rama, la vamos a echar que hierve. Vamos a tomar. la mujer que dió a luz.

Kontrolar (sp) axuka; Kwe'e axuka; kwe’e axuka nu nɨñɨ; vidi nɨñɨro

tnu yuku ñama:

\tx tnu yuku ñama:
\ge LOGANIACEAE Buddleja cf. crotonoides A. Gray, BUDDLEJACEAE Buddleja cordata Kunth
\tx kontrolar axuka: lo mismo chi'o va'a
\ge sp: control sp: sugar sp: lo mismo con: to cook good
tx tnu yuku ñama
\ge LOGANIACEAE Buddleja cf. crotonoides A. Gray, BUDDLEJACEAE Buddleja cordata Kunth
\tx xa kada kontrolar -i axuka.
\ge for, when pot: to make/to do sp: control -its sp: sugar
ft lengua de vaca: controlar azúcar (diabetes): lo mismo estamos hirviendo bien la lengua de vaca para que vamos hacer controlarlo azúcar.

ku tatnaro nduchi yataro

\tx tnu yaka: kutatna -ro
\ge FABACEAE Eysenhardtia subcoriacea Pennell pot: to cure -1p pl
\tx nduchi yataro: jwetniu -ro vixi, chakwa, yutnu
\ge kidney pot: to use -1p pl leaf treebark branch, stem
\tx xija dakwido -ro da ko'o -ro
\ge that pot: make it boil -1p pl then pot: to drink -1p pl
\tx ndantuu kɨu nu ku'u -ro
\ge the whole day if con: to be ill/ to hurt in general -1p pl

\tx ku tatna -ro nduchi yataro
\ge pot: to be medicine -1p pl kidney
\ft cuatillo: vamos a curar nuestros riñones: vamos a usar las hojas, la corteza, la rama, esto hacemos hervir, entonces vamos a tomar todo el día si estamos enfermos, vamos a curar nuestros riñones.

Ku'u iniro; kwe’e xiti ñɨɨro

tnu tnu'a:

\tx xa ku'u ini -ro: i'ni
\ge for, when con: to be ill/ to hurt in general inside -1p pl hot
\tx dakee -ro nuu ini -ro.
\ge pot: put in -1p pl in, on, in front of inside -1p pl
\tx Dakee -ro nda'a nuu ñu'u da
\ge pot: put in -1p pl leaf in, on, in front of fire then
\tx tenee -ro xiti -ro
\ge pot: to stick -1p pl stomach -1p pl
\ft casahuate: cuando nuestro al dentro está enfermo: caliente vamos a echar en nuestro estómago. Vamos a echar la hoja en la lumbre y la vamos a poner en nuestro estómago.

Ku'u xitiro; u'u xitiro; xaxia'an xitiro

yuku ua:

\tx yuku ua: xaxia'an
\ge hierba maestra, ajenjo con: to hurt (colics, strong pain)
\tx xiti -ro: ko'o -ro ora
\ge stomach -1p pl pot: to drink -1p pl when
\tx xaxia'an xiti -ro,
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx ka'nde -ro ɨɨn yutnu yuku ua,
\ge pot: will cut -1p pl one branch, stem hierba maestra, ajenjo
\tx dakee -ro nakwido
\ge pot: put in -1p pl pot: boil for a long time
\ft ajenjo, hierba maestra: dolor de estómago: tomamos cuando duele nuestro estómago, cortamos una rama de ajenjo, la echamos que hierve un tiempo largo

yuku kidi:

tx yuku kidi:
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less
tx xaxia'an xiti -ro, june'i:
\ge con: to hurt (colics, strong pain) stomach -1p pl diarrhea
\tx dakwido -ro vixi te ko'o -ro
\ge pot: make it boil -1p pl leaf and pot: to drink -1p pl
\ft escobilla: dolor de estómago, diarrea: hacemos hervir las hojas y tomamos.

ita yɨdɨ:

\tx ita yɨdɨ: xaxia'an
\ge LAMIACEAE Satureja oaxacana Standl. con: to hurt (colics, strong pain)
\tx xiti -ro: xa xaxia'an
\ge stomach -1p pl for, when con: to hurt (colics, strong pain)
\tx xiti -ro kwido xi'i ndute i'ni, jwetniu -ro
\ge stomach -1p pl pot: to boil with water hot pot: to use -1p pl
\tx yutnu, ko'o -ro ɨɨn a uu taxa,
\ge branch, stem pot: to drink -1p pl one or two cup
\tx kada datne uu a uni datne ko'o -ro
\ge pot: to make/to do morning two or three morning pot: to drink -1p pl
\ft flor de novia: dolor de estómago: cuando duele nuestro estómago se hierve con agua caliente, usamos las ramas, tomamos una o dos tazas, cada mañana dos o tres mañanas tomamos.

\tx ita yɨdɨ: xaxia'an
\ge LAMIACEAE Satureja oaxacana Standl. con: to hurt (colics, strong pain)
\tx xiti -ro: jwetniu -ro yutnu -de,
\ge stomach -1p pl pot: to use -1p pl wood, stick (of wood) -of
\tx dakwido -ro te ko'o -ro
\ge pot: make it boil -1p pl and pot: to drink -1p pl
\tx ndu daa nda ora
\ge agua de tiempo
\ft flor de novia: dolor de estómago: usamos sus ramas, lo hacemos hervir y tomamos como agua de tiempo.

\tx ita yɨdɨ: xaxia'an
\ge LAMIACEAE Satureja oaxacana Standl. con: to hurt (colics, strong pain)
\tx xitiro: nda'a yɨdɨ
\ge stomach -1p pl leaf LAMIACEAE Satureja oaxacana Standl.
\tx na ko'o -ro. Nda'a kwi o yichi. Kɨu
\ge as pot: to drink -1p pl leaf fresh or dry day
\tx xaxia'an xiti -ro.
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx Ko'o -ro uni datne ɨɨn taxa.
\ge pot: to drink -1p pl three morning one cup
\tx Jwetniuro xi ita yɨdɨ kwechi. Xi
\ge pot: to use -1p pl at/with/and LAMIACEAE at/with/and
\tx yutnu, nda'a ita yɨdɨ kwechi kwido ntuku
\ge branch, stem leaf LAMIACEAE pot: to boil again, another
\ft flor de novia: dolor de estómago: las hojas de flor de novia para que tomamos. las hojas verdes o secas. el día que duele nuestro estómago. tomamos 3 mañanas una taza. Usamos con flor de novia pequeña. con la rama, las hojas de flor de novia pequeña hervimos también.

\tx ita yɨdɨ: u'u xiti -ro:

\ge LAMIACEAE Satureja oaxacana Standl. painful stomach -1p pl
\tx kwido nda'a te ko'o -ro
\ge pot: to boil leaf and pot: to drink -1p pl
\ft flor de novia: painful stomach: hierve las hojas y tomamos

Mino kastila:

\tx mino kastila; xaxia'an xiti:
\ge LAMIACEAE Mentha sp. con: to hurt (colics, strong pain) stomach
\tx kani dakwido -ro xi ndute te
\ge long pot: make it boil -1p pl at/with/and water and
\tx ko'o -ro (ndena kuna'i),
\ge pot: to drink -1p pl until what pot: to be as planned
\tx jwetniu -ro yutnu mino kastila
\ge pot: to use -1p pl branch, stem LAMIACEAE Mentha sp.
\ft hierba buena: dolor de estómago: lo hacemos hervir durante un tiempo largo con agua y lo tomamos(hasta que se corte), usamos un tallo de la hierba buena.

\tx xaxia'an xiti
\ge con: to hurt (colics, strong pain) stomach
\tx da'ya kwechi -ro: jwetniu -ro mino kastila
\ge child small plural -1p pl pot: to use -1p pl LAMIACEAE Mentha sp.
\tx kɨu xaxia'an xiti
\ge day con: to hurt (colics, strong pain) stomach
\tx da'ya kwechi -ro. Dakwido -ro nda'a kwi
\ge child small plural -1p pl pot: make it boil -1p pl leaf fresh
\tx mino kastila te kuña'a -ro yɨvidi ni
\ge LAMIACEAE Mentha sp. and pot: to give -1p pl lukewarm just
\tx xe ko'o -i uu vuelta
\ge goes (and returns) pot: to drink -its two sp: times
\ft dolor de estómago de los niños pequeños: usamos la hierba buena el día que duele el estómago de nuestros niños pequeños. Hervimos las hojas frescas de la hierba buena y lo damos tibio, para que toma dos veces.

\tx xa ko'o -ro nuu
\ge for, when pot: to drink -1p pl if
\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx jwetniu -ro nda'a, dakwido -ro xi
\ge pot: to use -1p pl leaf pot: make it boil -1p pl at/with/and
\tx ndute te ko'o -ro ndute
\ge water and pot: to drink -1p pl water
\ft para que tomamos cuando duele nuestro estómago: usamos las hojas, las hacemos hervir con agua y tomamos el agua.

\tx ko'o dichi kwechi: ko'o dichi kwechi,
\ge pot: to drink children pot: to drink children

\tx dakwido -ro nda'a xi nde yutnu
\ge pot: make it boil -1p pl leaf at/with/and until branch, stem
\tx kwechi, kuña'a -ro na ko'o -i
\ge small plural pot: to give -1p pl as pot: to drink -its
\tx ɨɨn a uu datne.
\ge one or two morning
\ft tomen los niños: tomen los niños, hacemos hervir las hojas con los tallos chiquitos, lo damos para beber a ellos una o dos mañanas.

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx dakwido -ro ɨɨn a uu rama
\ge pot: make it boil -1p pl one or two sp: branch

\tx kwechi te ko'o -ro nde ndva'a -ro
\ge small plural and pot: to drink -1p pl until pot: get better -1p pl
\ft dolor de estómago: hacemos hervir una o dos ramas pequeñas y lo tomamos hasta que nos compongamos

\tx jwetniu -ro nda'i, dakwido -ro te
\ge pot: to use -1p pl its leaves pot: make it boil -1p pl and
\tx ko'o -ro na
\ge pot: to drink -1p pl as
\tx ndva'a xiti -ro
\ge pot: get better stomach -1p pl
\ft vamos a usar sus hojas, los hacemos hervir y lo tomamos cómo se componga nuestro estómago.

\tx jwetniu -ro nda'a te dakwido -ro te
\ge pot: to use -1p pl leaf and pot: make it boil -1p pl and
\tx ko'o -ro nde na
\ge pot: to drink -1p pl until as
\tx ndva'a -ro
\ge pot: get better -1p pl
\ft vamos a usar sus hojas, los hacemos hervir y lo tomamos hasta que se componga nuestro estómago.

\tx jwetniu -ro yutnu -de,
\ge pot: to use -1p pl branch, stem -of
\tx dakwido -ro te ko'o -ro
\ge pot: make it boil -1p pl and pot: to drink -1p pl
\tx ndu daa ndaa ora
\ge agua de tiempo
\ft vamos a usar su rama, lo hacemos hervir y lo vamos a tomar como agua de tiempo

\tx dakwido -ro vixi te ko'o -ro
\ge pot: make it boil -1p pl leaf and pot: to drink -1p pl
\ft Vamos a hacer hervir las hojas y lo vamos a tomar

\tx ko'o -ro ora xaxia'an
\ge pot: to drink -1p pl when con: to hurt (colics, strong pain)
\tx xiti -ro, ka'nde -ro
\ge stomach -1p pl pot: will cut -1p pl

\tx ɨɨn yutnu, dakee -ro na kwido
\ge one branch, stem pot: put in -1p pl as pot: to boil
\ft vamos a tomar cuando duele nuestro estómago, vamos a cortar una rama y la echamos a hervir

Tnu kawa:

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx tenee -ro xiti ko'o -ro xi alkojol
\ge pot: to stick -1p pl navel -1p pl at/with/and sp: alchohol
\tx nde na ndva'a -ro dita -i xa
\ge until as pot: get better -1p pl pot: stop -its for, when
\tx tna u'u -ro.
\ge con: have pain -1p pl
\ft hierba de ángel: dolor de estómago: lo ponemos en el ombligo con alcohol hasta que sanemos y se quita el dolor que tenemos.

\tx xaxia'an xiti -ro te
\ge con: to hurt (colics, strong pain) stomach -1p pl and
\tx tna u'u -ro ñɨɨ -ro: dakwido -ro
\ge con: have pain -1p pl body -1p pl pot: make it boil -1p pl
\tx te ko'o -ro o kanu -ro
\ge and pot: to drink -1p pl or pot: to break into pieces -1p pl
\tx te duku -ro nuu xaxia'an
\ge and to tie -1p pl on, place con: to hurt (colics, strong pain)
\ft dolor de estómago y dolor del cuerpo: hacemos hervir y tomamos o lo quebramos en pedazos y amarramos donde duele.

Tnu kawa kwaa:

\tx xaxia'an xiti -ro: xa
\ge con: to hurt (colics, strong pain) stomach -1p pl for, when
\tx xaxia'an xiti -ro kadava'a -ro
con: to hurt (colics, strong pain) stomach -1p pl pot: prepare -1p pl
\tx tuu ni'nu -ro nda'a tnu da te
\ge con: to have fallen -1p pl leaf -tree then and
\tx chinee -ro xiti -ro
\ge con: put something inside something else -1p pl stomach -1p pl
\tx nuu xaxia'an
\ge on, place con: to hurt (colics, strong pain)
\tx nda'a yɨ'ɨ tnu. Nuu xa da ni
\ge leaf tender -tree on, place for, when then just
\tx xaxia'an xiti -ro nadama -ro
\ge con: to hurt (colics, strong pain) stomach -1p pl pot: change-1p pl
\tx tnu. Na kɨu na nadama -ro.
\ge -class tree which day (cuando) as pot: change -1p pl
\ft hierba de ángel: dolor de estómago: cuando duele nuestro estómago vamos a preparar las hojas del árbol que están cayendo y las hojas tiernas del árbol metimos en nuestro estómago donde duele. donde duele nuestro estómago vamos a cambiarlo (las hojas). Vamos a cambiar hasta cuando.

ita yɨdɨ na'nu:

\tx xaxia'an xiti -ro, xa
\ge con: to hurt (colics, strong pain) stomach -1p pl for, when
\tx vixi ini: nde'a yutnu xi ita
\ge cold inside fruit (round) branch, stem at/with/and flower
\tx dakwido -ro te ko'o -ro
\ge pot: make it boil -1p pl and pot: to drink -1p pl
\tx ndute tiempo
\ge agua de tiempo
\ft hierba de borracho grande: dolor de estómago, frío al dentro: la fruta, la rama con flor, las hacemos hervir y tomamos como agua de tiempo.

yuku kawa:

\tx xaxia'an xiti -ro: na
\ge con: to hurt (colics, strong pain) stomach -1p pl what
\tx dakee -ro nuu ndute na dakwido
\ge pot: put in -1p pl in, on, in front of water as pot: make it boil
\tx dada ko'o -ro ɨɨn taxa idi ni
\ge then pot: to drink -1p pl one cup one, the first just
\tx vuelta. Nda'i yichi o yɨ'ɨ
\ge sp: times its leaves dry or tender
\ft hierba de coyote: dolor de estómago: lo vamos a echar en el agua y hacemos hervir después vamos a tomar una taza, solamente una vuelta. sus hojas secas o tiernas.

\tx tau -ro o dakwido -ro nda'i
\ge pot: to heat up -1p pl or pot: make it boil -1p pl its leaves
\tx te ko'o -ro uni vuelta
\ge and pot: to drink -1p pl three sp: times
\ft vamos a caldear o hacemos hervir sus hojas y tomamos tres veces.

\tx kanu -ro uni rama kwechi te
\ge pot: to break into pieces -1p pl three sp: branch small plural and
\tx dakwido -ro te ko'o -ro ɨɨn taxa
\ge pot: make it boil -1p pl and pot: to drink -1p pl one cup
\ft quebramos tres ramas pequeñas y las hacemos hervir y tomamos una taza.

Yuku ñaña:

\tx yuku ñaña da ni xaxia'an
\ge hierba de coyote then just con: to hurt (colics, strong pain)
\tx xiti -ro xetniu -ro yuku ñaña.
\ge stomach -1p pl con: to use -1p pl hierba de coyote
\tx Jwetniu -ro nda'a xetniu -ro,
\ge pot: to use -1p pl leaf con: to use -1p pl
\tx Ka'nu -ro yutnu luchi te
\ge pot: to break -1p pl branch, stem small singular and
\tx dakwido -ro, ko'o -ro uu a uni

\ge pot: make it boil -1p pl pot: to drink -1p pl two or three
\tx datne ɨɨn a uu taxa, nuu xa kuna'i
\ge morning one or two cup if about to, already pot: to be as planned
\tx o da ni xaxia'an
\ge or then just con: to hurt (colics, strong pain)
\ft hierba de coyote así solamente para dolor de estómago éstamos usando la hierba de coyote. vamos a usar las hojas que éstamos usando, vamos a quebrar una rama chiquita y vamos a hacer la hervir, vamos a
tomar dos o tres mañanas una o dos tazas si se va cortar o así solamente duele.

\tx dɨu ni xa kwido te ko'o -ro
\ge it is the same for, when pot: to boil and pot: to drink -1p pl
\tx ya io xaxia'an
\ge this con: to exist con: to hurt (colics, strong pain)
\tx xiti -ro uu vuelta. Ko'o -ro xi
\ge stomach -1p pl two sp: times pot: to drink -1p pl at/with/and
\tx io ua
\ge con: to exist bitter
\ft también vamos a hervir esto, cuando hay dolor de estómago dos veces. lo vamos a tomar con su amargor.

\tx jwetniu -ro nda'a te dakwido -ro te
\ge pot: to use -1p pl leaf and pot: make it boil -1p pl and
\tx ko'o -ro nde na
\ge pot: to drink -1p pl until as
\tx ndva'a -ro
\ge pot: get better -1p pl
\ft vamos a usar las hojas y las vamos a hacer hervir y tomamos hasta nos compongamos.

\tx ko'o -ro ora xaxia'an
\ge pot: to drink -1p pl when con: to hurt (colics, strong pain)
\tx xiti -ro, ka'nde -ro ɨɨn yutnu
\ge stomach -1p pl pot: will cut -1p pl one branch
\tx, dakee -ro na kwido
\ge, stem pot: put in -1p pl as pot: to boil
\ft vamos a tomar cuando duele nuestro estómago, vamos a cortar una rama y la echamos para que hierve.

Ita mitu:

\tx jwetniu -ro nda'a te dakwido -ro te
\ge pot: to use -1p pl leaf and pot: make it boil -1p pl and
\tx ko'o -ro nde
\ge pot: to drink -1p pl until
\tx na ndva'a -ro
\ge as pot: get better -1p pl
\ft mirto: vamos a usar las hojas y las vamos a hacer hervir y tomamos hasta nos compongamos.

\tx jwetniu -ro yutnu -de, dakwido -ro
\ge pot: to use -1p pl branch, stem -of pot: make it boil -1p pl
\tx te ko'o -ro ndu daa ndaa ora
\ge and pot: to drink -1p pl agua de tiempo
\ft vamos a usar su rama y la hacemos hervir y tomamos como agua de tiempo.

\tx jwetniu -ro ita te dakwido -ro
\ge pot: to use -1p pl flower and pot: make it boil -1p pl
\tx te ko'o -ro uu
\ge and pot: to drink -1p pl two
\tx datne i'ni i'ni
\ge morning hot hot
\ft vamos a usar la flor y la hacemos hervir y tomamos dos mañanas muy caliente.

\tx nge'e -ro yuku mirtu te
\ge com: gather -1p pl LAMIACEAE Salvia microphylla Kunth and
\tx jandodo -ro ta'uli ndute te ko'o -ro
\ge pot: put on -1p pl a little bit water and pot: to drink -1p pl
\tx ndute yuku ora yichi -ro ndute.
\ge water plant when con: thirst -1p pl water
\tx Xaxia'an -ro xiti -ro
\ge con: to hurt (colics, strong pain) -1p pl stomach -1p pl
\tx nde ko'o -ro
\ge until pot: to drink -1p pl
\tx ndute yuku mirtu.
\ge water LAMIACEAE Salvia microphylla Kunth
\ft recogimos mirto y vamos a echarlo con un poco de agua y vamos a tomar el agua de hierba cuando tenemos sed. Nuestro estómago duele hasta que tomamos agua de hierba mirto.

Tutitnu:

\tx xaxia'an xiti -ro,
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx kuna'i: tutitnu
\ge pot: to be as planned SOLANACEAE Solanum lanceolatum Cav.
\tx chi'i -un vitna ora
\ge pot: to put in -2p sg fam ws now when
\tx xaxia'an xiti -ro te
\ge con: to hurt (colics, strong pain) stomach -1p pl and
\tx kidava'a -ro ɨɨn koo luchi chi da’ya -ro
\ge con:to do/make -1p pl one tamal small singular because child -1p pl
\tx nuu -i meero, kuna'i dolor
\ge on, place -its we pot: to be as planned sp: pain
\ft hierba loca: dolor de estómago, que se corte: echas la hierba loca cuando hay dolor de estómago y hacemos un tamal pequeño para nosotros (que ponemos) en el lugar (que duele) de nuestro niño, que se corte el dolor.

\tx ku'u xiti -ro:

\ge con: to be ill/ to hurt in general stomach -1p pl
\tx tau -ro ku'u
\ge pot: to heat up -1p pl con: to be ill/ to hurt in general
\tx xiti -ro na kwatu, jwetniu -ro
\ge stomach -1p pl calm the pain pot: to use -1p pl
\tx nda'a tutitnu kajatna'a
\ge leaf SOLANACEAE Solanum lanceolatum Cav. con: struggle with pain
\tx -ro nda'a tnu te dake'e -ro nuu
\ge -1p pl leaf -tree and to heat up -1p pl in, on, in front of
\tx xiyo te tau -ro xiti -ro.
\ge comal and pot: to heat up -1p pl stomach -1p pl
\ft dolor de barriga: calentamos nuestro estómago enfermo para calmar el dolor, vamos a usar la hoja de la hierba loca cuando nos afecta el dolor, calentamos la hoja del árbol en el comal y caldeamos nuestro estómago.

\tx tenee -ro xiti ko'o -ro xi alkojol
\ge pot: to stick -1p pl navel -1p pl at/with/and sp: alchohol **nde na ndva'a -ro, dita -i**
until as pot: get better -1p pl pot: stop -its
\tx xa tna u'u -ro. xaxia'an
\ge for, when con: have pain -1p pl con: to hurt (colics, strong pain)
\tx xiti -ro: nde'a chi'o nuu
\ge stomach -1p pl con: to see con: to cook in, on, in front of
\tx nu'u te tenee -ro nuu
\ge fireplace, stove and pot: to stick -1p pl on, place
\tx xiti -ro xi alkojol.
\ge stomach -1p pl at/with/and sp: alchohol
\ft vamos a pegar la en nuestro ombligo con alcohol hasta que nos compongamos, que se quite el dolor que tenemos. Dolor de estómago: estamos viendo que se hierve en la lumbre y la vamos a pegar en nuestro estómago con alcohol.

Tutitnu kwixi:

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx ka'nde -ro te duku -ro
\ge pot: will cut -1p pl and pot: to tie -1p pl
\tx nuu xaxia'an meeni
\ge on, place con: to hurt (colics, strong pain) only
\ft hierba loca blanca: dolor de estómago: vamos a cortar y lo amarramos en el lugar que duele solo.

yuku hierba maestra:

\tx xaxia'an xiti -ro: na
\ge con: to hurt (colics, strong pain) stomach -1p pl what
\tx kee -ro nuu aguardiente
\ge pot: to put in -1p pl in, on, in front of sp: a type of alcohol
\tx na kada represar -i te ko'o -ro
\ge as pot: to make/to do sp: repress -its and pot: to drink -1p pl

\tx te io va'a xa xaxia'an
\ge and con: to exist good for, when con: to hurt (colics, strong pain)
\tx xiti -ro
\ge stomach -1p pl
\ft ajenjo, hierba maestra: dolor de estómago: lo vamos a poner en aguardiente para represarlo (el dolor)

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx dakwido -ro una rama
\ge pot: make it boil -1p pl sp:one sp: branch
\tx luchi te ko'o -ro
\ge small singular and pot: to drink -1p pl
\ft dolor de estómago: vamos a hacer hervir una rama chiquita y lo vamos a tomar.

\tx xaxia'an xiti -ro: dɨu na
\ge con: to hurt (colics, strong pain) stomach -1p pl also what
\tx dakee -ro nuu ndute na
\ge pot: put in -1p pl in, on, in front of water as
\tx dakwido dada ko'o -ro ɨɨn taxa, uu a
\ge pot: make it boil then pot: to drink -1p pl one cup two or
\tx uni vuelta. Nda'i yɨ'ɨ o yichi.
\ge three sp: times its leaves tender or dry
\ft dolor de estómago: también lo vamos a echar en agua y lo vamos a hacer hervir después vamos a tomar una taza, dos o tres veces. sus hojas tiernas o secas.

\tx xaxia'an xiti -ro: jwetniu -ro
\ge con: to hurt (colics, strong pain) stomach -1p pl pot: to use-1p pl
\tx yutnu -de, dakwido -ro te
\ge branch, stem -of pot: make it boil -1p pl and
\tx ko'o -ro ndu daa ndaa ora
\ge pot: to drink -1p pl agua de tiempo
\ft dolor de estómago: vamos a usar su tallo, lo vamos a hacer hervir y lo vamos a tomar como agua de tiempo.

ruta ua, ruta vidi:

\tx ngani xa ku'u
\ge com: get used to for, when con: to be ill/ to hurt in general
\tx xiti -ro: nani io dakwido -ro
\ge stomach -1p pl as con: to exist pot: make it boil -1p pl
\tx te ko'o -ro ndu daa ndaa ora .
\ge and pot: to drink -1p pl agua de tiempo
\ft poleo, marubio amargo, poleo menta blanca, marubio dulce: se acostumbró a tener dolor de estómago: como es (seco o fresco) lo vamos a hacer hervir y lo vamos a tomar como agua de tiempo.

manzaniya:

\tx xaxia'an xiti: dakwido -ro
\ge con: to hurt (colics, strong pain) stomach pot: make it boil -1p pl
\tx xi ndute, ko'o -ro ndena
\ge at/with/and water pot: to drink -1p pl until
\tx kuna'i, jwetniu -ro yutnu
\ge what pot: to be as planned pot: to use -1p pl branch, stem
\tx manzaniya
\ge sp: chamomile
\ft *manzanilla: dolor de estómago: vamos a hacer hervir con agua, vamos a tomar hasta que se corte, vamos a usar su tallo.*

\tx jwetniuro nda'a te dakwidoro te
\ge pot: to use -1p pl leaf and pot: make it boil -1p pl and
\tx ko'o -ro nde na ndva'a -ro.
\ge pot: to drink -1p pl until as pot: get better -1p pl
\ft *vamos a usar las hojas y hacemos hervir y vamos a tomar hasta que nos compongamos.*

yuku chudini:

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx kwido -ro nda'a yuku chudini
\ge pot: to boil -1p pl leaf ASTERACEAE Brickellia veronicifolia (Kunth) A. Gray
\tx te na ko'o -ro kɨu xaxia'an
\ge and as pot: to drink -1p pl day con: to hurt (colics, strong pain)
\tx xiti -ro. Nda'a kwi o yichi, ɨɨn taxa,
\ge stomach -1p pl leaf fresh or dry one cup
\tx idi ni vuelta.
\ge one, the first just sp: times
\ft *oreja de ratón: dolor de estómago: vamos a hervir las hojas de la oreja de ratón y vamos a tomar el día que duele nuestro estómago. las hojas frescas o secas, una taza una sola vez.*

\tx xaxia'an xiti -ro:
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx ka'nu -ro xi'i nde yutnu
\ge pot: to break -1p pl with which branch, stem
\tx dakwido -ro da ko'o -ro
\ge pot: make it boil -1p pl then pot: to drink -1p pl
\tx ɨɨn a uu datne ɨɨn a uu taxa
\ge one or two morning one or two cup
\ft *dolor de estómago: vamos a quebrar el tallo después vamos a tomar una a dos mañanas una a dos tazas.*

\tx xaxia'an xiti -ro: jwetniu -ro
\ge con: to hurt (colics, strong pain) stomach -1p pl pot: to use-1p pl
\tx yutnu -de, dakwido -ro te
\ge branch, stem -of pot: make it boil -1p pl and
\tx ko'o -ro ndu daa ndaa ora

\ge pot: to drink -1p pl agua de tiempo
\ft dolor de estómago: vamos a usar su tallo y lo vamos hacer hervir y lo vamos a tomar como agua de tiempo.

\tx xaxia'an xiti -ro, june'i:
\ge con: to hurt (colics, strong pain) stomach -1p pl diarrhea
\tx dakwido -ro vixi te
\ge pot: make it boil -1p pl leaf and
\tx ko'o -ro.
\ge pot: to drink -1p pl
\ft dolor de estómago, diarrea: vamos a hacer hervir las hojas y vamos a tomar.

Ku'u tachiro; Tachi; tachi u'u

Alkamfor:

\tx alkamfor: tachi u'u: ndiko vixi
\ge camphor mal aire pot: to grind leaf
\tx alkamfor te ruda xi aju, xi alkojol
\ge camphor and ruda at/with/and sp: garlic at/with/and sp: alchohol **\tx te kuchi -ro uni vuelta**
\ge and pot: to rub -1p pl three sp: times
\tx xa tatna -ro tachi u'u
\ge for, when medicine -1p pl mal aire
\ft alcanfor: mal aire: se muelen la hoja de alcanfor y ruda con ajo, con alcohol y nos frotamos tres veces para curar el mal aire.

tnuta yuxi:

\tx xa tachi u'u xa kuu tatna kɨtɨ -ro:
\ge for, when mal aire for, when con: to be medicine animal -1p pl
\tx nda'a yutnu kani -ro ko'o
\ge leaf branch, stem pot: to hit -1p pl pot: to drink
\tx kɨtɨ, dakee daxi -ro nuu ndute
\ge animal pot: put in pot: to soak -1p pl in, on, in front of water
\tx nda'a yutnu, tɨtnɨ vuelta
\ge leaf branch, stem several sp: times
\ft chamizo blanco: para mal aire o es medicina para nuestros animales: vamos a pegar con el tallo con hoja o lo va tomar el animal, lo vamos a serenar, algunas veces.

iñu leu:

\tx xa ku tatna -ro tachi u'u:
\ge for, when pot: to be medicine -1p pl mal aire
tnu'u -ro iñu leu
pot: pull out of the soil -1p pl PAPAVERACEAE Argemone sp.
\tx kani -ro yata -ro xi alkojol.

\ge pot: to hit -1p pl back -1p pl at/with/and sp: alchohol
Idi ni a uu vuelta
one, the first just or two sp: times
\ft chicalote: para curar mal aire: vamos a agarrar el chicalote del suelo, vamos a pegar nuestra espalda con alcohol. solamente uno o dos veces.

iñu kɨu:

\tx tachi u'u: jwetniu -ro iñu kɨu
\ge mal aire pot: to use -1p pl APIACEAE Eryngium montanum J.M.Coult. & Rose
\tx xa kuu tachi -ro, kani -ro
\ge for, when con: to be wind/air -1p pl pot: to hit -1p pl
\tx yata -ro, dɨkɨ -ro xi alkojol chi
\ge back -1p pl head -1p pl at/with/and sp: alchohol because
\tx kuu tachi -ro. Na tuu va'a nga kɨu kuu
\ge con: to be wind/air -1p pl what con: to be good just day con:to be
\tx tatna -ro. Xetniu -r xa tachi -da.
\ge medicine -1p pl con: to use -1p sg fam for, when wind/air -1p sg res
\ft hierba de sapo: mal aire: vamos a usar hierba de sapo para el aire, vamos a pegar nuestra espalda, cabeza con alcohol porque tenemos aire. es bueno solo el día como medicina. lo estoy usando cuando tengo aire.

ita te'u yuku:

\tx tachi u'u: naku'a -ro
\ge mal aire to cleanse -1p pl
\ft dalia: mal aire: nos vamos a limpiar

tnu yuku ñama:

\tx tnu yuku ñama:
\ge LOGANIACEAE Buddleja cf. crotonoides A. Gray, BUDDLEJACEAE Buddleja cordata Kunth
\tx xa kine'i tachi: naku'a -r
\ge for, when pot: remove it wind/air pot: to cleanse -1p sg fam
\tx meero xi alkojol, nde
\ge we at/with/and sp: alchohol until
\tx na ndva'a -ro.
\ge as pot: get better -1p pl
\ft lengua de vaca: para quitar aire: voy a limpiar nosotros con alcohol, hasta nos compongamos.

tnu de'ñu:

\tx ku'u tachi -ro: tnu de'ñu
\ge con: to be ill/ to hurt in general wind/air -1p pl CUPRESSACEAE Juniperus flaccida Schltdl.
\tx nu ku'u tachir
\ge if con: to be ill/ to hurt in general wind/air -1p sg fam
\tx kani -r ñɨɨ -r

\ge pot: to hit -1p sg fam body -1p sg fam
\tx tnu de'ñu. Yutnu
\ge CUPRESSACEAE Juniperus flaccida Schltdl. branch, stem
\tx kwechi ñani ñɨɨ -ro
\ge small plural pot: to be hit body -1p pl
\ft enebro: tener aire: enebro si tengo aire, voy a pegar mi cuerpo con enebro, una rama chica, para pegar nuestro cuerpo.

\tx tachi u'u: xa kani -ro ñɨɨ -ro.
\ge mal aire for, when pot: to hit -1p pl body -1p pl
\tx Kani -ro ndantu'u ñɨɨ -ro.
\ge pot: to hit -1p pl the whole body -1p pl
\tx Ka'nu -ro nda'i xi alkojol.
\ge pot: to break -1p pl its leaves at/with/and sp: alchohol
\tx Idi ni a uu vuelta
\ge one, the first just or two sp: times
\ft mal aire: vamos a pegar nuestro cuerpo. vamos a pegar todo el cuerpo. vamos a quebrar sus hojas con alcohol.solamente una o dos veces.

\tx tachi u'u: kani -ro yata -ro, xe'e -ro
\ge mal aire pot: to hit -1p pl back -1p pl foot -1p pl
\tx xi alkojol uni vuelta te
\ge at/with/and sp: alchohol three sp: times and
\tx dakwido -ro te ko'o -ro ɨɨn taxa
\ge pot: make it boil -1p pl and pot: to drink -1p pl one cup
\tx xa io krudu nuu kani
\ge for, when con: to exist sp: raw on, place pot: to hit
\ft mal aire: vamos a pegar nuestra espalda, pie con alcohol tres veces y vamos a hacer hervir y vamos a tomar una taza cuando se pega el lugar (afectado con una rama) cruda.

Ku'u yataro; Tna u'uro yataro; Xaxia'an yataro

yuku kawa:

\tx kɨ'ɨ -ro taxna'a -ro nda'a
\ge pot: to go -1p pl pot: to bring together -1p pl leaf
\tx kwechi yuku kawa datete -ro
\ge small plural hierba de coyote pot: to heat -1p pl
\tx nuu ñu'u, jantu -ro xiti -ro
\ge in, on, in front of fire to place -1p pl stomach -1p pl
\tx yata ka'a -ro
\ge back cadera -1p pl
\ft hierba de coyote: vamos a juntar las hojas pequeñas de hierba de coyote, lo calentamos en la lumbre, lo ponemos en el estómago, la espalda, nuestra cadera) se juntan las hojas frescas, y se calientan en el carbón y se las ocupa para caldear el lugar afectado.

tutitnu:

\tx xaxia'an yata -ro, xiti -ro,

\ge con: to hurt (colics, strong pain) back -1p pl stomach -1p pl
\tx nda'a -ro: jwetniu -ro nda'a, nu
\ge hand -1p pl pot: to use -1p pl leaf if
\tx xaxia'an yata -ro,
\ge con: to hurt (colics, strong pain) back -1p pl

\tx xiti -ro, nda'a -ro,
\ge stomach -1p pl hand -1p pl
\tx calentar la hoja en el comal
\ge sp: to heat the leaf in the comal
\tx te tenee -ro nu taka xaxia'an.
\ge and pot: to stick -1p pl if pot: to collect con: to hurt (colics, strong pain)
ft hierba loca: dolor de espalda, estómago, mano: vamos a usar las hojas si tenemos dolor de espalda, estómago, mano. calentamos la hoja en el comal y la pegamos, lo vamos a juntar cuando duele.

yuku kweyido, yuku dolor:

\tx yuku kweyido, yuku dolor: xaxia'an
\ge hierba de dolor con: to hurt (colics, strong pain)
\tx yata -ro, yɨkɨna'a -ro: jwetniu -ro
\ge back -1p pl ribs -1p pl pot: to use -1p pl
\tx ña'u -i. Tiñu ña'u -i te tenee -ro nuu
\ge tuber -its foam tuber -its and pot: to stick -1p pl on, place
\tx xaxia'an uni vuelta.
\ge con: to hurt (colics, strong pain) three sp: times
ft hierba de dolor: dolor de espalda, costillas: usamos su camote. espuma de su camote ponemos donde duele tres veces.

ku'u yɨkɨ xitiro; Xaxia'an yɨkɨ xitiro

ndewa:

\tx ndewa: xa kani -ro xe'e -ro,
\ge chichicaxtle for, when pot: to hit -1p pl foot -1p pl
\tx nda'a -ro yɨkɨ xiti -ro: kanu -ro
\ge hand -1p pl knee -1p pl pot: to break into pieces -1p pl
\tx yutnu tɨtnɨ vuelta, di'naka yojo -ro
\ge branch, stem several sp: times firsly pot: to rub -1p pl
\tx alkojol
\ge sp: alchohol
ft chichicaxtle: para que vamos a pegar, nuestros pies, manos, rodillas. vamos a quebrar en pedazos su rama algunas veces, primero vamos a frotar con alcohol.

yuku kidi:

\tx ku'u yɨkɨ xiti -ro:
\ge to be ill/ to hurt in general knee -1p pl
taxna'a -ro yuku kidi.
pot: to bring together -1p pl ASTERACEAE Gymosperma glutinosum (Spreng.) Less

\tx Tenee -ro xe'e -ro te duku -ro
\ge pot: to stick -1p pl foot -1p pl and pot: to tie -1p pl
\tx xi alkojol uni kɨu vuelta,
\ge at/with/and sp: alchohol three day sp: times
\tx nde na ndva'a
\ge until as pot: get better
\ft escobilla: dolor de rodilla: vamos a recoger escobilla. vamos a pegar en nuestro pie y amarramos con alcohol 3 días una vez, hasta que se componga.

ku'u yoo; Nyee nɨñɨ yooña

du'a cabayu:

\tx du'a cabayu: du'a cabayu tatna
\ge EQUISETACEAE Equisetum sp. EQUISETACEAE Equisetum sp. medicine
ñadɨ'ɨ xa ora kaa nyee nɨñɨ yoo ña:
woman for, when when hour com: to arrive blood month she
\tx du'a cabayu xija kuu tatna ñadɨ'ɨ
\ge EQUISETACEAE Equisetum sp. that con: to be medicine woman
\tx xa ora kaa nyee nɨñɨ yoo ña, nu ña
\ge for, when when hour com: to arrive blood month she if no
\tx kwini nɨñɨ xa kɨ ndɨ'ɨ
\ge con: to want blood for, when will go (away) con: be finished
\tx kuu xa kaa xi'i ña yuku ija.
\ge con: to be for, when hour con: to drink she plant that
\tx Ka'nu -ro yutnu luchi te
\ge pot: to break -1p pl branch, stem small singular and
\tx dakwido -ro ndaa te ko'o -ro
\ge pot: make it boil -1p pl all and pot: to drink -1p pl
\tx ɨɨn a uu datne ɨɨn taxa. Xija kuu
\ge one or two morning one cup that con: to be
\tx ndute ko'o ña. ɨɨn a uu kɨu
\ge water pot: to drink she one or two day
\ft cola de caballo: cola de caballo es medicina de mujer a la hora que llegó la sangre de su mes: este cola de caballo es medicina de mujer a la hora que llegue la sangre de su mes, si no quiere sangre para que se va y se termina esta planta es lo que toma a la hora. Vamos a cortar una rama pequeña y vamos a hacer hervir todo y vamos a a tomar una taza una a dos mañanas. Esta es el agua que ella va tomar. uno o dos días.

Yoo ngu

yuku orejano:

\tx yoo nguu: yuku orejano xetniu -ro na
\ge month com: to be orégano con: to use -1p pl as
\tx kuña'a -ro ñadɨ'ɨ xa ña tuu
\ge pot: to give -1p pl woman for, when no con: to be
\tx yoo -i nguu. Uni vuelta na
\ge month -its com: to be three sp: times as
\tx kuña'a -ro ɨɨn taxa datne datne.

\ge pot: to give -1p pl one cup morning morning
\ft orégano: pasó la Menstruación (menopausia): usamos orégano para que lo vamos a dar a la mujer cuando ya no menstrua. Tres veces vamos a dar una taza temprano por la mañana.

Kwedayu

ita bombil:

\tx ita bombil: **kwedayu:**
\ge NYCTAGINACEAE Bougainvillea spectabilis Willd. cough
\tx dakwido -ro ita te ko'o -ro
\ge pot: make it boil -1p pl flower and pot: to drink -1p pl
\ft bugambilia: gripe: hervimos la flor y la tomamos

tnu nde'a kuxi:

\tx kwedayu: jwetniu -ro nda'i, dakwido -ro
\ge cough pot: to use -1p pl its leaves pot: make it boil -1p pl
\tx te ko'o -ro
\ge and pot: to drink -1p pl
\ft capulinar: gripe: usamos sus hojas, hervimos y tomamos

yuku kidi:

\tx kwedayu,: nakwido nda'a
\ge cough pot: boil for a long time leaf
\tx yuku kidi da te
\ge ASTERACEAE Gymosperma glutinosum (Spreng.) Less then and
\tx jandodo -ro ɨɨn kɨdɨ luchi te
\ge pot: put on -1p pl one pot small singular and
\tx ko'o -ro na tna'a -ro kwedayu ɨɨn
\ge pot: to drink -1p pl as con: struggle -1p pl cough one
\tx taxa ɨɨn datne
\ge cup one morning
\ft escobilla: gripe: se hierve un tiempo largo las hojas de escobilla después los vamos a echar en una olla pequeña y tomamos cuando tenemos gripe una taza en la mañana.

sp: eucalipto:

\tx kwedayu: meeni nui xa yute
\ge cough only its ends for, when tender
\tx dakwido -ro nuu
\ge pot: make it boil -1p pl in, on, in front of
\tx kɨdɨ te ko'o -ro na ndva'a
\ge pot and pot: to drink -1p pl as pot: get better
\ft sp: eucalipto: gripe: solamente sus puntas verdes vamos hacer hervir en una olla y vamos tomar como se componga.

kwedayu tnuu; Toz (sp) kroniko (sp)

yuku pasma:

\tx yuku pasma: kwedayu tnuu: kwido -ro
\ge PRIMULACEAE Anagalis arvensis whooping cough pot: to boil -1p pl
\tx nda'a yuku pasma te kuña'a -ro
\ge leaf PRIMULACEAE Anagalis arvensis and pot: to give -1p pl
\tx ndute yuku na ko'o ñayiw na
\ge water plant as pot: to drink human being what
\tx tna'i xi kwe'e. Na kuña'a
\ge struggles at/with/and disease what pot: to give
\tx -ro uni vuelta.
\ge -1p pl three sp: times
\ft hierba de pasma: toz ferina: hervimos las hojas de la hierba de pasma y damos el agua de hierba tres veces a tomar a la persona que tiene esta enfermedad. lo vamos a dar tres veces.

ita inu:

\tx kwedayu tnuu: dakwido -ro ta
\ge whooping cough pot: make it boil -1p pl it flower
\tx yutnu -de te ko'o -ro
\ge branch, stem -of and pot: to drink -1p pl
\tx nde na ngokwii
\ge until as pot: go away
\ft flor de cerrillo: toz ferina: vamos hacer hervir su flor y tallo y vamos a tomar hasta que se quita.

kwe'e idi iñu

te'e nduyu:

\tx te'e nduyu: kwe'e idi iñu: te'e nduyu xija kuu
\ge chilacayote espinilla chilacayote that con: to be
\tx tatna -ro xa tna'a -ro kwe'e idi iñu
\ge medicine -1p pl for, when con: struggle -1p pl espinilla
\tx te nanda kuu tatna -ro
\ge and how con: to be medicine -1p pl
\tx ku'u -ro ñɨɨ -ro uni datne ɨɨn tuu.
\ge pot:to rub -1p pl body -1p pl three morning one con: to be
\tx Jwetniu -ro nda'a te'e
\ge pot: to use -1p pl leaf abbrev. chilacayote
\ft chilacayote: espinilla: este chilacayote es nuestra medicina cuando tenemos espinilla y como es nuestra medicina vamos a frotar nuestros cuerpos tres mañanas una vez. usamos la hoja de chilacayote.

\tx kwe'e idi iñu: na taka -ro nda'a -i
\ge espinilla as pot: to collect -1p pl leaf -its
\tx te ku'u -ro ndondoo
\ge and pot:to rub -1p pl everything
\tx nuu tuchi. Meeni. Uni datne

\ge on, place throbbing only three morning
\ft espinilla: vamos a colectar sus hojas y vamos a frotar todo donde hay latido. solo. tres mañanas.

kwe'e ndɨ'i

tnutka'a:

\tx tnutka'a: **kwe'e ndɨ'i:**
\ge VISCACEAE Phoradendron reichenbachianum Oliv. chicken pox
\tx dakwido -ro te kuchi -ro nuu
\ge pot: make it boil -1p pl and pot: to rub -1p pl on, place
\tx tna'a -ro kwe'e ndɨ'i.
\ge con: struggle -1p pl chicken pox
\ft injerto: la varicela: vamos a hacer hervir y vamos a frotar donde padecemos de varicela.

kwe’e nduchinuur

iñu leu:

\tx iñu leu: **Dɨku dakee -ro nduchinuu -ro**
\ge PAPAVERACEAE Argemone sp. milk pot: put in -1p pl eye -1p pl
\tx idi ni vuelta
\ge one, the first just sp: times
\ft chicalote: vamos a echar su leche en nuestro ojo solamente una vez.

Kwe'e yuxi; Nyuxi; Yuxi

tnu de'ñu

\tx naku'a -ro: tnu de'ñu
\ge pot: to cleanse -1p pl CUPRESSACEAE Juniperus flaccida Schltdl.
\tx naku'a -ro dichi kwechi ñɨɨ xa
\ge pot: to cleanse -1p pl children body for, when
\tx yuxi. Ka'nde -ro uxa yutnu kwi
\ge mal de ojo pot: will cut -1p pl seven branch, stem fresh
\tx xi alkojol te naku'a -ro
\ge at/with/and sp: alchohol and pot: to cleanse -1p pl
\tx idi ni vuelta. Nax nuu kwini
\ge one, the first just sp: times what face con: to want
\ft enebro: limpiamos: limpiamos con enebro los cuerpos de niños que tienen mal de ojo. vamos a cortar siete ramas frescas y vamos a limpiar con alcohol solamente una vez su cara.

Tnutayuxi:

\tx tnutayuxi:
\ge ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx yuxi, kwe'e yuxi: Tnutayuxi
\ge mal de ojo disease mal de ojo ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx xe tna'a -ro xa ka
\ge goes (and returns) con: struggle -1p pl for, when plural
\tx naku'a ñayiw da’ya ora yuxi
\ge pot: to cleanse human being child when mal de ojo
\ft chamizo blanco: mal de ojo: chamizo blanco lo usamos para limpiar la gente y los niños a la hora de mal de ojo.

\tx yuxi: xa vixi kuu tayuxi,
\ge mal de ojo for, when leaf to be ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx ngee -ro tayuxi
\ge com: to gather -1p pl ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx te kani -ro ñɨɨ -ro uni a koon vuelta.
\ge and pot: to hit -1p pl body -1p pl three or four sp: times
\tx Jwetniuro tnutayuxi
\ge pot: to use -1p pl ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx tachi nga ña'a
\ge wind/air just known object
\ft mal de ojo: se usa la hoja de chamizo blanco, fuimos a recolectar chamizo blanco y vamos a pegar nuestro cuerpo tres a cuatro veces. Vamos a usar chamizo blanco solo cuando tenemos aire.

\tx kwe'e yuxi: naku'a -ro da’ya
\ge disease mal de ojo pot: to cleanse -1p pl child
\tx kwechi kwe'e yuxi. Jwetniu -ro
\ge small plural disease mal de ojo pot: to use -1p pl
\tx yutnu -de xi alkojol, uni vuelta
\ge branch, stem -of at/with/and sp: alchohol three sp: times
\ft mal de ojo: limpiamos los niños pequeños con mal de ojo. Usamos las ramas con alcohol, tres veces

\tx kwe'e yuxi: xa naku'a da’ya kwechi
\ge disease mal de ojo for, when pot: to cleanse child small plural **\tx kwe'e yuxi, kodo -ro dɨkɨ -ro**
\ge disease mal de ojo pot: to sweep -1p pl head -1p pl
\ft para limpiar los niños pequeños con mal de ojo, barremos nuestras cabezas

\tx yuxi: xa naku'a -ro dichi kwechi
\ge mal de ojo for, when pot: to cleanse -1p pl children
\tx ora kaa yuxi. Jwetniu -ro nda'a -tnu,
\ge when hour mal de ojo pot: to use -1p pl leaf -tree
kani -ro xi'i nda'a kwechi -tnu
pot: to hit -1p pl with leaf small plural -tree
\tx ɨɨn a uu vuelta. Naku'a -ro
\ge one or two sp: times pot: to cleanse -1p pl

\tx ndɨu chuun xi'i xaku alkojol
\ge egg, testicles chicken with few sp: alchohol
\ft ojo: limpiamos los niños pequeños la hora cuando hay ojo. Vamos a usar las hojas del árbol, vamos a pegar con las hojas chiquitas del árbol una o dos veces. Vamos a limpiar (con) el huevo de gallina con un poco alcohol.

\tx yuxi: yuku ija kida -i nu ñayiw
\ge mal de ojo plant that con: to do/make -its if human being
\tx xa kaku -i, xa ka
\ge about to, already pot: to be born -its for, when plural
\tx nyuxi, xa xaxia'an
\ge com: to have mal de ojo for, when con: to hurt (colics, strong pain)
\tx dɨkɨ, nda'a ro, xe'e -ro,
\ge head hand -1p pl foot -1p pl
\tx nditu'u -ro naku'a -ro
\ge all -1p pl pot: to cleanse -1p pl
\ft ojo: esta hierba usa la gente cuando nazca, cuando hay ojo, para dolor de cabeza, nuestro mano, nuestro pie, todo limpiamos.

\tx ña ka'a -ro:
\ge no con: to speak -1p pl
\tx tnutayuxi
\ge ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx yuxi -ro te ndɨu chuun naku'a -ro.
\ge mal de ojo -1p pl and egg, testicles chicken pot: to cleanse-1p pl
\tx Tnutayuxi
\ge ASTERACEAE Barkleyanthus salicifolius (Kunth) H. Robinson & Brettell
\tx naku'a -ro meero chi yuxi -ro,
\ge pot: to cleanse -1p pl we because mal de ojo -1p pl
\tx ka'nde -ro uxa yutnu kwi
\ge pot: will cut -1p pl seven branch, stem fresh
\tx xi alkojol. Kɨu uu vuelta
\ge at/with/and sp: alchohol day two sp: times
\ft no hablamos: chamizo blanco cuando tenemos ojo y vamos a limpiar con el huevo de gallina. chamizo blanco vamos a limpiar nosotros porque tenemos ojo, vamos a cortar siete ramas frescas con alcohol. dos veces al día.

kwendu ini

yuku yaa:

\tx yuku yaa: kwendu ini:
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. tantrum
\tx ndiko -ro yutnu -de kwendu ini datne
\ge pot: to grind -1p pl branch, stem -of tantrum morning
\tx daxi -ro xi kwe'e ndute da

\ge pot: to soak -1p pl at/with/and enough, many water then
\tx kuchi ñɨɨ -ro uni vuelta nde na ngokwii
\ge pot: to bathe body -1p pl three sp: times until as pot: go away
\ft espule: berrinche: vamos a moler las ramas (para) berrinche en la mañana los serenamos con mucha agua después bañamos nuestro cuerpo tres veces hasta que se quita.

Kwe'nu idiro

tndu'u:

\tx Kwe'nu idi -ro: ndiko -ro ña'u te
\ge pot: grow hair -1p pl pot: to grind -1p pl tuber and
\tx chindaxiro nuu ndute te nakini
\ge pot: to soak -1p pl in, on, in front of water and pot: to wash
\tx -ro te kodo -ro dɨkɨ -ro kwe'nu idi -ro
\ge -1p pl and pot: pour -1p pl head -1p pl pot: grow hair -1p pl
\ft amole: para que crezcan nuestros cabellos: molemos el camote y remojamos en agua y lavamos y echamos en nuestras cabezas para que crezcan nuestros cabellos.

Kwiña

Yuku pasma:

\tx yuku pasma: tachi u'u, kwiña:
\ge PRIMULACEAE Anagalis arvensis mal aire swelling
\tx kuchiro nanu kwiña ñɨɨ -ro.
\ge reduce swelling body -1p pl
\tx Dakwido -ro yutnu -de
\ge pot: make it boil -1p pl branch, stem -of
\ft hierba de pasma: mal aire, hinchazón: vamos a bajar hinchazón de nuestro cuerpo. vamos a hacer hervir su tallo.

\tx kwiña: kwido da te xi'i da'ma te
\ge swelling pot: to boil then and with clothes and
\tx tau -ro nuu xaxia'an,
\ge pot: make a poultice -1p pl on, place con: to hurt (colics, strong pain)
\tx tenee -ro nda'a yuku pasma
\ge pot: to stick -1p pl leaf PRIMULACEAE Anagalis arvensis
\ft hinchazón: se hierve y se caldea con un trapo donde duele, pegamos la hoja de la hierba de pasma.

lavado ñadɨ'ɨ xa nguu ngɨu

tnu ñuu kwe'e:

\tx lavado ñadɨ'ɨ xa nguu ngɨu: tnu ñuu kwe'e:
\ge sp: wash woman for, when com: to be com: enter red oak
\tx tnu ñuu kwe'e chakwa ka'nde -ro, dakwido -ro
\ge red oak treebark pot: will cut -1p pl pot: make it boil -1p pl
\tx nuu ndute da kada -ro
\ge in, on, in front of water then pot: to make/to do -1p pl
\tx lavado ñadɨ'ɨ xa nguu ngɨu
\ge red oak: sp:wash woman for, when com: to be com: enter
\ft lavado mujer bajaron los ovarios, con manguera se lava al dentro

na kidiro; ñayiw ña kidi

tnu ndoko:

\tx tnu ndoko: ñayiw ña kidi: xi ñu'u
\ge sapota human being no pot: to sleep at/with/and con: to have
\tx xa na ko'o ñayiw ña kidi.
\ge for, when as pot: to drink human being no pot: to sleep
\tx Jwetniu -ro vixi.
\ge pot: to use -1p pl leaf
\ft zapotal: la persona no duerme: para tener cuando va tomar la persona que no duerme. Vamos a usar las hojas.

tnu ndoko lingu:

\tx tnu ndoko lingu: na kidi -ro:
\ge RUTACEAE Casimiroa edulis Llave & Lex. as pot: to sleep -1p pl
\tx jwetniu -ro nda'a tnu ndoko lingu
\ge pot: to use -1p pl leaf RUTACEAE Casimiroa edulis Llave & Lex.
\tx te dakwido -ro te ko'o -ro ɨɨn taxa
\ge and pot: make it boil -1p pl and pot: to drink -1p pl one cup
\tx nde datne te xa kwa'a na ndva'a.
\ge until morning and for, when pot: to be able as pot: get better
\ft zapotal blanco: para que dormimos: vamos a usar las hojas de zapotal blanco y vamos hacer hervir y vamos a tomar una taza cada mañana para poder componerse.

ndɨ'i; ndɨ'ɨ i; ndɨ'jɨ; tna'aro ndɨ'ɨ i

yuku yaa:

\tx tna'a -ro ndɨ'ɨ i: uni datne

\ge con: struggle -1p pl pimples three morning
\tx ndiko -ro te kuchi -ro.
\ge pot: to grind -1p pl and pot: to rub -1p pl
\tx Jwetniu -ro nda'i yɨ'ɨ.
\ge pot: to use -1p pl its leaves tender
\ft espule: cuando tenemos granos: vamos a moler por tres mañanas y frotar. Vamos a usar sus hojas tiernas.

ndɨ'i duju; ndɨ'i dujuro xi ndɨ'i yu'u; ndɨ'i yu'uro

tnutka'a:

\tx tnutka'a: xa
\ge VISCACEAE Phoradendron reichenbachianum Oliv. for, when
\tx io ndɨ'i yu'u -ro, duju -ro:
\ge con: to exist pimples in the mouth -1p pl throat -1p pl
\tx dakwidoro nda'i, chiyu'u -ro
\ge pot: make it boil -1p pl its leaves pot: to rinse -1p pl
\tx ndute yuku uu a uni vuelta.
\ge water plant two or three sp: times
\ft injerto: cuando hay granos en la boca, en la garganta, vamos a hacer hervir sus hojas y enjuagamos dos o tres veces con el agua de hierba.

ita daa:

\tx xa io ndɨ'i yu'u -ro,
\ge for, when con: to exist pimples in the mouth -1p pl
\tx duju -ro: dakwido -ro nda'i,
\ge throat -1p pl pot: make it boil -1p pl its leaves
\tx chiyu'uro ndute yuku uu a uni vuelta.
\ge pot: to rinse agua plant two or three sp: times
\ft siempreviva: cuando hay granos en la boca, en la garganta, vamos a hacer hervir sus hojas y enjuagamos dos o tres veces con el agua de hierba.

ndɨ'ɨ i yaa; ndɨ'i yaa

yuku yaa:

\tx yuku yaa: ndɨ'i yaa:
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. measles
\tx jwetniu -ro nda'a yɨ'ɨ, ndiko -ro
\ge pot: to use -1p pl leaf tender pot: to grind -1p pl
\tx te kuchi -ro da'ya kwechi uni vuelta.
\ge and pot: to rub -1p pl child small plural three sp: times
\ft espule: sarampión: usamos las hojas frescas, molemos y bañamos los ninos pequeños tres veces.

\tx ndɨ'i yaa: ngee -ro yuku yaa

\ge measles com: to gather -1p pl ASTERACEAE Pinaropappus roseus (Less.) Less.
\tx ndiko -ro te kuchi -ro ndantu'u
\ge pot: to grind -1p pl and pot: to bathe -1p pl the whole
\tx ñɨɨ -ro uni vuelta ora ndɨ'i yaa
\ge body -1p pl three sp: times when measles
\ft recogimos espule, vamos a moler y frotar todo nuestro cuerpo tres veces a la hora de sarampión.

\tx xa ndɨ'i yaa: ndiko -ro nda'a
\ge for, when measles pot: to grind -1p pl leaf
\tx yuku yaa te ku'u -ro
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. and pot:to rub -1p pl **\tx ñɨɨ -ro uni datne te ko'o -ro ndute yuku**
\ge body -1p pl three morning and pot: to drink -1p pl water plant
\ft sarampión: molemos la hoja y frotamos nuestro cuerpo 3 mañanas y tomamos el agua de la hierba.

\tx ndɨ'i yaa: na xa xetniu -ro
\ge measles what for, when con: to use -1p pl
\tx yuku yaa xa
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. for, when
\tx tna'a -ro ndɨ'i yaa te kuchi -ro te
\ge con: struggle -1p pl measles and pot: to rub -1p pl and
\tx ko'o -ro ɨɨn tkadɨ luchi.
\ge pot: to drink -1p pl one spoon small singular
\tx Ndiko -ro ndaa yuku yaa
\ge pot: to grind -1p pl all ASTERACEAE Pinaropappus roseus (Less.) Less.
\tx xi'i nde yo'i nuu yodo. Dakeeni'ni -ro.
\ge with until its root in, on, in front of metate pot: to strain-1p pl **\tx Uni datne xetniu -ro**
\ge three morning con: to use -1p pl
\ft sarampión: usamos espule cuando tenemos sarampión y vamos a tallar y tomar una cuchara pequeña. Vamos a moler toda la planta de espule con su raíz en el metate. Vamos a colar. Lo estamos usando tres mañanas.

\tx ndɨ'i yaa: ndiko -ro yuku yaa
\ge measles pot: to grind -1p pl ASTERACEAE Pinaropappus roseus (Less.) Less.
\tx te kuchi -ro nu tna'a -ro ndɨ'i yaa.
\ge and pot: to rub -1p pl if con: struggle -1p pl measles
\tx Uni o koon datne. Jwetniu -ro nde nda'i
\ge three or four morning pot: to use -1p pl until its leaves
\tx xi yo'i
\ge at/with/and its root
\ft sarampión: vamos a moler espule y vamos a frotar si tenemos sarampión. tres o cuatro mañanas. vamos ausar sus hojas hasta la raíz.

\tx yuku yaa jwetniu -ro
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. pot: to use -1p pl
\tx kɨu kuu ka'u -ro xi
\ge day con: to be con: to count/to read -1p pl at/with/and
\tx ndɨ'i yaa. Kuchi -ro xi ndute
\ge measles pot: to rub -1p pl at/with/and water
\tx yuku yaa uni vuelta
\ge ASTERACEAE Pinaropappus roseus (Less.) Less. three sp: times
\tx te ko'o -ro ndute.
\ge and pot: to drink -1p pl water
\ft Vamos a usar espule el día que estamos estudiando con sarampión. Vamos a frotar con el agua del espule tres veces y vamos a tomar el agua.

\tx ndɨ'i yaa: jwetniu -ro nda'a yɨ'ɨ, ndiko -ro
\ge measles pot: to use -1p pl leaf tender pot: to grind -1p pl **\tx te ko'o -ro**
\ge and pot: to drink -1p pl
\tx te kuchi -ro da'ya kwechi uni vuelta.
\ge and pot: to rub -1p pl child small plural three sp: times
\ft sarampión: vamos a usar las hojas tiernas, vamos a moler y tomar y frotar los niños tres veces.

ndɨ'i te'yu

tnu nii:

\tx tnu nii: ndɨ'i te'yu: dakwido -ro
\ge BETULACEAE Alnus sp. smallpox pot: make it boil -1p pl
\tx nda'a te nakini -ro nde na ndva'a
\ge leaf and pot: to wash -1p pl until as pot: get better
\ft elite: viruela: vamos a hacer hervir las hojas y vamos a lavar hasta que se componga.

ñɨ'ɨ

tnu tnu'a, yuku kidi:

\tx tnu tnu'a: ñɨ'ɨ:
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult. *temazcal* (sweatbath)
\tx tnu tnu'a nuu
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult. end
\tx xetniu -ro xa kɨ'ɨ -ro xitna
\ge con: to use -1p pl for, when pot: to go -1p pl grandmother
\tx ñɨ'ɨ, tnu tnu'a
\ge *temazcal* (sweatbath) CONVOLVULACEAE Ipomoea murucoides Roem. & Schult.
\tx nda'a dandu'a -ro xi'i yuku kidi
\ge leaf pot: to boil a long time -1p pl with ASTERACEAE Gymosperma glutinosum (Spreng.) Less
\tx xe kuu ndute kɨu -ro ñɨ'ɨ

\ge goes (and returns) con: to be water pot: to enter -1p pl *temazcal* (sweatbath)
\ft casahuate, escobilla: temazcal: casahuate lo ocupamos cuando vamos a la reina temazcal, la hoja de casahuate la vamos a hervir un tiempo largo con escobilla para el agua cuando entramos el temazcal.

tnu tau, tnu kawa kwaa:

\tx ñɨ'ɨ: nda'a tnu tau
\ge *temazcal* (sweatbath) leaf ASTERACEAE Baccharis salicifolia (Ruiz & Pavón) Pers.
\tx xi tnu kawa kwaa
\ge at/with/and ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson
\tx dandu'a -ro te kɨu -ro
\ge pot: to boil a long time -1p pl and pot: to enter -1p pl
\tx xi'i ndute yuku ini
\ge with water herb inside
\ft chamizo del río, hierba de ángel: temazcal: las hojas de chamizo de río con hierba de ángel vamos a hervir a tiempo largo y entramos con el
agua de hierba.

tnu tau:

\tx ñɨ'ɨ: jwetniu -ro vixi
\ge *temazcal* (sweatbath) pot: to use -1p pl leaf
\tx tnu tau yute xe
\ge ASTERACEAE Baccharis salicifolia (Ruiz & Pavón) Pers. tender goes (and returns)
\tx kɨu -ro ñɨ'ɨ, kani -ro ñɨɨ-ro
\ge pot: to enter -1p pl *temazcal* (sweatbath) pot: to hit -1p pl body -1p pl
\ft chamizo del río: temazcal: usamos la hoja de chamizo del río tierna cuando entramos el temazcal, pegamos nuestros cuerpos.

\tx ñɨ'ɨ: ka'nde -ro nda'a kwechi
\ge *temazcal* (sweatbath) pot: will cut -1p pl leaf small plural
\tx te na duku -ro xa na kɨu -ro
\ge and what pot: to tie -1p pl for, when as pot: to enter -1p pl
\tx ñɨ'ɨ xa nadaka -ro
\ge *temazcal* (sweatbath) for, when pot: to hit with leafs -1p pl
\tx ñayiw ku'u
\ge human being con: to be ill/ to hurt in general
\ft temazcal: vamos a cortar las hojas pequeñas y las amarramos cuando vamos a entrar el temazcal cuando vamos a hojear la persona enferma.

tnu nduchi idu:

\tx tnu nduchi idu kida -ro
\ge SAPINDACEAE Dodonaea viscosa (L.) Jacq. con: to do/make -1p pl
\tx vixi xa kaa -ro ora kɨu -ro ñɨ'ɨ

\ge leaf for, when hour -1p pl when con: to enter -1p pl *temazcal* (sweatbath)
\ft gacho de venado: gacho de venado usamos las hojas a la hora que entramos el temazcal.

\tx jwetniu -ro yutnu xiti ñɨ'ɨ,
\ge pot: to use -1p pl branch, stem in, inside *temazcal* (sweatbath)
\tx kani -ro tnu nduchi idu.
\ge pot: to hit -1p pl SAPINDACEAE Dodonaea viscosa (L.) Jacq.
\tx nda'a tenee -ro yɨkɨ xiti
\ge leaf pot: to stick -1p pl knee
\ft usamos las ramas al dentro de temazcal, pegamos con gacho de venado. las hojas ponemos en la rodilla.

\tx nda'a kwechi -tnu xa kani -ro
\ge leaf small plural -tree for, when pot: to hit -1p pl
\tx xiti ñɨ'ɨ
\ge in, inside *temazcal* (sweatbath)
\ft las hojas pequeñas de árbol para pegar al dentro de temazcal

tnu ñuu:

\tx ñɨ'ɨ: ngee -ro tnu ñuu
\ge *temazcal* (sweatbath) com: to gather -1p pl encino capulincillo
\tx na kɨu -ro ñɨ'ɨ kani -ro
\ge as pot: to enter -1p pl *temazcal* (sweatbath) pot: to hit -1p pl
\tx nuu ñɨɨ -ro xi vixi
\ge on, place body -1p pl at/with/and leaf
\tx tnu ñuu
\ge encino capulincillo
\ft encino, capulincillo: temazcal: recogimos capulincillo para entrar el temazcal pegamos nuestros cuerpos con la hoja de capulincillo.

tnu de'ñu:

\tx ñɨ'ɨ: naku'a -ro xi
\ge *temazcal* (sweatbath) pot: to cleanse -1p pl at/with/and
\tx yutnu xiti ñɨ'ɨ
\ge branch, stem in, inside *temazcal* (sweatbath)
\ft enebro: temazcal: vamos a limpiar con la rama al dentro del temazcal.

yuku chudini

\tx nuu xaxia'an xiti -ro:
\ge on, place con: to hurt (colics, strong pain) stomach -1p pl
\tx jwetniu -ro nda'a yuku chudini
\ge pot: to use -1p pl leaf ASTERACEAE Brickellia veronicifolia (Kunth) A. Gray
\tx te dakwido -ro te ko'o -ro ɨɨn yaxi.
\ge and pot: make it boil -1p pl and pot: to drink -1p pl one jícara

\tx Jwetniu -ro yutnu kwido na kee -ro
\ge pot: to use -1p pl branch, stem pot: to boil as pot: to put in-1p pl
\tx yuu ndaka ñɨ'ɨ na kee yoko
\ge hot *temazcal* stones *temazcal* (sweatbath) as pot: come out vapor
\tx na ndva'a ñayiw ku'u.
\ge as pot: get better human being to be ill/ to hurt in general
\ft oreja de ratón: dolor de estómago: vamos a usar las hojas de oreja de ratón y vamos hacer hervir y vamos a tomar una jicara. vamos a usar su tallo, se hierve para que lo ponemos en las piedras calientes del temazcal para que salga vapor para que se componga la persona enferma.

Presión (sp)

tnu ndoko lingu:

\tx tnu ndoko lingu: presión:
\ge RUTACEAE Casimiroa edulis Llave & Lex. sp: bloodpressure
\tx vixi tnu ndoko lingu
\ge leaf RUTACEAE Casimiroa edulis Llave & Lex.
\tx xetniu -ro xa vichi kida kontrolar -i
\ge con: to use -1p pl for, when very con: to do/make sp: control -its
\tx presión na ko'o -ro té.
\ge sp: bloodpressure as pot: to drink -1p pl sp: tea
\ft zapotal blanco: presión arterial: usamos la hoja de zapotal blanco para controlar bien la presión arterial, como vamos a tomar el té.

Purga (sp)

ita nuni:

\tx ita nuni: ita nuni kada -ro purga dada
\ge ita nuni ita nuni pot: to make/to do -1p pl sp: purge then
\tx ndoo -i xiti -ro, kii kuu
\ge clean -its stomach -1p pl INC: will come con: to be
\tx xiti -ro. Pedasu chakwa -tnu, kwini -r
\ge in, inside -1p pl sp:piece treebark -tree con: to want -1p sg fam
\tx kada purga. Dandu'a -ro
\ge pot: to make/to do sp: purge pot: to boil a long time -1p pl
\tx -tnu te ko'o -ro idi ni vuelta
\ge -tree and pot: to drink -1p pl one, the first just sp: times
\ft ita nuni: ita nuni vamos a hacer purga después se limpia nuestro estómago, va venir lo que está al dentro. Queremos un pedazo de la

corteza del árbol para hacer purga. Vamos a hervir esto (clas árbol) un tiempo largo y vamos a tomar solamente una vez.

Tna u'uro; tna u'uro ñɨɨro; u'uro ñɨɨro; Xaxia'an; xaxia'an ñɨɨro; xaxia'anro ñɨɨro; xaxia'an dujuro

yuku pasma, yuku disipela:

\tx xaxia'an: kɨ'ɨ -ro ku
\ge con: to hurt (colics, strong pain) pot: to go -1p pl hab
\tx taxna'a -ro yuku disipela
\ge pot: to bring together -1p pl hierba de calavera, disípela, hierba de pasma
\tx te nuu xiyo ija chido -ro te na
\ge and in, on, in front of comal that pot: to put -1p pl and as
\tx tau -ro nuu xaxia'an,
\ge pot: to heat up -1p pl on, place con: to hurt (colics, strong pain)
\tx kada -ro uni vuelta:
\ge pot: to make/to do -1p pl three sp: times
\tx yuku pasma chi'o vixi nuu
\ge PRIMULACEAE Anagalis arvensis con: to cook leaf in, on, in front
\tx nu'u te tenee -ro, tau -ro,
\ge of fireplace, stove and pot: to stick -1p pl pot: to heat up -1p pl
\tx duku -ro xi da'ma nuu xaxia'an,
\ge pot: to tie -1p pl at/with/and clothes on, place con: to hurt (colics, strong pain)
\tx ntuku xaxia'an duju -ro.
\ge again, another con: to hurt (colics, strong pain) throat -1p pl
\ft hierba de calavera, disípela, hierba de pasma: dolor: vamos a ir habitualmente a juntar hierba de disípela y lo vamos a poner en el comal y vamos a caldear donde duele, vamos hacerlo tres veces. hervumos las hojas de hierba de pasma en la lumbre y los vamos a pegar, vamos a caldear, los vamos a amarrar con un trapo en el lugar que duele, también para dolor de garganta.

iñu leu:

\tx iñu leu: xaxia'an
\ge PAPAVERACEAE Argemone sp. con: to hurt (colics, strong pain)
\tx ñɨɨ -ro, ku'u tachi -ro:
\ge body -1p pl con: to be ill/ to hurt in general wind/air -1p pl
\tx nu xaxia'an ñɨɨ -r te
\ge if con: to hurt (colics, strong pain) body -1p sg fam and
\tx kani -r yuku ñɨɨ -r. Tnu'u
\ge pot: to hit -1p sg fam plant body -1p sg fam pot: pull out of the soil
\tx -ro iñu leu te ñani ñɨɨ -ro
\ge -1p pl PAPAVERACEAE Argemone sp. and pot: to be hit body -1p pl

\ft chicalote: duele nuestro cuerpo, estamos enfermo con aire: si duele mi cuerpo voy a pegar mi cuerpo con la hierba. Vamos a arrancar chicalote y se pega nuestros cuerpos.

ndewa tata:

\tx xa xaxia'an ñɨɨ -ro: nu
\ge for, when con: to hurt (colics, strong pain) body -1p pl if
\tx xa xaxia'an ñɨɨ -ro
\ge for, when con: to hurt (colics, strong pain) body -1p pl
\tx te ku'u -ro nda'a ndewa tata xi
\ge and pot:to rub -1p pl leaf chichicaxtle de casa at/with/and
\tx alkojol. ɨɨn a uu vuelta
\ge sp: alchohol one o two sp: times
\ft chichicaxtle del casa: cuando duelen nuestros cuerpos: si duelen nuestros cuerpos y vamos a frotar la hoja de chichicaxtle de casa con alcohol. una a dos veces.

tnu kawa:

\tx u'u -ro ñɨɨ -ro: tnu kawa
\ge pain -1p pl body -1p pl ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson
\tx dandu'a -ro te ku'u -ro
\ge pot: to boil a long time -1p pl and pot:to rub -1p pl
\tx ñɨ'ɨ ora otra u'u -ro ñɨɨ -ro
\ge *temazcal* (sweatbath) when sp: other pain -1p pl body -1p pl
\tx te kuna'i dolor de tna u'u -ro
\ge and pot: to be as planned sp: pain that pot: have pain -1p pl
\tx xe'e -ro a yata -ro.
\ge foot -1p pl or back -1p pl
\ft hierba de ángel: dolor del cuerpo: hierba de ángel vamos a hervir un tiempo largo y vamos a frotar en el temazcal la hora que duele nuestro cuerpo otra vez para que se corta el dolor que tenemos del pie y espalda.

\tx xaxia'an -ro ñɨɨ -ro:
\ge con: to hurt (colics, strong pain) -1p pl body -1p pl
\tx xiyo nuu nu'u te
\ge comal in, on, in front of fireplace, stove and
\tx tau -ro xa xaxia'an.
\ge pot: to heat up -1p pl for, when con: to hurt (colics, strong pain)
\tx Jwetniu -ro vixi
\ge pot: to use -1p pl leaf
\ft dolor del cuerpo: calentamos en el comal y caldeamos donde duele. usamos las hojas

\tx kani -ro
\ge pot: to hit -1p pl
\ft vamos a pegar

yau papalome:

\tx ndu'a -ro te xaxia'an
\ge con: to boil -1p pl and con: to hurt (colics, strong pain)
\tx ñɨɨ -ro: jwetniu -ro yau papalome kɨu
\ge body -1p pl pot: to use -1p pl agave papalome day
\tx ndu'a -ro te xaxia'an
\ge con: to boil -1p pl and con: to hurt (colics, strong pain)
\tx ñɨɨ -ro te ndata -ro yau te na xiyo
\ge body -1p pl and pot: to open -1p pl agave and as comal
\tx nuu ñu'u te i'ni na jandodo -ro
\ge in, on, in front of fire and hot as pot: put on -1p pl
\tx nuu xaxia'an. Uu a uni vuelta.
\ge on, place con: to hurt (colics, strong pain) two or three sp: times
\ft maguey papalome: lo hervimos para dolor del cuerpo: vamos a usar maguey papalome el día que lo estamos hirviendo y duele nuestro cuerpo y vamos a abrir el maguey en el comal en la lumbre y lo vamos a poner caliente en el lugar donde duele. dos a tres veces.

yau nduxa:

\tx ndu'a -ro te xaxia'an
\ge con: to boil -1p pl and con: to hurt (colics, strong pain)
\tx ñɨɨ -ro: jwetniu -ro yau nduxa kɨu
\ge body -1p pl pot: to use -1p pl maguey papalome day
\tx ndu'a -ro te xaxia'an
\ge con: to boil -1p pl and con: to hurt (colics, strong pain)
\tx ñɨɨ -ro te ndata -ro yau te na xiyo
\ge body -1p pl and pot: to open -1p pl agave and as comal
\tx nuu ñu'u te i'ni na jandodo -ro nuu
\ge in, on, in front of fire and hot as pot: put on -1p pl on, place
\tx xaxia'an. Uu a uni vuelta
\ge con: to hurt (colics, strong pain) two or three sp: times
\ft maguey papalome: hervimos cuando duele nuestro cuerpo: vamos a usar maguey papalome el día que lo hervimos y que duele nuestro cuerpo y vamos a abrir el maguey en el comal en la lumbre y caliente lo vamos a poner en el lugar que duele. dos o tres veces.

tnu de'ñu

\tx ñɨɨ -ro nu io tna u'u -ro:
\ge body -1p pl when con: to exist con: have pain -1p pl
\tx kwido -ro nuu tnu de'ñu
\ge pot: to boil -1p pl end CUPRESSACEAE Juniperus flaccida Schltdl.
\tx te kani -ro ñɨɨ -ro nu io tna u'u -ro
\ge and pot: to hit -1p pl body -1p pl if con: to exist con: have pain -1p pl
\ft enebro: nuestro cuerpo cuando tenemos dolor: vamos a hervir la punta de enebro y vamos a pegar nuestro cuerpo cuando tenemos dolor.

tnu kawa:

\tx tau -ro xiti -ro: tau -ro
\ge pot: to heat up -1p pl stomach -1p pl pot: to heat up -1p pl
\tx xiti -ro xi nda'a yutnu kawa.
\ge stomach -1p pl at/with/and leaf branch abbrev. ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson
\tx Na kadava'a -ro royo kwechi yutnu
\ge as pot: prepare -1p pl bundle small plural branch, stem
\tx kawa
\ge abbrev. ASTERACEAE Ageratina petiolaris (Mociño & Sessé ex DC.) R.M. King & H. Robinson
\tx te jandodo -ro nuu xiyo te na
\ge and pot: put on -1p pl in, on, in front of comal and as
\tx ku i'ni. Na koo i'ni te na jandodo -ro
\ge pot: to be hot as tamal hot and as pot: put on -1p pl
\tx nuu xiti -ro. Uni kɨu na kada -ro,
\ge on, place stomach -1p pl three day as pot: to make/to do -1p pl
\tx jandodo -ro uni xa kwaa
\ge pot: put on -1p pl three night
\ft hierba de ángel: caldeamos nuestro estómago con las hojas de hierba de ángel. Hacemos un rollo pequeño de hierba de ángel y echamos en el comal que se hace caliente. Lo echamos en el estómago como un tamal caliente. tres días lo hacemos. echamos tres veces en la noche.

yuku kawa:

\tx kɨ'ɨ -ro taxna'a -ro nda'a
\ge pot: to go -1p pl pot: to bring together -1p pl leaf
\tx kwechi yuku kawa datete -ro
\ge small plural hierba de coyote pot: to heat -1p pl
\tx nuu ñu'u, jantu -ro xiti -ro
\ge in, on, in front of fire pot: to place -1p pl stomach -1p pl
\tx yata ka'a -ro
\ge back cadera -1p pl
\ft hierba de coyote: vamos a juntar las hojas pequeñas de hierba de coyote, lo calentamos en la lumbre, lo ponemos en el estómago, la espalda, nuestra cadera.

Tna u'uro xe'ero; Xaxia'an xe'ero

yuku kidi:

\tx xa xaxia'an xe'e -ro: xa
\ge for, when con: to hurt (colics, strong pain) foot -1p pl for, when
\tx xaxia'an xe'e -ro,
\ge con: to hurt (colics, strong pain) foot -1p pl
\tx tna'a -ro kaxi xija kɨu xe'e -ro o yɨkɨ xiti -ro.

\ge con: struggle -1p pl cold that day foot -1p pl or knee -1p pl
\tx Ka'nu -ro nui xa yute da
\ge pot: to break -1p pl its ends for, when tender then
\tx te kodo -ro aguardiente na
\ge and pot: to sweep -1p pl sp: a type of alcohol what
\tx dama -ro tna oko koon ora.
\ge pot: change -1p pl con: struggle 20 four when
\tx Nu xa nguna'i yɨkɨ xiti -ro te
\ge when for, when com: to be as planned knee -1p pl and
\tx da nga ndandoo -ro, ma na
\ge then just com: to leave -1p pl no what
\tx dama -ro yuku
\ge pot: change -1p pl plant
\ft escobilla: cuando duele nuestro pie: cuando duele nuestro pie, tenemos frío este día en nuestro pie o rodilla. Vamos a cortar sus puntas cuando (son) frescas y vamos barrer con aguardiente lo que vamos cambiar durante 24 horas. Para cuando se calmó (el dolor de) la rodilla y después solo lo dejamos, no vamos a cambiar la planta.

ndewa buro:

\tx xa xaxia'an xe'e -ro: xa
\ge for, when con: to hurt (colics, strong pain) foot -1p pl for, when
\tx xaxia'an xe'e -ro o ñɨɨ -ro
\ge con: to hurt (colics, strong pain) foot -1p pl or body -1p pl **\tx te kani -ro nda'i ndewa xi**
\ge and pot: to hit -1p pl its leaves chichicaxtle at/with/and
\tx alkojol o aguardiente ɨɨn a uu vuelta
\ge sp: alchohol or sp: a type of alcohol one or two sp: times
\ft chichicaxtle de burro: cuando duelen nuestros pies: cuando duelen nuestros pies o cuerpos pegamos con su hoja de chichicaxtle con alcohol o aguardiente una o dos veces.

ndewa tata:

\tx xaxia'an xe'e -ro: lo mismo
\ge con: to hurt (colics, strong pain) foot -1p pl sp: the same
\tx ndewa tata nuu xaxia'an
\ge chichicaxtle de casa on, place con: to hurt (colics, strong pain)
\tx xe'e -ro te ku'u -ro xi'i ndewa tata
\ge foot -1p pl and pot:to rub -1p pl with chichicaxtle de casa
\tx nuu tuchi -ro te vichi tatna
\ge on, place throbbing -1p pl and very medicine
\ft chichixaxtle de casa: duelen nuestros pies: lo mismo chichicaxtle de casa donde duelen nuestros pies y vamos a frotar con chichicaxtle de casa donde tenemos latido es muy medicinal.

ndewa ngutu:

\tx Ndewa ngutu kani -ro xe'e -ro a
\ge chichicaxtle silvestre pot: to hit -1p pl foot -1p pl or
\tx nda'a -ro nu io nde loko

\ge hand -1p pl if con: to exist which sp: crazy
\tx tna'a ora te ku ndva'a
\ge con: struggle when and pot: to be pot: get better
\ft chichicaxtle silvestre: chichicaxtle silvestre vamos a pegar nuestros pies o manos cuando hay mucho dolor y va componerse.

tnuta ve'yu, yuku chiki río'o:

\tx tau -ro xe'e -ro xaxia'an
\ge pot: to heat up -1p pl foot -1p pl con: to hurt (colics, strong pain)
\tx xa vixi: jwetniu -ro nda'a dandvidi -ro
\ge for, when cold pot: to use -1p pl leaf pot: to heat up -1p pl
\tx nuu xiyo tanto kɨu
\ge in, on, in front of comal sp:this many day
\ft chuparrosa: caldeamos nuestros pies cuando duelen por el frío: usamos las hojas, calentamos en el comal tantos días

Tna'aro ora yodo iniro; yodo ini; yodo iniro

tanaña:

\tx tanaña: tna'a -ro ora yodo ini -ro
\ge chayote con: struggle -1p pl when anxiety -1p pl
\tx ansiedad: tna'a -ro ora yodo ini -ro,
\ge sp: anxiety con: struggle -1p pl when anxiety -1p pl
\tx dakwido -ro nda'a tanaña te ko'o -ro
\ge pot: make it boil -1p pl leaf chayote and pot: to drink -1p pl
\ft chayote: ansiedad: la hora que tenemos ansiedad, vamos a hacer hervir las hojas de chayotal y vamos a tomar.

tna'aro tnikwe'ero; tnikwe'e; tnikwe'ero; tnukwe'e; Tnukwe'e xitiro; Ñayiw ndɨka

tnu tnu'a:

\tx tnu tnu'a: tnikwe'e:
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult. wound
\tx tnu tnu'a
\ge CONVOLVULACEAE Ipomoea murucoides Roem. & Schult.
\tx io ii
\ge con: to exist sacred
\ft casahuate: herida: casahuate es muy delicado (sagrado).

yuku na tna'a:

\tx tni kwe'e -ro, golpe: dakwido -ro
\ge wound -1p pl sp: bruise pot: make it boil -1p pl

\tx nda'i te ko'o -ro como agua de tiempo.
\ge its leaves and pot: to drink -1p pl sp: as sp: agua de tiempo
\tx dakee -ro nakini -ro nuu
\ge pot: put in -1p pl pot: to wash -1p pl in, on, in front of
\tx tni kwe'e -ro, ndiko -ro nda'i yichi,
\ge wound -1p pl pot: to grind -1p pl its leaves dry
\tx dakee -ro yuchi nuu tni kwe'e -ro.
\ge pot: put in -1p pl powder in, on, in front of wound -1p pl
\tx Ntuku nakini -ro o ko'o -ro,
\ge again, another pot: to wash -1p pl or pot: to drink -1p pl
\tx dakwido -ro nda'i. Nde na ndva'a
\ge pot: make it boil -1p pl its leaves until as pot: get better
\ft *vergonzosa: herida, golpe: vamos hacer hervir sus hojas y vamos a tomar como agua de tiempo. vamos a echar/vamos a lavar la herida, vamos a moler sus hojas secas, vamos a echar el polvo en nuestra herida. también vamos a lavar o vamos a tomar, vamos a hacer hervir sus hojas. hasta componerse.*

\tx ndiko da te yuchi nuu tnikwe'e
\ge pot: to grind then and powder in, on, in front of wound
\ft *se muele y el polvo en la herida.*

\tx nda'i tau -ro nuu
\ge its leaves pot: make a poultice -1p pl in, on, in front of
\tx tni kwe'e -ro, ndiko -ro nda'i yuchi
\ge wound -1p pl pot: to grind -1p pl its leaves powder
\tx te tenee -ro nuu tnikwe'e
\ge and pot: to stick -1p pl in, on, in front of wound
\ft *vamos a hacer fomentos de sus hojas en nuestra herida. vamos a moler sus hojas y vamos a pegar el polvo en la herida.*

yuku na tna'a, nduxa,tamorial, yuku mansu:

\tx tnikwe'e: vixi yuku na tna'a xi
\ge wound leaf MIMOSACEAE Mimosa albida at/with/and
\tx nduxa xi ña'u
\ge OXALIDACEAE Oxalis nelsonii (Small) Knuth at/with/and tuber
\tx tamorial xi ña'u yuku mansu ndiko -ro
\ge sp:tamorial at/with/and tuber hierba de manzo pot: to grind -1p pl
\tx kwi, tenee -ro nuu tni kwe'e.
\ge fresh pot: to stick -1p pl in, on, in front of wound
\ft *vergonzosa, coyul, tamorial, hierba de manzo: herida: las hojas de la vergonzosa con coyul con el camote de tamorial con el camote de hierba de manzo vamos a moler fresco,lo vamos a pegar en la herida.*

yuku mansu:

\tx tnikwe'e -ro: dandu'a -ro yutnu
\ge wound -1p pl pot:to boil a long time -1p pl branch, stem
\tx te ko'o -ro o nakini -ro
\ge and pot: to drink -1p pl or pot: to wash -1p pl
\tx ndute nuu tnikwe'e
\ge water on, place wound

\ft hierba de manzo: tenemos herida: hervimos un tiempo largo el tallo y tomamos o lavamos en el agua donde hay herida

tnu yuxa:

\tx tnukwe'e: xetniu -ro tnu yuxa kɨu xa
\ge con: get hurt con: to use -1p pl PINACEAE Pinus sp. day for, when
\tx na nu kwe'e -ro te kaja -ro
\ge when when disease -1p pl and to hurt (slow pain) -1p pl
\tx nuu tnukwe'e, idi ni vuelta
\ge in, on, in front of con: get hurt one, the first just sp: times
\ft ocote: herida: estamos usando el ocote el día que estamos enfermos y tenemos dolor en el lugar que esta herido, una sola vez.

nu ndita nɨñɨ

tnu yuxa:

\tx nu ndita nɨñɨ: jwetniu -ro iti kawa.
\ge when pot: to fall blood pot: to use -1p pl pine slices
\tx Kwido xi ndute nuu nu'u
\ge pot: to boil at/with/and water in, on, in front of fireplace, stove **\tx te ko'o -ro uni vuelta**
\ge and pot: to drink -1p pl three sp: times
\ft hemorragia: vamos a usar rajas de ocote. se hierven con agua en la lumbre y vamos a tomar tres veces.

Tna'aro tuchi; Tuchi; Tuchi iniro

yuku kawa:

\tx yuku kawa: tuchi: dakwido -ro
\ge ajenjo, hierba maestra throbbing pot: make it boil -1p pl
\tx vixi te ko'o -ro
\ge leaf and pot: to drink -1p pl
\ft hierba maestra, ajenjo :latido: vamos a hacer hervir las hojas y vamos a tomar.

yuku kawa:

\tx tuchi: yuku kawa ko'o -ro xa
\ge throbbing hierba de coyote pot: to drink -1p pl for, when
\tx tuchi. Jwetniu -ro yuku kawa
\ge throbbing pot: to use -1p pl hierba de coyote
\tx xaxia'an xiti -ro,
\ge con: to hurt (colics, strong pain) stomach -1p pl
\tx dandu'a -ro, ko'o -ro.
\ge pot: to boil a long time -1p pl pot: to drink -1p pl
\tx Ndu'a -tnu.

\ge pot: to boil -tree
\ft hierba de coyote: latido: hierba de coyote vamos a tomar para el latido. Vamos a usar hierba de coyote (cuando) duele nuestro estómago, vamos a hervir un tiempo largo, vamos a tomar. Se hierve la rama.

\tx xa tuchi tna'a -ro tuchi:
\ge for, when throbbing con: struggle -1p pl throbbing
\tx jwetniu -ro nda'a dakwido -ro xi
\ge pot: to use -1p pl leaf pot: make it boil -1p pl at/with/and
\tx ndute te ko'o -ro datne ɨɨn taxa.
\ge water and pot: to drink -1p pl morning one cup
\ft para latido, tenemos latido: vamos a usar las hojas. vamos a hacer hervir con agua y vamos a tomar una taza en la mañana.

tuu ña'a ñuñu

ita daa:

\tx ita daa: ora tuu ña'a ñuñu: ita daa
\ge CRASSULACEAE Sedum sp. when bee sting CRASSULACEAE Sedum sp.
\tx xija tau -ro ñɨɨ -ro ora
\ge that pot: make a poultice -1p pl body -1p pl when
\tx tuu ña'a ñuñu. Jwetniu -ro nda'a kwechi.
\ge bee sting pot: to use -1p pl leaf small plural
\tx Meeni nda'i dachi'o -ro nuu
\ge only its leaves pot: to cook -1p pl in, on, in front of
\tx xiyo, ita daa da te
\ge comal CRASSULACEAE Sedum sp. then and
\tx tau -ro ñɨɨ -ro nuu kata
\ge pot: make a poultice -1p pl body -1p pl on, place itch
\ft siempreviva: cuando (tenemos) picadura de abeja: vamos hacer fomentos de este siempreviva en nuestro cuerpo cuando nos picó la abeja. Vamos a usar las hojas chiquitas. solamente sus hojas vamos a cocinar
en el comal, entonces vamos hacer fomentos de siempreviva donde hay comezón.

xa'ni tndaku kɨtɨ te’yu

\tx yuku nu toto/yuku yuu: yuku nde'e
\ge APOCYNACEAE Asclepias linaria Cav. plant strong
\tx xa'ni tndaku kɨtɨ te’yu
\ge con: to kill parasite animal rotten
\ft hierba brava, venenosa: matamos el gusanito en animales donde tienen podrido.

xaxia'an dɨkɨro

tnu de'ñu:

\tx xaxia'an dɨkɨ -r:
\ge con: to hurt (colics, strong pain) head -1p sg fam
\tx tnu de'ñu ngee -ro
\ge CUPRESSACEAE Juniperus flaccida Schltdl. com: to gather -1p pl
\tx te kani -ro xa xaxia'an
\ge and pot: to hit -1p pl for, when con: to hurt (colics, strong pain)
\tx dɨkɨ -r idi ni a uu vuelta
\ge head -1p sg fam one, the first just or two sp: times
\ft enebro: dolor de mi cabeza: recolectamos enebro y vamos a pegar cuando duele mi cabeza solamente una o dos veces.

Xaxia'an ka'aro xi xaxia'an yɨkɨna'a xi xaxia'an yɨkɨro

tnundoko lingu:

\tx tnundoko lingu:
\ge RUTACEAE Casimiroa edulis Llave & Lex.
\tx xaxia'an yɨkɨ -ro:
\ge con: to hurt (colics, strong pain) bone -1p pl
\tx ka xetniu ñayiw nu xaxia'an
\ge plural con: to use human being if con: to hurt (colics, strong pain)
\tx taka yɨkɨ -ro xiti -ro. Jwetniu -ro
\ge pot: to collect bone -1p pl inside -1p pl pot: to use -1p pl
\tx vixi te tau -ro taka xaxia'an.
\ge leaf and pot: to heat up -1p pl pot: to collect con: to hurt (colics, strong pain)
\ft zapotal blanco: reumatismo: las personas lo ocupan si les dueleb todos los huesos al dentro. Vamos a usar la hoja y vamos a caldear todo que duele.

Xaxia'anro anuro

yuku kweyido, yuku dolor:

\tx yuku kweyido, yuku dolor: xa tna'a -ro
\ge hierba de dolor for, when con: struggle -1p pl
\tx xaxia'an -ro anu -ro:
\ge con: to hurt (colics, strong pain) -1p pl heart -1p pl
\tx da ni naxku ñe'e -ro ña'u -i,
\ge then just what is pot: scratch, scrape -1p pl tuber -its
\tx ndiko -ro ña'u -i te kawa -ro
\ge pot: to grind -1p pl tuber -its and pot: to whisk -1p pl
\tx na kɨtɨ tiñu te tenee -ro.
\ge as to make foam and pot: to stick -1p pl
\ft hierba de dolor: para (cuando) padecemos de dolor de nuestro corazón: entonces solo vamos a escarbar su camote, vamos a moler su camote y vamos a batir hasta que se hace espuma y lo vamos a pegar.

Appendix 8 – Freelisting analysis tables

Appendix 8.1: freelisting results *yuku tatna*

Rank	yuku tatna	Frequency	Frequency %	Average Rank	Smith's S
1	tnu kawa/tnu kawa kwaa/yuku tnu kawa (kwaa)	14	41,2%	8,571	0,247
2	tnuta yuxi	13	38,2%	6,308	0,283
3	mino kastila	13	38,2%	12,154	0,201
4	yuku kidi	12	35,3%	6,667	0,236
5	yuku kawa/yuku kawa kwechi/yuku ñaña	11	32,4%	4,545	0,252
6	yau kastila	11	32,4%	13,182	0,129
7	tutitnu	10	29,4%	9,600	0,187
8	yuku tatna ruda	10	29,4%	10,500	0,173
9	yuku chudini	9	26,5%	11,667	0,150
10	yuku yaa	9	26,5%	13,778	0,117
11	mino/mino ñuu dau	8	23,5%	15,875	0,109
12	yuku na tna'a	8	23,5%	12,000	0,101
13	tnu de'ñu	8	23,5%	9,500	0,109
14	yau ngichi	8	23,5%	14,250	0,101
15	yuku ua/yuku kawa/yuku hierba maestra	7	20,6%	10,714	0,137
16	tnu granada	6	17,6%	13,833	0,102
17	ña'u (camote tamorial)	6	17,6%	10,167	0,101
18	ita yɨdɨ	6	17,6%	5,667	0,114
19	tnu ndido	6	17,6%	19,833	0,060
20	tnuta yatu	5	14,7%	8,400	0,111
21	tnu tau/tnu tau yute	5	14,7%	7,800	0,111
22	tnu tnu'a	5	14,7%	6,600	0,096
23	yuku tachi kwixi/yuku tachi	5	14,7%	10,600	0,082
24	yuku pasma	5	14,7%	10,400	0,076
25	yuku romeru	5	14,7%	12,000	0,075
26	ita mitu/yuku mirtu	5	14,7%	12,800	0,087
27	tnu nduchi idu	4	11,8%	17,000	0,058
28	tnu ndoko	4	11,8%	9,250	0,062
29	kɨ'u/yuku alfaresia	4	11,8%	10,250	0,078
30	kwendɨjɨ	4	11,8%	10,000	0,061
31	tnu yuxa	4	11,8%	7,250	0,082
32	yuku santa maria	4	11,8%	16,750	0,049
33	tnu nduchi nde'e	3	8,8%	10,667	0,032
34	tnuta ve’yu	3	8,8%	5,667	0,060
35	ndewa ngutu	3	8,8%	22,667	0,035
36	tnu yuku ñama	3	8,8%	8,667	0,056
37	tnu ndoko lingu	3	8,8%	14,000	0,055

Rank	yuku tatna	Frequency	Frequency %	Average Rank	Smith's S
38	tnu yaka	3	8,8%	9,000	0,051
39	titi te’yu	3	8,8%	13,667	0,041
40	ndewa tata	3	8,8%	17,000	0,042
41	ita roxa kwixi	3	8,8%	17,667	0,031
42	iñu leu	3	8,8%	9,667	0,047
43	tanaña/tnuta naña	3	8,8%	15,000	0,045
44	nduwa ndoo	3	8,8%	15,000	0,042
45	yau nduxa	3	8,8%	21,333	0,031
46	yuku arnika/arnika	3	8,8%	7,000	0,061
47	tnu ndee	3	8,8%	15,333	0,030
48	ita yɨdɨ kwechi	3	8,8%	20,000	0,035
49	ita kwaa, ita dini	3	8,8%	11,000	0,053
50	tnuta duxa	3	8,8%	5,000	0,070
51	yuku chuwa/yuwa chuwa	3	8,8%	9,333	0,048
52	ita daa	3	8,8%	9,000	0,060
53	yuku tnani ñu'u	3	8,8%	9,667	0,057
54	ruta vidi	3	8,8%	9,667	0,042
55	nduyu/te'e nduyu	2	5,9%	14,000	0,015
56	tayoo kuchi	2	5,9%	15,000	0,012
57	tnu nduchi nde'e kwixi	2	5,9%	16,500	0,018
58	yuku tachi tnuu	2	5,9%	21,000	0,019
59	mansaniya	2	5,9%	6,500	0,044
60	yuku tuchi	2	5,9%	5,500	0,037
61	iñu kɨu	2	5,9%	11,000	0,039
62	tnu tɨchɨ	2	5,9%	4,500	0,036
63	tnu ñuu	2	5,9%	7,500	0,023
64	vi'inde	2	5,9%	10,500	0,016
65	tnu tkee	2	5,9%	13,000	0,024
66	nduxa	2	5,9%	27,500	0,013
67	ita yɨdɨ na'nu	2	5,9%	34,500	0,005
68	ndewa	2	5,9%	5,000	0,046
69	du'a cabayu	2	5,9%	14,000	0,036
70	ndewa buru	2	5,9%	16,000	0,032
71	yuku kweyido	2	5,9%	18,500	0,018
72	ruta ua	2	5,9%	3,500	0,052
73	tutitnu kwixi	2	5,9%	6,000	0,026
74	yuku ndo'o	2	5,9%	8,500	0,010
75	tnu tka'a	2	5,9%	14,500	0,020
76	tndu'u	2	5,9%	17,000	0,020
77	ita seriw, ita inu	2	5,9%	19,500	0,017

Rank	yuku tatna	Frequency	Frequency %	Average Rank	Smith's S
78	tnu piru	2	5,9%	22,000	0,016
79	tnu tndɨdɨ	1	2,9%	8,000	0,011
80	ruta kuchi	1	2,9%	1,000	0,029
81	yuku yɨjɨ kwechi	1	2,9%	18,000	0,012
82	tnu nduchi nde'e kwe'e	1	2,9%	24,000	0,006
83	tnu duñu	1	2,9%	25,000	0,005
84	ita nuni	1	2,9%	7,000	0,013
85	tnu ñuu kwixi	1	2,9%	9,000	0,008
86	orejano	1	2,9%	16,000	0,010
87	yuku chaa	1	2,9%	20,000	0,005
88	yuku disipela	1	2,9%	22,000	0,003
89	yuku ita dini	1	2,9%	3,000	0,028
90	ita ndɨyɨ	1	2,9%	10,000	0,021
91	yuku yɨkɨ	1	2,9%	19,000	0,013
92	vi'inde ñuu vidi	1	2,9%	10,000	0,012
93	tnu ndete	1	2,9%	13,000	0,006
94	yuku kwedayu	1	2,9%	5,000	0,023
95	tiko	1	2,9%	17,000	0,003
96	yau twixi	1	2,9%	22,000	0,007
97	chɨyɨ	1	2,9%	23,000	0,005
98	tnu ta'u	1	2,9%	25,000	0,003
99	ruta	1	2,9%	26,000	0,002
100	tnu kwendɨu	1	2,9%	1,000	0,029
101	tnu ndete koo	1	2,9%	4,000	0,022
102	chate itu	1	2,9%	8,000	0,012
103	tnu tna'nu	1	2,9%	6,000	0,019
104	eucalipto	1	2,9%	8,000	0,024
105	yuku hierba nuestra	1	2,9%	13,000	0,021
106	yuku nga'a	1	2,9%	18,000	0,017
107	tnu nde'a kuxi/tnu nde'a kwixi	1	2,9%	26,000	0,011
108	tnu nde'a drasnu	1	2,9%	27,000	0,011
109	tamorial blanco	1	2,9%	30,000	0,009
110	tamorial morado/tamorial rojo	1	2,9%	31,000	0,008
111	ita bombil/bugambilia	1	2,9%	39,000	0,002
112	nispero	1	2,9%	40,000	0,001
113	iñu tndu	1	2,9%	6,000	0,023
114	valeriana	1	2,9%	15,000	0,011
115	yuku chɨ'ɨ ñaña	1	2,9%	7,000	0,025
116	tnu ndɨu/tnu tndɨu	1	2,9%	12,000	0,020
117	yuku nu toto/yuku yuu	1	2,9%	16,000	0,017

Rank	yuku tatna	Frequency	Frequency %	Average Rank	Smith's S
118	tnu nii	1	2,9%	17,000	0,016
119	ndewa tɨtnɨñɨ	1	2,9%	20,000	0,014
120	tnu ndee nda'a kwechi	1	2,9%	25,000	0,010
121	tnu tnuu	1	2,9%	5,000	0,023
122	ita te'u yuku	1	2,9%	14,000	0,009
123	ita san jose	1	2,9%	16,000	0,006
124	tnu ñuu kwe'e	1	2,9%	7,000	0,020
125	yuku ii/ita ii	1	2,9%	9,000	0,016
126	yuku da'ya/ita kwixi kwechi	1	2,9%	18,000	0,002
127	alkamfor	1	2,9%	2,000	0,026
128	yuku mansu	1	2,9%	5,000	0,018

Appendix 8.2: freelisting results *plantas medicinales*

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
1	escobilla	23	67,6%	16,826	0,291
2	ruda	21	61,8%	7,571	0,428
3	chamizo blanco	21	61,8%	13,143	0,325
4	hierba buena	20	58,8%	14,050	0,361
5	hierba de ángel	17	50,0%	12,059	0,335
6	espule/hierba de chapulín	17	50,0%	14,176	0,222
7	ajenjo/hierba maestra	15	44,1%	20,933	0,260
8	maguey sábila/sábila	15	44,1%	13,867	0,208
9	maguey papalomé	15	44,1%	19,667	0,204
10	oreja de ratón/orejita de ratón/hierba de estrella/hierba de lucero	14	41,2%	20,071	0,263
11	manzanilla	13	38,2%	13,154	0,242
12	romero	13	38,2%	8,846	0,250
13	hierba de coyote	13	38,2%	18,154	0,265
14	hierba loca	12	35,3%	17,583	0,172
15	enebro	12	35,3%	12,083	0,204
16	ocote	12	35,3%	27,083	0,143
17	hierba de borracho/borrachito/el borracho/flor de novia	11	32,4%	15,182	0,237
18	chichicaxtle	11	32,4%	22,273	0,144
19	santa maría/flor de santa maría	11	32,4%	15,000	0,230
20	vergonzosa, hierba sosa	10	29,4%	22,900	0,128
21	tamorial	9	26,5%	17,444	0,123
22	árnica	9	26,5%	12,333	0,187
23	grillal blanco	9	26,5%	19,556	0,125
24	cola de caballo	9	26,5%	25,111	0,124

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
25	manzanita/pinguica	9	26,5%	22,333	0,135
26	guayaba	9	26,5%	13,778	0,175
27	orégano	8	23,5%	15,000	0,146
28	granada	8	23,5%	14,375	0,135
29	eucalipto	8	23,5%	16,875	0,148
30	siempreviva	8	23,5%	17,375	0,151
31	aguacate	7	20,6%	11,571	0,134
32	marubio	7	20,6%	8,571	0,157
33	mirto	7	20,6%	15,714	0,116
34	hierba tinta/flor de tinta/berresija	7	20,6%	15,714	0,128
35	somaque	7	20,6%	38,429	0,081
36	epazote	6	17,6%	28,167	0,089
37	poleo, marubio amargo	6	17,6%	20,000	0,086
38	casahuate	6	17,6%	27,333	0,072
39	tika chola/chica chola	6	17,6%	24,667	0,076
40	hierba de san pablo, tabacón	5	14,7%	26,400	0,070
41	fresno/encino de agua	5	14,7%	16,200	0,092
42	hierba santa	5	14,7%	30,600	0,082
43	bugambilia	5	14,7%	9,000	0,084
44	níspero	5	14,7%	12,200	0,085
45	tronadora	5	14,7%	22,400	0,088
46	gordolobo	5	14,7%	9,600	0,105
47	granicillo/huele de noche	5	14,7%	16,000	0,091
48	carrizo	5	14,7%	23,400	0,070
49	pericón	5	14,7%	44,400	0,052
50	tejocote	5	14,7%	42,000	0,033
51	estafiate	5	14,7%	10,800	0,109
52	lengua de vaca/tepozán	5	14,7%	20,600	0,079
53	valeriana	5	14,7%	39,600	0,045
54	chicalote	4	11,8%	8,250	0,087
55	injerto	4	11,8%	17,750	0,084
56	alkamfor	4	11,8%	27,000	0,045
57	zapotal	4	11,8%	16,500	0,043
58	chayotal	4	11,8%	29,750	0,059
59	nopal	4	11,8%	27,250	0,069
60	geranio	4	11,8%	19,750	0,085
61	malva	4	11,8%	49,250	0,026
62	chamizo del río/chamizo de quete	4	11,8%	16,000	0,052
63	cabeza de viejo	4	11,8%	18,500	0,055
64	camote de conejo/hierba de conejo	4	11,8%	30,750	0,047

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
65	hierba de dolor	4	11,8%	9,500	0,047
66	pirul	3	8,8%	13,333	0,060
67	hierba de pasma	3	8,8%	14,000	0,054
68	elote	3	8,8%	58,000	0,022
69	chilacayote	3	8,8%	48,667	0,033
70	epazote morado/epazote rojo	3	8,8%	63,667	0,023
71	capulinar, capulín blanco	3	8,8%	19,667	0,048
72	floribundio	3	8,8%	12,000	0,068
73	rosa blanca	3	8,8%	28,667	0,054
74	zapotal blanco	3	8,8%	38,333	0,056
75	aniz	3	8,8%	25,333	0,044
76	albahaca	3	8,8%	46,333	0,023
77	ajo	3	8,8%	74,000	0,020
78	durazno	3	8,8%	21,333	0,027
79	árnica de casa	3	8,8%	30,333	0,045
80	tamorial morado/tamorial rojo	3	8,8%	37,667	0,027
81	coyul	3	8,8%	16,667	0,029
82	hierba de borracho chica	3	8,8%	13,000	0,049
83	rosa de castilla	3	8,8%	17,333	0,044
84	encino capulincillo	3	8,8%	22,000	0,024
85	grillal rojo	2	5,9%	29,500	0,039
86	vaporu	2	5,9%	34,000	0,007
87	laurel	2	5,9%	17,500	0,006
88	hierba de tinta silvestre	2	5,9%	54,000	0,023
89	gacho del venado	2	5,9%	11,500	0,025
90	tabacón (sin espina)	2	5,9%	24,500	0,007
91	chichicaxtle de casa	2	5,9%	17,000	0,023
92	berro de agua	2	5,9%	9,500	0,036
93	miltomate	2	5,9%	51,500	0,009
94	órgano (de 5 rajitas)	2	5,9%	40,500	0,039
95	chupamirto, toronjil	2	5,9%	50,000	0,034
96	poleo menta blanca, marubio dulce	2	5,9%	22,000	0,034
97	cilantro	2	5,9%	37,500	0,025
98	pegajosa	2	5,9%	37,000	0,020
99	epazote de zorrillo	2	5,9%	29,500	0,041
100	cedrón	2	5,9%	43,000	0,020
101	marihuana	2	5,9%	92,500	0,011
102	tomillo	2	5,9%	37,500	0,037
103	cola de rata	2	5,9%	45,500	0,025
104	zarzamora	2	5,9%	49,000	0,012

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
105	té de limón	2	5,9%	40,500	0,034
106	manzana	2	5,9%	80,500	0,014
107	chuparrosa	2	5,9%	13,000	0,024
108	doradilla	2	5,9%	29,500	0,032
109	árnica amarilla/árnica chica	2	5,9%	41,000	0,028
110	tamorial blanco	2	5,9%	50,000	0,026
111	amole	2	5,9%	66,000	0,011
112	huaje	2	5,9%	57,500	0,017
113	hierba de borracho grande	2	5,9%	17,000	0,021
114	quelite podrido/hierba de pastor	2	5,9%	6,500	0,047
115	quebradero	2	5,9%	7,500	0,032
116	hierba loca blanca	2	5,9%	5,500	0,034
117	dalia	2	5,9%	6,500	0,044
118	romerillo	2	5,9%	10,000	0,015
119	flor de cerrillo, doncella	2	5,9%	23,500	0,010
120	diente de león	1	2,9%	7,000	0,024
121	chichicaxtle de burro	1	2,9%	21,000	0,004
122	maguey blanco	1	2,9%	10,000	0,014
123	dedo de dios	1	2,9%	7,000	0,028
124	encino rojo	1	2,9%	17,000	0,024
125	flor de piedra	1	2,9%	18,000	0,024
126	nogal	1	2,9%	22,000	0,023
127	siempreviva de monte	1	2,9%	31,000	0,020
128	grillal	1	2,9%	34,000	0,019
129	copa de oro	1	2,9%	35,000	0,019
130	azares (flores de plantas cítricas, como limón, naranja, mandarina, toronja)	1	2,9%	39,000	0,018
131	toloache	1	2,9%	43,000	0,016
132	cempasúchil	1	2,9%	46,000	0,015
133	cacaya de maguey papalomé/flor de manita	1	2,9%	52,000	0,013
134	limón	1	2,9%	55,000	0,013
135	naranja	1	2,9%	56,000	0,012
136	laurel del monte	1	2,9%	59,000	0,011
137	bretónica	1	2,9%	67,000	0,009
138	cascara de nuez	1	2,9%	72,000	0,007
139	anona	1	2,9%	73,000	0,007
140	zanahoria	1	2,9%	75,000	0,006
141	cilantrillo	1	2,9%	77,000	0,006
142	papaya	1	2,9%	78,000	0,005
143	lechuga	1	2,9%	81,000	0,004

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
144	papa	1	2,9%	82,000	0,004
145	toronja	1	2,9%	83,000	0,004
146	alfalfa	1	2,9%	85,000	0,003
147	jitomate	1	2,9%	90,000	0,002
148	cebolla	1	2,9%	91,000	0,001
149	tronco de chivo	1	2,9%	12,000	0,015
150	pastle/eno	1	2,9%	13,000	0,014
151	llantén blanco	1	2,9%	2,000	0,029
152	árnica morada	1	2,9%	3,000	0,029
153	gordolobo silvestre/llantén	1	2,9%	4,000	0,029
154	pasto de gusanito	1	2,9%	5,000	0,028
155	encino amarillo	1	2,9%	17,000	0,026
156	quelite de guajolote	1	2,9%	28,000	0,023
157	coyul de víbora	1	2,9%	29,000	0,023
158	sábila amarilla	1	2,9%	30,000	0,023
159	sábila verde	1	2,9%	31,000	0,022
160	sábila roja/morada	1	2,9%	32,000	0,022
161	biznaga	1	2,9%	34,000	0,022
162	espinosilla verde	1	2,9%	37,000	0,021
163	espinosilla negra	1	2,9%	38,000	0,021
164	hierba de uva	1	2,9%	41,000	0,020
165	pasto de mosquito	1	2,9%	42,000	0,020
166	helecho, cría de agua	1	2,9%	46,000	0,019
167	flor de naranja	1	2,9%	49,000	0,018
168	maguey vedo	1	2,9%	55,000	0,017
169	órgano (de 6 rajitas)	1	2,9%	56,000	0,017
170	órgano (de 4 rajitas)	1	2,9%	57,000	0,016
171	hierba de manzo	1	2,9%	60,000	0,016
172	cebolla morada	1	2,9%	62,000	0,015
173	dátil silvestre	1	2,9%	63,000	0,015
174	las pasas	1	2,9%	64,000	0,015
175	rábano morado	1	2,9%	65,000	0,015
176	melón	1	2,9%	66,000	0,014
177	ciruela pasa	1	2,9%	68,000	0,014
178	chaya	1	2,9%	72,000	0,013
179	árnica de castilla, árnica de burro	1	2,9%	76,000	0,012
180	nopal de coyote	1	2,9%	78,000	0,012
181	makaxani	1	2,9%	79,000	0,011
182	yuku kaja	1	2,9%	80,000	0,011
183	sabino	1	2,9%	81,000	0,011

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
184	hierba de cucaracha	1	2,9%	82,000	0,011
185	hierba de la rozadura	1	2,9%	84,000	0,010
186	la lengua de venado	1	2,9%	87,000	0,009
187	cilantro de venado	1	2,9%	89,000	0,009
188	manita de león	1	2,9%	90,000	0,009
189	hierba de la cabezona	1	2,9%	91,000	0,009
190	kawal	1	2,9%	92,000	0,008
191	espinal amarillo	1	2,9%	93,000	0,008
192	lechuguilla	1	2,9%	94,000	0,008
193	hierba de sapo	1	2,9%	95,000	0,008
194	hierba de canela	1	2,9%	97,000	0,007
195	hierba de gusano	1	2,9%	98,000	0,007
196	la consuelta	1	2,9%	103,000	0,006
197	modroño/palo guero/capulín de monte	1	2,9%	105,000	0,005
198	canahuala	1	2,9%	107,000	0,005
199	lirio	1	2,9%	108,000	0,005
200	capitaneja	1	2,9%	110,000	0,004
201	llantén morado	1	2,9%	118,000	0,002
202	toloache morado	1	2,9%	119,000	0,002
203	toloache blanco	1	2,9%	120,000	0,002
204	nariz de guajolote	1	2,9%	123,000	0,001
205	encino blanco	1	2,9%	5,000	0,019
206	quiebra hueso	1	2,9%	10,000	0,005
207	ita nuni	1	2,9%	11,000	0,003
208	abrojo negro	1	2,9%	10,000	0,021
209	uacatillo	1	2,9%	11,000	0,020
210	chamizo negro	1	2,9%	18,000	0,013
211	hierba de estrellita	1	2,9%	24,000	0,014
212	nildo	1	2,9%	26,000	0,012
213	alpiste	1	2,9%	42,000	0,001
214	huaje de víbora	1	2,9%	4,000	0,023
215	hinojo	1	2,9%	5,000	0,021
216	árnica de monte	1	2,9%	9,000	0,013
217	hierba de disentería	1	2,9%	3,000	0,028
218	siempreviva dedo de niño	1	2,9%	7,000	0,025
219	caretilla	1	2,9%	21,000	0,013
220	hierba negra	1	2,9%	34,000	0,002
221	rosa laurel	1	2,9%	3,000	0,024
222	flor de platanillo	1	2,9%	5,000	0,021
223	flor de margarita	1	2,9%	7,000	0,017

Rank	plantas medicinales	Frequency	Frequency %	Average rank	Smith's S
224	flor de jazmín	1	2,9%	10,000	0,008
225	berro del monte	1	2,9%	17,000	0,005
226	papaloquelite	1	2,9%	19,000	0,001
227	palmar	1	2,9%	22,000	0,021
228	chichicaxtle silvestre	1	2,9%	11,000	0,039
229	ajo chino	1	2,9%	19,000	0,025
230	cedro	1	2,9%	25,000	0,003
231	elite	1	2,9%	33,000	0,028
232	té naranja	1	2,9%	2,000	0,007
233	flor de ceniza	1	2,9%	8,000	0,013
234	hierba de cáncer	1	2,9%	25,000	0,012
235	palo de mulato	1	2,9%	26,000	0,012
236	uña de gato	1	2,9%	27,000	0,006
237	hierba de san pablo	1	2,9%	35,000	0,008
238	hierba del Frío	1	2,9%	9,000	0,021
239	yuku vixi	1	2,9%	8,000	0,002
240	cresta de gallo	1	2,9%	23,000	0,000

Appendix 8.3: freelisting results of plants listed both in Mixtec and Spanish during the two freelisting interviews

yuku tatna	Spanish name	Mixtec Freelist				Spanish Freelist			
		F	F %	Av Rank	Smith's S	F	F %	Av Rank	Smith's S
tnu kawa/tnu kawa kwaa/yuku tnu kawa (kwaa)	hierba de ángel	14	41,2%	8,571	0,247	17	50,0%	12,059	0,335
tnuta yuxi	chamizo blanco	13	38,2%	6,308	0,283	21	61,8%	13,143	0,325
mino kastila	hierba buena	13	38,2%	12,154	0,201	20	58,8%	14,050	0,361
yuku kidi	escobilla	12	35,3%	6,667	0,236	23	67,6%	16,826	0,291
yuku kawa/yuku kawa kwechi/yuku ñaña	hierba de coyote	11	32,4%	4,545	0,252	13	38,2%	18,154	0,265
yau kastila	maguey sábila/sábila	11	32,4%	13,182	0,129	15	44,1%	13,867	0,208
tutitnu	hierba loca	10	29,4%	9,600	0,187	12	35,3%	17,583	0,172
yuku tatna ruda	ruda	10	29,4%	10,500	0,173	21	61,8%	7,571	0,428
yuku chudini	oreja de ratón/orejita de ratón/hierba de estrella/hierba de lucero	9	26,5%	11,667	0,150	14	41,2%	20,071	0,263
yuku yaa	espule/hierba de	9	26,5%	13,778	0,117	17	50,0%	14,176	0,222

yuku tatna	Spanish name	Mixtec Freelist				Spanish Freelist			
		F	F %	Av Rank	Smith's S	F	F %	Av Rank	Smith's S
	chapulín								
tnu de'ñu	enebro	8	23,5%	9,500	0,109	12	35,3%	12,083	0,204
yuku na tna'a	vergonzosa, hierba sosa	8	23,5%	12,000	0,101	10	29,4%	22,900	0,128
yau ngichi	maguey vedo	8	23,5%	14,250	0,101	1	2,9%	55,000	0,017
mino/mino ñuu dau	epazote	8	23,5%	15,875	0,109	6	17,6%	28,167	0,089
yuku ua/yuku kawa/yuku hierba maestra	ajenjo/hierba maestra	7	20,6%	10,714	0,137	15	44,1%	20,933	0,260
ita yɨdɨ	hierba de borracho/ borrachito/el borracho/ flor de novia	6	17,6%	5,667	0,114	11	32,4%	15,182	0,237
ña'u (camote tamorial)	tamorial	6	17,6%	10,167	0,101	9	26,5%	17,444	0,123
tnu granada	granada	6	17,6%	13,833	0,102	8	23,5%	14,375	0,135
tnu ndido	manzanita/ pinguica	6	17,6%	19,833	0,060	9	26,5%	22,333	0,135
tnu tnu'a	casahuate	5	14,7%	6,600	0,096	6	17,6%	27,333	0,072
tnu tau/tnu tau yute	chamizo del río/chamizo de quete	5	14,7%	7,800	0,111	4	11,8%	16,000	0,052
tnuta yatu	tronadora	5	14,7%	8,400	0,111	5	14,7%	22,400	0,088
yuku pasma	hierba de pasma	5	14,7%	10,400	0,076	3	8,8%	14,000	0,054
yuku tachi kwixi/yuku tachi	camote de conejo/hierba de conejo	5	14,7%	10,600	0,082	4	11,8%	30,750	0,047
yuku romeru	romero	5	14,7%	12,000	0,075	13	38,2%	8,846	0,250
ita mitu/yuku mirtu	mirto	5	14,7%	12,800	0,087	7	20,6%	15,714	0,116
tnu yuxa	ocote	4	11,8%	7,250	0,082	12	35,3%	27,083	0,143
tnu ndoko	zapotal	4	11,8%	9,250	0,062	4	11,8%	16,500	0,043
kwendɨjɨ	guayaba	4	11,8%	10,000	0,061	9	26,5%	13,778	0,175
kɨ'u/yuku alfaresia	hierba tinta/flor de tinta/berresija	4	11,8%	10,250	0,078	7	20,6%	15,714	0,128
yuku santa maria	santa maría/flor de santa maría	4	11,8%	16,750	0,049	11	32,4%	15,000	0,230
tnu nduchi idu	gacho del venado	4	11,8%	17,000	0,058	2	5,9%	11,500	0,025
tnuta duxa	árnica	3	8,8%	5,000	0,070	2	5,9%	41,000	0,028

yuku tatna	Spanish name	Mixtec Freelist				Spanish Freelist			
		F	F %	Av Rank	Smith's S	F	F %	Av Rank	Smith's S
	amarilla/árnica chica								
tnuta ve'yu	chuparrosa	3	8,8%	5,667	0,060	2	5,9%	13,000	0,024
yuku arnika/arnika	árnica	3	8,8%	7,000	0,061	9	26,5%	12,333	0,187
tnu yuku ñama	lengua de vaca/tepozán	3	8,8%	8,667	0,056	5	14,7%	20,600	0,079
ita daa	siempreviva	3	8,8%	9,000	0,060	8	23,5%	17,375	0,151
yuku chuwa/yuwa chuwa	tika chola/chica chola	3	8,8%	9,333	0,048	6	17,6%	24,667	0,076
iñu leu	chicalote	3	8,8%	9,667	0,047	4	11,8%	8,250	0,087
ruta vidi	poleo menta blanca, marubio dulce	3	8,8%	9,667	0,042	2	5,9%	22,000	0,034
tnu nduchi nde'e	grillal	3	8,8%	10,667	0,032	1	2,9%	34,000	0,019
ita kwaa, ita dini	pericón	3	8,8%	11,000	0,053	5	14,7%	44,400	0,052
titi te'yu	quelite podrido/hierba de pastor	3	8,8%	13,667	0,041	2	5,9%	6,500	0,047
tnu ndoko lingu	zapotal blanco	3	8,8%	14,000	0,055	3	8,8%	38,333	0,056
nduwa ndoo	hierba santa	3	8,8%	15,000	0,042	5	14,7%	30,600	0,082
tanaña/tnuta naña	chayotal	3	8,8%	15,000	0,045	4	11,8%	29,750	0,059
tnu ndee	somaque	3	8,8%	15,333	0,030	7	20,6%	38,429	0,081
ndewa tata	chichicaxtle de casa	3	8,8%	17,000	0,042	2	5,9%	17,000	0,023
ita roxa kwixi	rosa blanca	3	8,8%	17,667	0,031	3	8,8%	28,667	0,054
ita yɨdɨ kwechi	hierba de borracho chica	3	8,8%	20,000	0,035	3	8,8%	13,000	0,049
yau nduxa	maguey papalomé	3	8,8%	21,333	0,031	15	44,1%	19,667	0,204
ndewa ngutu	chichicaxtle silvestre	3	8,8%	22,667	0,035	1	2,9%	11,000	0,039
ruta ua	poleo, marubio amargo	2	5,9%	3,500	0,052	6	17,6%	20,000	0,086
tnu tɨchɨ	aguacate	2	5,9%	4,500	0,036	7	20,6%	11,571	0,134
ndewa	chichicaxtle	2	5,9%	5,000	0,046	11	32,4%	22,273	0,144
tutitnu kwixi	hierba loca blanca	2	5,9%	6,000	0,026	2	5,9%	5,500	0,034
mansaniya	manzanilla	2	5,9%	6,500	0,044	13	38,2%	13,154	0,242
tnu ñuu	encino capulincillo	2	5,9%	7,500	0,023	3	8,8%	22,000	0,024

yuku tatna	Spanish name	Mixtec Freelist				Spanish Freelist			
		F	F %	Av Rank	Smith's S	F	F %	Av Rank	Smith's S
vi'inde	nopal	2	5,9%	10,500	0,016	4	11,8%	27,250	0,069
iñu kɨu	hierba de sapo	2	5,9%	11,000	0,039	1	2,9%	95,000	0,008
du'a cabayu	cola de caballo	2	5,9%	14,000	0,036	9	26,5%	25,111	0,124
nduyu/te'e nduyu	chilacayote	2	5,9%	14,000	0,015	3	8,8%	48,667	0,033
tnu tka'a	injerto	2	5,9%	14,500	0,020	4	11,8%	17,750	0,084
tayoo kuchi	malva	2	5,9%	15,000	0,012	4	11,8%	49,250	0,026
ndewa buru	chichicaxtle de burro	2	5,9%	16,000	0,032	1	2,9%	21,000	0,004
tnu nduchi nde'e kwixi	grillal blanco	2	5,9%	16,500	0,018	9	26,5%	19,556	0,125
tndu'u	amole	2	5,9%	17,000	0,020	2	5,9%	66,000	0,011
yuku kweyido	hierba de dolor	2	5,9%	18,500	0,018	4	11,8%	9,500	0,047
ita seriw, ita inu	flor de cerrillo, doncella	2	5,9%	19,500	0,017	2	5,9%	23,500	0,010
tnu piru	pirul	2	5,9%	22,000	0,016	3	8,8%	13,333	0,060
nduxa	coyul	2	5,9%	27,500	0,013	3	8,8%	16,667	0,029
ita yɨdɨ na'nu	hierba de borracho grande	2	5,9%	34,500	0,005	2	5,9%	17,000	0,021
tnu kwendɨu	limón	1	2,9%	1,000	0,029	1	2,9%	55,000	0,013
alkamfor	alcanfor	1	2,9%	2,000	0,026	4	11,8%	27,000	0,045
tnu ndete koo	huaje de víbora	1	2,9%	4,000	0,022	1	2,9%	4,000	0,023
tnu tnuu	tejocote	1	2,9%	5,000	0,023	5	14,7%	42,000	0,033
yuku kwedayu	estafiate	1	2,9%	5,000	0,023	5	14,7%	10,800	0,109
yuku kwedayu	gordolobo	1	2,9%	5,000	0,023	5	14,7%	9,600	0,105
yuku mansu	hierba de manzo	1	2,9%	5,000	0,018	1	2,9%	60,000	0,016
tnu tna'nu	quiebra hueso	1	2,9%	6,000	0,019	1	2,9%	10,000	0,005
iñu tndu	caretilla	1	2,9%	6,000	0,023	1	2,9%	21,000	0,013
ita nuni	ita nuni	1	2,9%	7,000	0,013	1	2,9%	11,000	0,003
chate itu	cabello de elote	1	2,9%	8,000	0,012	3	8,8%	58,000	0,022
eucalipto	eucalipto	1	2,9%	8,000	0,024	8	23,5%	16,875	0,148
yuku ii/ita ii	toloache	1	2,9%	9,000	0,016	1	2,9%	43,000	0,016
tnu ndɨu/tnu tndɨu	granicillo/huele de noche	1	2,9%	12,000	0,020	5	14,7%	16,000	0,091
tnu ndete	huaje	1	2,9%	13,000	0,006	2	5,9%	57,500	0,017
ita te'u yuku	dalia	1	2,9%	14,000	0,009	2	5,9%	6,500	0,044
valeriana	valeriana	1	2,9%	15,000	0,011	5	14,7%	39,600	0,045
orejano	orégano	1	2,9%	16,000	0,010	8	23,5%	15,000	0,146
tiko	hinojo	1	2,9%	17,000	0,003	1	2,9%	5,000	0,021
tnu nii	elite	1	2,9%	17,000	0,016	1	2,9%	33,000	0,028
yuku nga'a	diente de león	1	2,9%	18,000	0,017	1	2,9%	7,000	0,024

yuku tatna	Spanish name	Mixtec Freelist				Spanish Freelist			
		F	F %	Av Rank	Smith's S	F	F %	Av Rank	Smith's S
yuku yɨjɨ kwechi	hierba de cáncer	1	2,9%	18,000	0,012	1	2,9%	25,000	0,012
yuku yɨkɨ	hierba de tinta silvestre	1	2,9%	19,000	0,013	2	5,9%	54,000	0,023
tnu nduchi nde'e kwe'e	grillal rojo	1	2,9%	24,000	0,006	2	5,9%	29,500	0,039
tnu duñu	romerillo	1	2,9%	25,000	0,005	2	5,9%	10,000	0,015
tnu ndee nda'a kwechi	somaque	1	2,9%	25,000	0,010	7	20,6%	38,429	0,081
ruta	marubio	1	2,9%	26,000	0,002	7	20,6%	8,571	0,157
tnu nde'a kuxi/tnu nde'a kwixi	capulinar, capulín blanco	1	2,9%	26,000	0,011	3	8,8%	19,667	0,048
tnu nde'a drasnu	durazno	1	2,9%	27,000	0,011	3	8,8%	21,333	0,027
tamorial blanco	tamorial blanco	1	2,9%	30,000	0,009	2	5,9%	50,000	0,026
tamorial morado/ tamorial rojo	tamorial morado/tamorial rojo	1	2,9%	31,000	0,008	3	8,8%	37,667	0,027
ita bombil/ bugambilia	bugambilia	1	2,9%	39,000	0,002	5	14,7%	9,000	0,084
nispero	níspero	1	2,9%	40,000	0,001	5	14,7%	12,200	0,085