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Ethnobotanical Survey of Plants Traditionally Used for Malaria Prevention and Treatment in Selected Resettlement and Indigenous Villages in Sasiga District, Western Ethiopia

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Abstract
Despite rapid control scale-up with insecticides and drugs, malaria remains one of the major health problems in Ethiopia. Increased resistance to insecticides and established drugs by malaria vectors and parasites in that order and their prohibitive costs necessitate the search for alternative cost-effective malaria control tools in the country. Traditional remedies are the most important source of therapeutics for nearly 80% of the population and 95% of the traditional medical preparations in Ethiopia is of plant origin. As the Ethiopian indigenous medicinal plants' knowledge and diversity is vulnerable to be lost when communities migrate to a different flora driven by human actions, continuous documentation and preservation of traditional knowledge and the plant species is a priority. Thus, we report an ethnobotanical survey of plants traditionally used for malaria prevention and treatment in a native and resettled village in Sasiga district, western Ethiopia. To document anti-malarial plant traditional knowledge and determine level of utilization for prevention and treatment of malaria by households, 50 household heads (5% of all households per village) were surveyed of which five household heads per village were traditional healers and included by snow ball sampling. Whereas the rest were addressed by systematic sampling in which every 20th household head was considered. The data were collected through semi-structured interviews performed during field survey and were analyzed using a statistical computer program SPSS version 20.0. A total of sixteen plant species belonging to fourteen families have been reported which were used to prevent and treat malaria by the people. The most cited plant species for malaria prevention by both villages were *Allium sativum* (78.22%), *Melia azedarach* (75.44%) and *Echinops kebericho* (65.22%). Whereas, the major plant species exploited for malaria treatment in the villages in decreasing order of use report were *Allium sativum* (84.00%), *Phoenix reclinata* (81.00%), *Schinus molle* (79.55%), *Carica papaya* (77.11%), *Vigna unguiculata* (75.44%) and *Lepidium sativum* (69.33%).This study has documented more anti-malarial plant species to be used in the indigenous village as compared to the resettled village. The existing medicinal plant species and the indigenous knowledge on traditional medicinal plants in the recently resettled area were under serious threat and were at risk of getting lost. Therefore, urgently warrant sustainable conservation and further research.
Keywords: Indigenous knowledge, malaria vectors, medicinal plants, resettlement

1. Introduction

Despite rapid control scale-up with insecticides and drugs [1], malaria is one of the major health problems in Ethiopia. Synthetic insecticides are widely used currently for malaria control techniques in the form of indoor residual spraying (IRS) and long lasting insecticidal nets (LLINs) plus prompt and effective treatment with anti-malarial drugs in the country [2]. These methods have proven to be highly effective at reducing malaria incidence and prevalence [1, 3]. However, increased resistance to insecticides by the major malaria vectors [4, 5] and increased spread of drug resistance by malaria parasites [2] and prohibitive costs of the insecticides and drugs necessitate the search for alternative cost-effective methods for malaria control in Ethiopia [6,7,8].

Most efficacious synthetic chemicals, such as preythroid insecticide treated nets, have proven difficult to implement on a sustainable basis and cover household members in peripheral communities for reasons of availability, acceptability, and cost [9]. In Ethiopia, the traditional remedies are the most important source of therapeutics for nearly 80% of the population and 95% of the traditional medical preparations in the country is of plant origin [10]. Local medicinal plants are available and beneficial to the rural communities to supplement malaria control programs. For example, Chinaberry (*Melia azederach*) was recently investigated as a locally available, low cost and sustainable insecticide that can aid in controlling malaria in Ethiopia [7].

Other prior studies have also shown that a number of medicinal plants are utilized for the control of malaria as larvicides, adulticides, and mosquito repellents and for malaria therapy in Ethiopia [7,10,11]. For

example, Berhanu and his colleagues [11] indicated eight species of medicinal plants that were used as insecticides and insect repellents and 11 species as anti-malarial in western Gojjam, Ethiopia. Out of these, the same study found that 65.7% of the study informants utilized *Lepidium sativum* for treatment of malaria followed by *Croton macrostachyus* (61.4%). Likewise, Yirga [12] reported that *Dodonaea viscosa* fruits were predominantly used for the treatment of malaria through dermal and oral administration in northern Ethiopia.

Peripheral communities are in the midst of botanical resources but, cannot easily access health facilities for prompt and effective malaria diagnosis and treatment in Ethiopia [13] mainly due to geographical and economical barriers. As a result, home management of malaria in the form of self-treatment with traditional medicine is the major action taken to control malaria [14]. Traditional medication heavily relies on medicinal plants in Ethiopia [10]. However, the Ethiopian indigenous medicinal plants' knowledge that perpetuate by word of mouth within families and the communities is fragile traditional skills that are likely to be lost when communities emigrate to other regions with a different flora; and can also be lost by lifestyle changes and due to rapid loss of natural habitats [15].

Population pressure, ecological degradation, drought and famine have often resulted in the immigration and resettlement of a huge number of Ethiopian populations to malaria enedemic lowlands from highland areas. These have resulted in rapid growth of human population in malaria endemic lowlands that has become a threat to local flora leading to the resurgence of the disease [16, 17]. However, studies on the anti-malarial plants and their threats from resettlement villages are limited. Therefore, this study was conducted to document traditional medicinal plant species that are utilized for malaria prevention and treatment and the indigenous knowledge of the people in a native and resettled village in western Ethiopia. Documentation of medicinal plants and the associated indigenous knowledge is very important to conserve the medicinal plant genetic diversity and preserve the knowledge and traditional skills.

1.1. Materials and methods

1.1.1. The study area

The study was conducted in Karsa Mojo (KM): an indigenous village and Mada Jalala (MJ): a resettlement village in Sasiga district. Sasiga district was purposely selected for this study because it is among the major malaria-prone areas in western Ethiopia. Both villages are located in the upper Blue Nile River Basins, namely Anger-Didessa Basins (Fig. 1). The two villages were also selected purposely based on accessibility and knowledge of reported malaria cases.

KM is located at 9° 22′N, 36° 10′E and is situated adjacent to MJ about 7kms to the west. Whereas, MJ is located at 9° 14′N, 36° 27′E. There were about 400 and 600 household heads in KM and MJ in 2012 respectively. The area is relatively flat, with the natural vegetation mainly of riverside forests dominated by indigenous trees and savanna vegetations. Its elevation averages about 1350 meters above sea level. In this area, annual rain and relative humidity for nine consecutive years (2002-2010) averages about 93.35cm and 75.5% respectively. In the years 2002-2010 mean annual temperature of the area was 20.1°C and annual minimum and maximum temperatures was 11.2 and 29.1°C, respectively (Source: National Meteorological Service Agency of Ethiopia, Unpublished data).

Most households in both villages primarily depend on subsistence rain fed agriculture and livestock herding although small scale irrigation schemes are also currently introduced. Malaria control heavily relies on LLINs and by treatment of diagnosed cases with anti-malarial drugs.

1.1.2. An Ethno botanical survey

To document an indigenous anti-malarial plant traditional knowledge and determine level of utilization of traditional medicinal plants for prevention and treatment of malaria by households, 50 households heads (5% of all households per village) were surveyed of which five household heads per village were traditional healers and included by snow ball (referral) sampling. Whereas the rest were addressed by systematic sampling in which every 20th household head was considered. The sample household heads from all-age groups were randomly interviewed from the two villages.

The ethno-botanical techniques employed to collect data on knowledge and usage of medicinal plants was based on semi-structured interviews and field observation. All collections were made by the researcher (Oljira Kenea) who can speak the local language and also familiar with some of the traditional plants used by the local people.

For collection of information on plants used for treating and prevention of malaria by the people living in the rural study villages, a semi-structured questionnaire was prepared that focus to collect socio-economic status of the participants, local names of the anti-malarial plants, plant parts used, and how such knowledge is preserved and transmitted to next generation. With the help of local informants, the plant species were observed in the field and the plant specimens were taxonomically identified with the help of herbarium materials and experts.

1.1.3. Data analysis

Data collected during the survey was checked by the researcher in the field and after data cleaning, coding and

editing; entry and analysis was made using the statistical package for social sciences (SPSS) version 20.0 software (SPSS Inc, Chicago, IL, USA). Descriptive statistics mainly frequency and cross tab were employed to analysis the proportion of use-reports of medicinal plant species that were frequently cited by the informants during ethno botanical survey.

1.1.4. Ethical considerations

The objectives of the study were clearly explained and verbal consent was obtained from each study participant. Approval to conduct the study was granted by the Department of Zoological Sciences, Addis Ababa University.

1.2. Results

1.2.1. Socio-economic characteristics of participants and their knowledge about anti-malarial plants

Socio-economic features of respondents are depicted in Table 1. In this ethno-botanical study, male respondents constitute 80.7% and female were 19.3%. The majority of the informants who participated in the study from KM (81.7%) and MJ (80.0%) were male. Age of the respondents was ranging from ≤ 20 to ≥ 51 with 78 (52.0%) informants' age ranged from 41-50 years. The majority of the informants (60%) were unable to read and write and their estimated monthly income ranged from birr 500.00 to 1000.00 ($27.70 to $55.50).

Overall, 114 (76.0%) of the respondents had adequate knowledge about traditional anti-malarial medicinal plants in the villages. 78.3% of the respondents from KM and 74.4% from MJ reported that they had adequate knowledge about traditional medicinal plants that are used for malaria prevention and treatment in their localities. Whereas, 83.3% of the respondents from KM and 85.6% of the informants from MJ were reported that they have used medicinal plants for malaria prevention and treatment.

1.2.2. Traditional usage of anti-malarial plants by households

The present ethno-botanical survey results revealed a total of seven plant species used by the local community of KM and MJ for prevention of malaria (Table 2). As it can be seen from the table, the most cited plant species and its percentage use for malaria prevention by both villages were as follows: *Allium sativum* (78.22%), *Melia azedarach* (75.44%) and *Echinops kebericho* (65.22%). Malaria prevention use report of the plant species for each village revealed that *Allium sativum* (80.55%), *Echinops kebericho* (75.11%) and *Eucalyptus citriodora* (61.66%) were the most frequently used plant species in KM (Table 4). Whereas, *Allium sativum* (79.55%), *Echinops kebericho* (70.74%) and *Melia azedarach* (61.55%) were the dominant plant species used for malaria prevention in MJ(Table 4).

The plant species used for malaria therapy and their use reports by the study communities are shown in Table 3 and 5. Overall, the major plant species exploited for malaria treatment in the villages in decreasing order of use report in percent were *Allium sativum* (84.00%), *Phoenix reclinata* (81.00%), *Schinus molle* (79.55%), *Carica papaya* (77.11%), *Vigna unguiculata* (75.44%) and *Lepidium sativum* (69.33%). Regarding anti-malarial use report of the plant species by each village, it was found that, *Allium sativum* (70.00%), *Carica papaya* (67.77%), *Phoenix reclinata* (65.22%) and *Schinus molle* (64.55%) were the most frequently utilized anti malarial traditional medicinal plants in KM. Nevertheless, in MJ, *Allium sativum* (81.77%), *Carica papaya* (78.85%) and *Schinus molle* (77.33%) were found to be the predominant anti malarial plant species used by the villagers (Table 5).

The 12 plant species that were mentioned by the informants as effective against malaria and vector mosquitoes and their uses that were documented during field survey work are provided in Tables 2-5. The respondents had good knowledge about malaria and could identify it from other fevers on the basis of locally accepted characteristic symptoms that included headache, fever, joint pains, sweating, loss of appetite, thirst, shivering, and bitter taste in the mouth.

1.2.3. Sources of knowledge about medicinal plants and their preservations

It was found that majority of indigenous knowledge on anti malarial plants were restricted to elder members with ages ranging from 41 to 50 years (Table 1) and the younger's have limited contribution in this aspect. The majority of the informants said that the best means of transferring this traditional medicinal knowledge and skill was at the family level. The information has been orally passed down from family members, particularly grandparents and parents. Nonetheless, some traditional healers kept the knowledge with them. The informants' responses indicated that most of the traditional healers were not interested to transfer their knowledge to interested individuals in the community as they may loss their income or recognition in the community.

As a result accurate knowledge of the plants and their medicinal properties were held by only a few individuals in the community and without exception indigenous knowledge which was handed down to some elders throughout generation is at risk of getting lost. On the other hand, informants' report showed that the young generation is not eager to acquire the knowledge and skills of the traditional medicinal plants due to the wrong assumption that the practice is only undertaken by uneducated and uncivilized people.

1.2.4. Threats to the anti malarial medicinal plants and indigenous knowledge

In this study, human factor was found to contribute to the threats that affect medicinal plant species and indigenous knowledge in the study villages. The most serious threat to the existing knowledge and practice on

traditional anti malarial medicinal plants included; immigration, agricultural expansion, forest-fire, settlement, cultural change, particularly the influence of modernization, accessibility to modern medicine, and lack of interests by the younger generations were the main problems reported by the informants during the study.
Modernization and modification of culture in the area have played a major role in changing the attitude of younger generation to ignore the use of traditional knowledge. Deforestation which is driven by human activities, including agricultural development was reported to be the major threat to the local flora in general and to the anti-malarial medicinal plants in particular.

1.3. Discussions

The present study has documented sixteen plant species traditionally used for malaria prevention and treatment in KM and MJ villages. Of these, the most cited species for malaria prevention in both villages were *Allium sativum* (78.22%), *Melia azedarach* (75.44%) and *Echinops kebericho* (65.22%). Malaria prevention use report of the plant species for each village further revealed that *Allium sativum* (80.55%), *Echinops kebericho* (75.11%) and *Eucalyptus citriodora* (61.66%) were the most frequently used plant species in KM whereas, *Allium sativum* (79.55%), *Echinops kebericho* (70.74%) and *Melia azedarach* (61.55%) were the dominant plant species used for malaria prevention in MJ. However, the majority of plant species (63.6%) that were cited to be used for malaria prevention were reported from KM as compared to the use-reports in MJ.

Some of the plant species presently identified have previously been documented elsewhere in the country regardless of some discrepancy in their use-report percentage [11,18,19]. For example, Berhanu and colleagues [11] reported that *Allium sativum, Lepidium sativum* and *Melia azedarach* were widely used as insecticidal and insect repellents in Jabitehnan district, west Gojjam Ethiopia.

The reasons for more plant species use-report from KM than MJ in this study could be due to more adaptability and familiarity to the local ecology and flora by the former than the later villagers as the later was a recent advent to the area and might have lost traditional knowledge and skills of medicinal plant exploitation due to emigration from their original ecology and flora. This observation is in agreement with prior reports who indicated that the Ethiopian indigenous medicinal plant's knowledge which is available in rural communities and perpetuated by word of mouth within families and the communities is fragile traditional skills that are likely to be lost when communities emigrate to other regions with a different flora [15].

The present ethno-botanical survey also found nine plant species that were reported to be used for anti-malarial agents in the study villages. Of the nine species, the major plant species exploited for malaria treatment in the villages in decreasing order of use-report in percent were *Allium sativum* (84.00%), *Phoenix reclinata* (81.00%), *Schinus molle* (79.55%), *Carica papaya* (77.11%), *Vigna unguiculata* (75.44%) and *Lepidium sativum* (69.33%). It was found that, *Allium sativum* (70.00%), *Carica papaya* (67.77%), *Phoenix reclinata* (65.22%) and *Schinus molle* (64.55%) were the most frequently utilized anti malarial traditional medicinal plants in KM whereas *Allium sativum* (81.77%), *Carica papaya* (78.85%) and *Schinus molle* (77.33%) were found to be the predominant anti malarial plant species used in MJ. Nevertheless, most of the plant species (53.3%) that were reported to be used for malaria therapy in the villages were cited by informants from KM than MJ.
In agreement with the present findings, the wide use of *Allium sativum* and *Lepidium sativum* for malaria therapy in Ethiopia was previously documented from different parts of the country [11,19]. Whereas, to our knowledge, *Phoenix reclinata*, *Schinus molle*, *Carica papaya* and *Vigna unguiculata* have not previously been documented for malaria treatment in Ethiopia and warrant future research to support the conservation and sustainable harvesting of the species. Some of these species such as *Carica papaya* however have been widely used for malaria therapy in other parts of Africa [20]. Moreover, the possible reason for more anti-malarial plant use-report from Karsa Mojo than Mada Jalala village was believed to be due to the explanations given earlier in this discussion.

Furthermore, it was found that the respondents had good knowledge about malaria and could identify it from other fevers on the basis of locally accepted characteristic symptoms that included headache, fever, chills, joint pains, sweating, and loss of appetite, weakness, vomiting, thirst, shivering, and bitter taste in the mouth. It was also found that majority of indigenous knowledge on anti-malarial plants were confined to elder members with ages above 41 years and the youngers have limited contribution in this aspect. The majority of the informant said that the best means of transferring this traditional medicinal knowledge and skill was at the family level. Fragile information has been orally passed down from family members, particularly grandparents and parents. Nonetheless, the informants' responses indicated that most of the traditional healers were not interested to transfer their knowledge to interested individuals in the community as they may loss their income or recognition in the community and/or due to the wrong believe that if the medicinal plant is known by the user it will not be curative. And such practices are consistent with previous reports in other parts of Ethiopia [12].

Finally, in this study, several factors were found to contribute to the threats that affect anti-malarial plants species and indigenous knowledge in the study area. The most serious threat to the existing knowledge and practice on traditional anti-malarial plants which were reported by the respondents during field survey

included immigration and resettlement, agricultural expansion, forest-fire, cultural change, particularly the influence of modern education, accessibility to modern medicine, and lack of interest by young generation to acquire the knowledge and skills of the traditional medicinal plants due to the wrong assumption that the practice is only undertaken by uneducated people. Therefore, the indigenous ethno-botanical knowledge and anti-malarial plant species in resettlement villages were under serious threats and warrant further studies and sustainable conservation before human factors and environmental factors could deplete them.

1.4. Conclusions: This study has documented 16 anti-malarial plant species reported to be used traditionally for malaria prevention and treatment in rural resettlement village of Sasiga district. It was found that majority of indigenous knowledge on anti-malarial plants were confined to elder members with ages above 41 years and the younger's have little contribution in this aspect. The best means of transferring this traditional medicinal knowledge and skill was through oral fragile information at family level. Human induced ecological changes most threaten the plant species in the resettlement villages and warrant immediate concern and action.

Competing interest

The authors declare that they have no competing interests.

Author contributions

Participated to the study design: OK, HT. Performed data collection: OK, HT. Performed data analysis and interpretation of results: OK, HT. Drafted and revised the manuscript: OK, HT. All authors read and approved the final manuscript.

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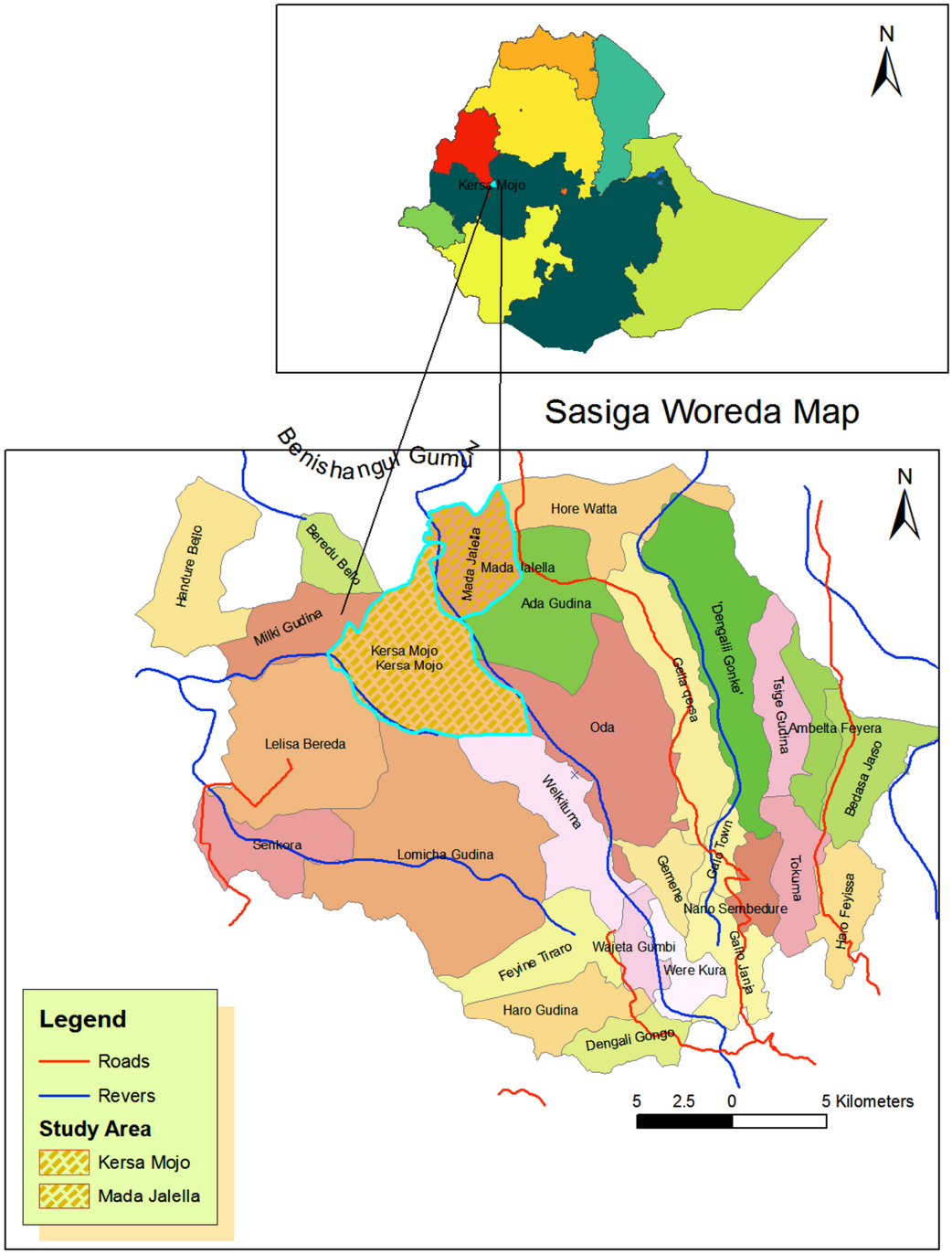

Figure 1. The study area map and its location in Ethiopia

Table 1. Socio-economic characteristics of participants

Variable	Karsa Mojo		Mada Jalala		Overall	
Gender group (of respondents): Male	49	81.7	72	80.0	121	80.7
Female	11	18.3	18	20.0	29	19.3
Age group distribution (in years):						
Below 20	3	5.0	5	5.6	8	5.3
20-40	11	18.3	7	7.8	18	12.0
41-50	23	38.3	55	61.1	78	52.0
≥51	23	38.3	23	25.6	46	30.7
Educational status:						
Unable to read and write	35	58.3	55	61.1	90	60.0
1-5th	20	33.3	33	36.7	53	35.3
6-10th	5	8.4	2	2.2	7	4.7
11-12th	0	0.0	0	0.0	0	0.0
>12th	0	0.0	0	0.0	0	0.0
Estimated monthly income (in Birr):						
<500.00	10	16.7	23	25.6	33	22.0
500.00-1000.00	44	73.3	59	65.6	103	68.7
>1000.00	6	10.0	8	8.8	14	9.3
Knowledge of anti-malarial plants:						
No	13	21.7	23	25.6	36	24.0
Yes	47	78.3	67	74.4	114	76.0
Use of anti-malarial plants:						
No	10	16.7	13	14.4	23	15.3
Yes	50	83.3	77	85.6	127	84.7

Table 2. The overall traditional medicinal plants used for malaria prevention based on informants' use report in the study villages

Family names	Scientific names	Local names	Use report (%)	Plant parts	Uses
Alliaceae	*Allium sativum*	Qulubi adi	78.22	Bulb	Repel forager mosquitoes
Asteraceae	*Echinops kebericho*	Qabaricho	65.22	Root	Smokes repel mosquitoes
Cucurbitaceae	Momordica foetida	Umba'o	55.11	Seed, fruit	Juice and smoke kill/repel insects
Meliaceae	*Melia azedarach*	Neemi	75.44	Leaf	Smoking deter mosquitoes
Myrtacae	*Eucalyptus citriodora*	Bargamo-adi	48.55	Leaf	Smokes repel mosquitoes
Phytolaccaceae	*Phytolacca dodecandra*	Andoode	6.77	Seed	Seed infusion kill mosquito larvae
Solanaceae	*Nicotiana tabacum*	Tambo	46.11	Leaf	Smoking deter mosquitoes indoor
Total			450		

Table 3. The overall traditional medicinal plants used for malaria treatment based on informants' use report in the study villages

Family names	Scientific names	Local names	Use report (%)	lant parts	Uses
Alliaceae	*Allium sativum*	Qulubi adi	84.00	Bulb	Eaten with food
Anacardiaceae	*Schinus molle*	Mimxa-Gumuz	79.55	Seed	Eaten with food
Arecaceae	*Phoenix reclinata*	Meexxi	81.00	Stem, root	Stem and root juice is taken
Bignoniaceae	*Stereospermum kunthiamum*	Botoro	12.77	Stem	Young stem juice is taken
Brassicaceae	*Lepidium sativum*	Feto	69.33	Seed	Seed juice is taken
Caricaceae	*Carica papaya*	Papaya	77.11	Leaf	Immature leaf juice is taken
Fabaceae	*Vigna unguiculata*	Epho-Gumuz	75.44	Leaf, seed	Cooked & eaten
Euphorbiaceae	*Croton macrostachyus*	Bkkanisa	21.00	Leaf	Tip shoot juice is taken
Meliaceae	*Melia azedarach*	Neemi	22.55	Seed	Juice given to patients
Total			450		

Table 4. Traditional medicinal plants used for malaria prevention in the study villages based on informants' use report

Family names	Scientific names	Local names	Use report (%)	Plant parts	Uses
Karsa Mojo (n=180)					
Alliaceae	*Allium sativum*	Qulubi adi	80.55	Bulb	Repel forager mosquitoes
Myrtacae	*Eucalyptus citriodora*	Bargamo-adi	61.66	Leaf	Smokes repel mosquitoes
Cucurbitaceae	Momordica foetida	Umba'o	46.66	Seed, fruit	Juice and smoke kill/repel insects
Meliaceae	*Melia azedarach*	Neemi	21.33	Leaf	Smoking deter mosquito indoor
Solanaceae	*Nicotiana tabacum*	Tambo	32.66	Leaf	Smoking deter mosquitoes
Asteraceae	*Echinops kebericho*	Qabaricho	75.11	Root	Smokes repel mosquitoes
Phytolaccaceae	*Phytolacca dodecandra*	Andoode	11.22	Seed	Seed infusion kill mosquito larvae
Mada Jalala (n=270)					
Asteraceae	*Echinops kebericho*	Qabaricho	70.74	Root	Smokes repel mosquitoes
Solanaceae	*Nicotiana tabacum*	Tambo	22.40	Leaf	Smoking deter mosquitoes
Alliaceae	*Allium sativum*	Qulubi adi	79.55	Bulb	Repel forager mosquitoes
Meliaceae	*Melia azedarach*	Neemi	61.55	Leaf	Smokes repel mosquitoes

Table 5. Traditional medicinal plants used for malaria treatment in Karsa Mojo and Mada Jalala villages

Family names	Scientific names	Local names	Use report (%)	Plant parts	Uses
Karsa Mojo (N= 180)					
Alliaceae	*Allium sativum*	Qulubi adi	70.00	Bulb	Eaten with food
Caricaceae	*Carica papaya*	Papaya	67.77	Leaf	Immature leaf juice is taken
Arecaceae	*Phoenix reclinata*	Meexxi	65.22	Stem, root	Stem and root juice is taken
Fabaceae	*Vigna unguiculata*	Epho-Gumuz	45.33	Leaf, seed	Cooked & eaten
Meliaceae	*Melia azedarach*	Neemi	34.11	Seed	Juice given to patients
Brassicaceae	*Lepidium sativum*	Feto	42.00	Seed	Seed juice is taken
Bignoniaceae	*Stereospermum kunthiamum*	Botoro	41.33	Stem	Young stem juice is taken
Anacardiaceae	*Schinus molle*	Mimxa-Gumuz	64.55	Seed	Eaten with food
Mada Jalala (n=270)					
Caricaceae	*Carica papaya*	Papaya	78.85	Leaf	Immature leaf juice is taken
Anacardiaceae	*Schinus molle*	Mimxa-Gumuz	77.33	Seed	Eaten with food
Bignoniaceae	*Stereospermum kunthiamum*	Botoro	45.18	Stem	Young stem juice is taken
Meliaceae	*Melia azedarach*	Neemi	47.00	Seed	Juice given to patients
Euphorbiaceae	*Croton macrostachyus*	Bkkanisa	42.22	Leaf	Tip shoot juice is taken
Brassicaceae	*Lepidium sativum*	Feto	49.96	Seed	Seed juice is taken
Alliaceae	*Allium sativum*	Qulubi adi	81.77	Bulb	Eaten with food

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