

You Are What You Eat: Malnutrition and its Determinants in Ecuador:

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BOSTON COLLEGE
MORRISSEY COLLEGE OF ARTS & SCIENCES
HONORS PROGRAM

YOU ARE WHAT YOU EAT:
MALNUTRITION & ITS DETERMINANTS IN ECUADOR



A SENIOR HONORS THESIS
BY
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ADVISED BY PROFESSOR JOHN MICHALCZYK

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Abstract

Why do we eat the foods that we do? This question is one that is not often considered by individuals as they go about their daily lives, but can have large implications on public health – for, there is a strong, physiological connection between food consumption and one’s health and wellbeing. Accordingly, when reflecting upon the health of a nation it is often important to consider its nutritional status. Ultimately, many determinants can contribute to how and why an individual eats certain foods, as can be seen in Ecuador. In this Latin American country, for instance, historical, socioeconomic, cultural, behavioral, socioeconomic, and environmental factors (among others) can be seen to influence the different diets – and by extension, the nutritional statuses – of different ethnic, regional, and geographic populations. Though common across Ecuador, discrepancies among these groups are particularly noticeable in the highland region, the Sierra. Overall, this paper examines the different forms of malnutrition, their implications on one’s health, and their prevalence across Ecuador. Additionally, it considers how the Ecuadorian diet was shaped, and how different subcuisines lend themselves to varying forms of malnutrition. Specifically, this paper focuses on the Sierra, given that levels of malnutrition are noticeably higher in this region, and that this highland area is home to large rural and indigenous communities who are most significantly impacted by the region’s nutritional conditions.

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Dedication

*for the individuals of Ecuador,
and particularly those living in unjust and/or harsh conditions*

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The Rural Sierra. Tingo, Ecuador (Photo Credit – Lindsay Stone, June 2014)

Introduction

Fried plantains, ceviche, spit-roasted guinea pig, steamed tubers and roots, spice-rubbed beef, tomatoes, empanadas, sipping chocolate, fish, flour tortillas, farmer’s cheese, popcorn, chicken and onions, sliced avocados, sweet rolls, boiled eggs, potato patties, rice pudding, mint tea... Such is just a sampling of the variety of foods and meals that can be found across the different geographical regions of Ecuador. This Latin American country spans from the Galapagos Islands and the country’s Pacific coast to the Amazon jungle, and is split down the middle by the Andes Mountain Range. Within these regions exist a wide variety of flora, fauna, and peoples – and among the different cultures associated with the latter, different food habits and diets have been adopted across the centuries due to their respective histories and geographical locations. However, despite the ample

and diverse set of foods which constitute Ecuadorian cuisine (which is generally split into two “subcuisines”: that of the coast and lowlands and that of the mountain highlands), Ecuador is home to a population afflicted by nutritional deficiencies (Long 171). In fact, issues including undernutrition, obesity, and micronutrient deficiency lend themselves to the “deleterious nutritional situation” prescribed by the World Bank in their most recent country study report on Ecuador (Walker et al. xiii). This poor nutritional status in Ecuador is a result of many factors, ranging from the individual level to that of the Ecuadorian society overall.

Regarding the health of the individual, it is important to recognize the different factors which influence how people are born, live, work, and survive – especially given that one’s family and community, social conditions, and geographical location can all impact one’s habits and thus factor into their multifaceted set of health determinants (Ortega). Though the actual foods that an individual consumes fundamentally dictate his or her physiological health, how and what one eats (i.e., according to their food habits) can also lend themselves to one’s wellbeing. As such, when looking at a region it can be beneficial to examine both its people’s food behaviors and the nutritional conditions as a measure of the community’s health; these factors can be key in understanding a population’s health, especially when health itself is not a primary focus of the community (as is often the case in rural communities, due to a lack of education, prioritization, etc.) (Ortega et al.).

To better understand why Ecuador’s nutritional state “is a source of great concern,” this paper will explore food behaviors present in Ecuador, according to different geographic, socioeconomic, ethnic, and cultural factors; specifically, it will examine the forces which have shaped the Ecuadorian diet, and the resulting nutritional conditions and concerns (Walker et al. xiii). This paper will largely analyze malnutrition levels in children, as they can be an indicator of not only the current, but also the future population’s health. Though a broad scope of the different geographical regions will be

presented, a focus will be placed on Ecuador's central, Andean highlands (i.e., the Sierra) and specific population types present there: that of urban cities (such as Quito, Ecuador's capital) and that of the rural and indigenous highland towns (including Tingo, Zambagua, and Cotacachi, small communities located in the Andes).

I. You Are What You Eat: The Role of Nutrition & Food Behavior on Malnutrition & Health

When defining the word "nutrition," one often refers to the food and calories that individuals consume and its impact on their wellbeing. According to nutrition literature, the average adult human – which, according to the "Estimated Energy Requirements equation," is characterized as the "reference male" at 5' 10" and 154 lbs, and the "reference female" at 5' 4" and 126 lbs – with a sedentary lifestyle needs 1,800 – 2,200 calories per day (depending on gender); this range indicates the minimum number of calories that one needs to maintain "energy balance" between one's caloric intake and energy expenditure (USDA). In addition to the summation of the energy lost from physical activity (ranging from heavy exercise to the light physical activity associated with one's daily life) and the thermic effect of food (i.e., the energy required to break down food), energy expenditure also includes one's basal metabolic rate (BMR). Around 45-70% of one's daily caloric intake is necessary to support the body's most basic functions, including protein synthesis, body temperature regulation, hormone production, brain function, digestion, and continued beating of the muscles in the heart ("Dietary Energy"). Beyond one's BMR, any additional activity – e.g., reading, housework, fidgeting, occupational work, household chores, social interactions, etc. – necessarily increases one's energy expenditure; in this way, an active, adult reference male needs as many as 3,000 calories per day to maintain his average energy needs, of which only 1,600 are allocated to his BMR (USDA; Anderson 47).

However, as nutritional anthropologist E. N. Anderson reminds us, humans “don’t simply need ‘food’ ... [but] need a vast range of nutrients” (Anderson 46). Nutrition plays an integral role in the health of an individual by providing not only adequate energy through foods’ caloric value, but also key nutrients which help the body to function at its best. Two nutrient subsets are necessary for the maintenance of one’s health and the prevention and treatment of disease: the energy-providing macronutrients (i.e., fats, carbohydrates, and protein) which function as the building blocks for the body, and micronutrients (i.e., vitamins and minerals) which help the human body efficiently process and utilize the energy produced by the body’s breakdown of the former nutrient subset. Though fats, carbohydrates, and proteins are crucial to human growth, development, and energy metabolism, vitamins and minerals are also necessary for a variety of physiological functions (Burchi et al.). Ultimately, the impact of food – and the macro- and micro- nutrients within it – on one’s health is most visible when specific diseases and conditions are conferred by dietary deficiencies; by throwing off the delicate nutrient balance that the body requires, a variety of health issues can arise.

But, despite the role that food has in the maintenance of health, social activity, and overall wellbeing, many live without access to proper nutrition – in fact, according to the UN’s Food and Agricultural Organization (FAO), “nearly 30 percent of the world’s population suffer from some form of malnutrition” and thus lack sufficient “energy or key nutrients” (“The Spectrum of Malnutrition”). While hunger – i.e., distress caused by the quantity of food consumed, which fails to ensure necessary caloric intake – often lends itself to this global health concern, the quality of one’s diet (i.e., the food’s nutritional composition) also plays an integral role (Burchi et al.) Malnutrition, the lack of proper nutrition (in either excess or absence of nutrients), can take on many forms; individuals affected can be categorized as having mild or moderate to severe acute malnutrition, or can lie on the opposite end of the spectrum, as obese. In general, undernutrition,

obesity (i.e., overnutrition), and micronutrient deficiency are often noted as three main categories that are encompassed by the term malnutrition. Although the former two categories are often easy to identify at a glance (due to the physical manifestations often caused by the lack of proper nutrition and an energy imbalance between calories consumed and expended), the latter is often overlooked or overshadowed despite the significant effect it can also have on individuals' health, well-being, and development. Regardless of its form, malnutrition clearly has significant physiological implications; as the World Health Organization (WHO) states, malnutrition gives rise to a "cellular imbalance between the supply of nutrients and energy and the body's demand for them," and thus prevents the body from "[ensuring] growth, maintenance, and specific functions" (qtd. in Grover et al.).

Forms of Malnutrition: Undernourishment, Hidden Hunger, and Obesity

Undernutrition or undernourishment can predominately be considered in terms of a lack of adequate food consumption, and is commonly manifested as "protein-energy undernutrition" or "protein energy malnutrition." This basic form of malnutrition often manifests itself in severe ways because of the afflicted person's failure to maintain energy balance and meet their basal metabolic needs; with insufficient energy intake, a variety of "physiologic adaptations" can develop, ranging from the biochemical to the developmental level and with the potential to affect "all organ systems in the body" (Grover et al.). Though (as the name suggests) protein-energy malnutrition can result from a lack of protein, it may also be caused by any diet lacking in "energy and protein because of a deficit in all major macronutrients" – including carbohydrates and fats, in addition to proteins ("Types of Malnutrition"). In this way, undernourishment, also categorized as "chronic hunger," is formally characterized by an inadequate intake of food necessary for one to meet one's dietary

energy needs (“Understanding Hunger and Malnutrition”). This form of malnutrition is commonly associated with stunting (growth retardation, indicated by a low height-for-age) and wasting (a low weight-for-height, indicative of acute malnutrition) in children and adults – particularly in instances of severe acute undernourishment (Reinhard et al. 10). In fact, because stunting is a strong visual indicator of undernutrition, some define chronic malnutrition as the presence of stunting and thus use the two terms interchangeably.¹

Though many (somewhat erroneously) associate malnutrition solely with protein-energy undernutrition, for others the issue is not necessarily one of improper caloric (i.e., energy) consumption. Instead, malnutrition can also be a problem of lacking sufficient intake of the “minerals and vitamins that [one needs] to thrive, physically and mentally,” leading to micronutrient deficiency (“Nutrition in 2 Minutes”). Though other forms of malnutrition may be easier to spot, it can often be the case for “people affected by undernutrition [to] not show symptoms of extreme hunger or starvation”; as such, micronutrient malnutrition is often referred to as “hidden hunger (“Nutrition: Strategy Overview”). Though this form of malnutrition can certainly stem from inadequate food intake – that is to say, hidden hunger can easily coexist with other forms of malnutrition – deficiencies in micronutrients and energy can also arise despite adequate consumption (von Grebmer et al.; “The Hidden Hunger”). Hence, what food is consumed – that is, the variety of nutrients – is just as important as the quantity (“Nutrition in 2 Minutes”). Diets lacking sufficient vitamins and minerals such as vitamin A, iodine, and iron – the “big three” of the nineteen essential micronutrients – have a significant role in the global disease burden; however, though vitamin A has a significant effect on public health, the three most prevalent micronutrient deficiencies (which each affect more

¹ Because wasting has been essentially eradicated in Ecuador since 1986, this report will similarly associate chronic malnutrition with stunting (Nutritional Failure in Ecuador). Thus, stunting will primarily be referenced when undernutrition or chronic malnutrition are mentioned.

than 1 billion people) are those of iodine, iron, and zinc (Burchi et al.). Each of these micronutrients lend themselves to different failures in health and development, ranging from a weakened immune system to higher rates of stunting and impaired cognition; consequently, though our bodies require only small amounts of micronutrients, not meeting these requirements can have large effects. Thus, as Kul Gautum, the former deputy executive director of UNICEF, states: “you might not feel [micronutrient deficiency] in the belly, but it strikes at the core of your health and vitality” (qtd. in von Gregmer et al. 20).

Finally, though historically having a large body mass has been viewed as a symbol of wealth and prestige in some cultures, obesity is in fact an indicator of improper nutrition (“The Spectrum of Malnutrition”). Though many associate malnutrition with a lack of food consumption, individuals who have an energy imbalance from excessive caloric intake suffer from a form of malnutrition defined as overnutrition; accordingly, those who are overweight or obese are susceptible to “abnormal physiological [conditions]” that result from “eating the wrong amount and/or kinds of food,” just like any other malnourished individual (von Grebmer et al. 21). Somewhat ironically, individuals with overnutrition can be lacking in key nutrients as well; as such, this third category of malnutrition often coincides with micronutrient deficiencies and/or undernourishment, particularly in developing and/or low- and middle-income countries. In this way, many who are overweight or obese are often subjected to a “double burden” or even “triple burden” of malnutrition (von Grebmer et al. 21). Though it may seem paradoxical, those who are overweight or obese can suffer from hidden hunger just like a stunted or wasted individual. For, when energy-dense and micronutrient-poor foods high in fat, sugar, and salt – which, as the WHO observes, “tend to be lower in cost but also in nutrient quality” – are readily available, undernutrition and obesity can often be found to “[coexist] within the same country, the same community and the same household” (“Obesity and

Overweight”). However, overnutrition is not solely caused by an excessive intake of foods (and particularly those which are energy-dense and high in fat); it can also be caused by a lack of physical inactivity – the causes of which are often culturally embedded, given modern transportation methods, urbanization, and sedentary societal patterns (“Obesity and Overweight”).

Looking to Children: Nutrition & Youth

Over the course of one’s lifespan, the consequences of malnutrition are not limited to improper growth and development during a certain age range; instead, its effects can be felt throughout the individuals’ lives as their levels of education and economic productivity are limited. However, to accurately measure the nutritional state of a populace in an individual region or on a global scale, most studies of conditions and progress are measured by the proportion of malnourished – and particularly underweight (“deficient weight for age”), wasted (“deficient weight for height”), or stunted (“deficient height for age”) – children under the age of five (Walekr et al. 8). Because of this, however, many statistics only represent a subset of the population, the use of underweight under-five children as a measurement is a powerful indicator of a population’s health and nutritional conditions.

Over the past years there has been increased cognizance and understanding of “the importance of early-childhood nutrition to developmental outcomes” (Walker et al. 1). A collection of “strong international evidence” points to a range of negative consequences that stem from “nutritional failure during pregnancy” and/or “in the first few years of life” (Walker et al. 1). Accordingly, “most of the irreversible damage due to malnutrition” occurs as early as six to eighteen months – and by two years, “the damage done... is [largely irreparable]” (World Bank; “Nutrition in 2 Minutes”). Accordingly, many professionals reference the so called “window of opportunity”; this period of time ranging from “pre-pregnancy to around 24 months” signifies a critical period of

child growth, health and development (Barker). During this time frame, children are subjected to significant “risk of malnutrition,” and thus will thus likely fail to realize “a strong, healthy, productive future” (“A Window of Opportunity”). Physiologically, young children “typically have less nutritional [reserves] than adults,” and are thus “particularly susceptible to malnutrition” (Katona et al.). Moreover, they are more vulnerable to entering into a deleterious cycle of malnutrition and disease, given that “poor nutrition leaves children underweight, weakened, and vulnerable to infections” (Katona et al.). In fact, it is estimated by some that “feeding all children worldwide an adequate diet” would decrease the instance of child deaths from pneumonia, diarrhea, malaria, and measles by more than 2.5 million (Katona et al.) Accordingly, many call for action to fight, treat, and prevent malnutrition during this window of opportunity to prevent its occurrence and lasting effects (“Nutrition in 2 Minutes”).

Thus, as the most at-risk subset of a population, it is not too surprising that children are the focus of most nutrition studies. However, it is beneficial to look at the nutritional status of the under-five age group because it not only reflects the current health of the children in a region, but also predicts that of the future adult population. For, as many studies have shown, early malnutrition is correlated to physical and mental damage, as well as decreased future health, welfare, and economic wellbeing. This is particularly the case with children who are undernourished during the window of opportunity, as they frequently experience decreased cognitive development which is detrimental to their future productivity, growth, and health; for instance, the World Bank associates a 2.5% decrease in future, adult earnings solely with the instance of childhood anemia (World Bank). Ultimately, childhood malnutrition inevitably leads to “negatively [affected] physical strength and cognitive ability in adults,” which “feeds directly into [a] reduced earnings potential of individuals,” decreased intellectual capacity and academic achievements, and an increased probability of general poor physical and social health (Walker et al. 1, 1; “A Window of Opportunity”).

Additionally, the nutritional status of children often correlates with that of their parents. Children, for instance, often have the same access to food as their parents, and learn to partake in similar food behaviors. In some cases, if a child is undernourished or is afflicted with undernutrition-related conditions, it is quite possible that his or her mother and/or father also faces the same health issues; if parents are undernourished themselves, it is unlikely that they would be able to provide an adequate diet for their child. In particular, the nutritional status of a child most frequently aligns with that of its mother. In fact, “malnutrition starts in the womb,” when a malnourished woman gives birth to a child who is inevitably also malnourished (“Nutrition in 2 Minutes”). Moreover, it is possible for malnourished mothers to be unable to provide fully nutritional breastmilk, which is important for its supply of “the ideal mix, density, and physiological form of nutrients” needed in a child’s infancy (Katona et al.). In general, while undoubtedly important to the milk’s nutritional content, a woman’s nutritional status is only slightly impactful on her breastmilk content. Because the female body is highly adapted to ensuring that the breastmilk “receives the available vitamins and minerals,” the quality and quantity of breastmilk isn’t reduced in mildly and moderately malnourished mothers – in these cases, the lack of caloric and/or nutrient intake will directly affect the mother, rather than her child (“Related Maternal Nutrition”). However, severely malnourished mothers may produce breastmilk of diminished quality and quantity with each subsequent feeding (“Related Maternal Nutrition”). Consequently, supplementation and complementary feeding (i.e., from non-breastmilk sources) are often needed for children born to significantly malnourished mothers (Katona et al.). In this way, yet another cycle is ultimately created – which in this case emerges as a potentially multi-generational, cyclical relationship established between mother and child.

Malnutrition as a Marker of Food Insecurity, Poor Health, and Disease

Health, as described by Dr. Ortega, is “a multifactorial consequence of social, biological, economic, cultural, and environmental conditions,” all of which “influence how people are born, live, work, age, and look for care” (Ortega). Consequently, one’s health determinants – and thus, their nutritional outcomes – are necessarily impacted by “individual factors” (e.g., one’s age, sex and/or gender, levels of activity, cultural association and traditions, food habits, personal hygiene, etc.), “social conditions” (e.g., access to education, average income, life expectancy, occupational safety, healthcare accessibility, social inequalities, etc.), and “global socio-political conditions” (Ortega). As a health outcome, a population’s nutritional conditions can function as a reflection of its people’s health conditions.

Regardless of the form of malnutrition – which vary depending on the type of nutrients, macro- or micro-, that are missing from or are in excess in one’s diet – insufficient nourishment plays an integral role in poor health and can be an accurate indicator of a population’s general wellbeing (“Types of Malnutrition”). As the FAO reminds us, “malnutrition... is not limited to the poor, nor is overnourishment a “luxury” of the wealthy”; though certain forms are more prevalent in individuals of certain social statuses – for instance, “poor people disproportionately suffer” from hidden hunger – malnutrition is not class specific and (though it is often the case) is thus not inherently and necessarily an indicator of one’s economic standing (“The Spectrum of Malnutrition”; von Grebmer et al. 23). No matter what form of malnutrition, “poor nutrition crosses economic lines and leads to health problems” (“The Spectrum of Malnutrition”). Ultimately, malnutrition’s effects can be widespread and its determinants equally as diverse.

Economic and social impacts, for instance, further exacerbate the problem, causing some of the determinants of malnutrition to be symptoms of it as well – contributing to a “devastating cycle

of household hunger and poverty,” as is often the case with food and nutrition insecurity (“The Spectrum of Malnutrition”). For, beyond acting as a marker of disease, the prevalence of malnutrition can also point out acute discrepancies in food security. Though inadequate dietary intake and disease directly cause malnutrition, other underlying issues – including inadequate health services, environmental safety, knowledge of child care and feeding, and food availability – also impact nutritional outcomes (Reinhard et al. 6).

In fact, many of these underlying factors can lend themselves to food insecurity, a situation which the FAO deems one of the “major causes of poor nutrition status” (“The State of Food Insecurity in the World 2015”). Earlier definitions of food security generated by the 1974 World Food Summit and the FAO outlined this condition as the “availability at all times of adequate... basic foodstuffs,” that “[ensures] that all people at all times have both physical and economic access to the basic food that they need”; however, food security has now evolved to include concepts of “nutrition security” as well (qtd. in Clay 27, qtd. in Clay 27; Reinhard 4). Accordingly, the FAO now defines food security as a situation whereby there is “physical, social, and economic access to sufficient, safe, and nutritious food that meets [one’s] dietary needs” – and specifically such food which, as the FAO and WHO later clarified, is “sufficient in terms of energy, but also in protein, fat and micronutrients,” in addition to its “quantity, quality, safety, and [cultural acceptance]” (qtd. in Clay 2; qtd. in Reinhard 4, qtd. in Reinhard 4). Thus, malnutrition and food insecurity – and nutrition insecurity, by extension – can often occur symbiotically; however, food insecurity “is only a precondition” for malnourishment, such that food security neither necessarily indicates adequate nutrition, nor solely prevents one from susceptibility to malnutrition (Reinhard 4).

Once affecting an individual and/or population, malnourishment’s physiological impact reaches far beyond what’s visible to the eye. As observed by Dr. Maberly of Emory University,

“clinical manifestations are just the tip of the iceberg”; malnutrition can be materialized through more subtle effects on the whole population, including reduced intellectual capacity, impaired social and economic development, and decreased work productivity (qtd in “The Hidden Hunger”). Although many statistics cite the prevalence of morbidity, growth defects, and other physical manifestations associated with malnutrition, most do not measure or indicate the “losses of lifetime productivity” and the provision of “resources [that] must be allocated to confront [the consequences of malnutrition]” (Caulfield et al.). Studies have shown, for instance, that impaired childhood cognitive development from malnutrition “[translates] indirectly into deficits in productivity in adulthood” (Caulfield et al.). In the case of children, the effects of their malnourishment can be felt throughout the course of their life, as they fail to meet their full growth, cognitive, and fitness potential. In fact, the FAO predicts that in 1990 alone, forty-six million years of “productive life” were lost solely from the global incidence micronutrient deficiencies (“The Spectrum of Malnutrition”).

In particular, the ramifications of an undernourished population can be felt in other ways aside from direct causes, as undernutrition increases the “risk factor for illness, disability, and death from other causes” (Skolnik 170). For, in addition to micronutrient deficiency, this form of malnutrition not only directly leads to nutritional deficiency-related health consequences (as mentioned above), but can also increase the chance of infection and illness; chronic hunger, for instance, can increase one’s risk of disease via a weakened immune system, cause fatigue and lethargy, and reduce one’s ability to work and provide for oneself. Thus, a “vicious cycle” between undernutrition and poor health is catalyzed (Katona et al.). In his article on *The Interaction between Nutrition and Infection*, Dr. Peter Katona explains this malnutrition-infection cycle as having four aspects, whereby inadequate dietary intake leads to poor health consequences that in turn exacerbate

undernutrition: among others, weight loss, inflammation, immunodeficiency, and mucosal damage can all summate to increase the frequency, severity, and duration of disease (Katona et al.). Thus, a “baleful synergy” exists between undernourishment and disease, whereby susceptibility to infection and inadequate nourishment further exacerbate each other (Caulfield et al.) Ultimately, diseases – such as infections characterized by loss of appetite, decreased food intake, nutrient malabsorption, increased energy needs, and/or altered metabolic function – which “deplete and deprive the body of essential nutrients” hinder proper immune response, and in turn further catalyze undernutrition and defective disease defense mechanisms (Caulfield et al.).

Ultimately, a variety of factors – i.e., social performance, biological functions, and economic development – are affected by malnourishment, to varying degrees, and often contribute to a positive feedback loop which further exacerbates the problem. The incidence of malnutrition in a population often indicates a cycle of stalled physical, mental, economic, and social development.

Beyond Food Accessibility & Health: Food Behaviors as a Determinant of Malnutrition

Unlike other living organisms, humans have evolved their notion of eating such that it has become an activity whose function exceeds merely sustaining the body – though it can be done mindlessly or function as just another part of one’s daily routine, eating can also bring people together and bear cultural significance. As humans, we have established the concept of “‘eating’ – socially – versus [merely] ‘feeding’” (Anderson 34). Though other animals partake in aspects of “social eating” – wolves, for instance, have been cited in participating in “social feeding,” and chimpanzees and woodpeckers have been described to “eat socially... and [cooperatively]” – humans most distinctively take part in this activity (Anderson 34, 34, 34). According to some food historians, cooking, communal eating, and other aspects of social eating can construct social ties, act

as social adhesion, and transform society just as the act of cooking transforms food (Fernandez-Armesto 5). Thus, nutritional conditions are not produced in isolation by the set of nutrients individuals consume, a household's state of food security (or conversely, food insecurity), or one's immunological status. Instead, social discourses, cultural traditions, popular trends, and habits emplaced by one's upbringing can all lend themselves to one's dietary choices, and thus their nutritional state. For, while food beliefs and food practices can benefit one's nutritional outcome, they can also be inimical to one's health; ultimately, it is possible for "beliefs and behaviors [to] lead to [feeding habits]" which "account for... poor nutritional status" (Walker et al. 46).

According to the ecological model of health, a variety of different influences – ranging from the level of the individual and his or her interpersonal relationships to the level of public policy – can impact one's nutritional state. Malnutrition often arises when perceptions of societal food and health discourses, specific lifestyles, improper education, etc. dictate one's behavior. Because of the social nature of eating, food behaviors stem from cultural and societal norms, beliefs, and traditions. In this way, food-related behavior can function as an attempt to self-identify, demarcate status, and/or uphold tradition. Within a given society, status and social roles can be implicitly indicated by one's food choices; in fact, some anthropologists even argue that food "may be second only to language as a social communication system" (Anderson 171). Though food's signaling can be highly stereotypical – e.g., the supposedly identifiable and allegedly inherent link between African Americans and soul food, police and doughnuts, American university students and instant ramen, etc. – it can also "[communicate] class, ethnic group, lifestyle affiliation, and other social positions" (Anderson 181, 171). It is unquestionable that humans like to categorize, demarcate, and establish rankings; thus, it is no surprise that, throughout history, food has become a method of "social

differentiation,” “a signifier of class, [and] a measure of rank” (Anderson 181; Fernandez-Armesto 101).

From this stems the issue food prestige – i.e., the notion of a certain food as belonging to a lower or higher class. Per this specific food-related discourse, many choose the foods they consume not by “biological necessity,” but according to their culturally constructed perceptions (Mengesha et al.). While food prestige can have a minimal effect on the set of nutrients one consumes, it could cause some to overlook nutrient-dense, healthful foods. During the first half of the 20th century in the United States, for instance, “low-status turnip greens” were disparaged by many blues singers, despite the greens’ high nutritional value (Anderson 185). Though the high concentration of micronutrients present in a specified “lowly” food – such as turnip and collard greens – could likely be found in other food sources, it is feasible for such avoidance patterns to lead to nutrient deficiencies in communities with limited access to nutritious foods.

Overall, though food can easily bring people together, it can also function as a method of “separation,” as “food [can mark] social class, ethnicity, and so on” – and from this, issues stemming from food-related discourses can easily arise (Anderson 172). For, while an individual’s economic and social status, religious and/or sociohistorical traditions, access to foods, etc. can all impact one’s food behaviors, so too can one’s perceptions of certain foods. As such, a discourse of food is constructed within community, and is subsequently acted upon and reinforced. Thus, although food’s primary function is nutrition, it is eaten “for both cultural and nutritional ends” whereby the “former influences the latter” (Mengesha et al.). As Dr. Dettwyler observes in her study of malnutrition, “relative poverty alone can’t completely explain variation in diet and nutritional status within a community”; instead, cultural food discourses that encourage or discourage the consumption of certain foods can increase one’s risk of malnutrition, external to other environmental

– e.g., economic, geographic, etc. – factors (qtd. in Mengesha et al.; Mengesha et al.). In this way, the nutritional status of a community and the individuals within it is established by not only the availability and “biological (nutritional) content” of food, but also “the cultural patterns that governs the food [norms, customs, and values]” (Mengesha et al.).

II. A Taste of Ecuador: Ecuadorian Culture, Geography, Diet, and Nutritional Status



Figure 1: Map of Ecuador’s Four Geographic Regions

The populace of Ecuador, which is comprised of many population groups with their own unique and rich cultural history and traditions, is spread out across Ecuador’s four main geographic regions. Of most relevance to this paper is the Sierra, Ecuador’s central Andean highlands; this region is characterized by the sprawling expanse of the Andes Mountains, which divide the country into two geographically distinct halves. To the west of the Sierra lies the Coast – i.e., the coastal, Pacific lowlands also known as the Costa – and the Galapagos Islands, which emerge from the Pacific Ocean 600 miles off Ecuador’s coastline; to the east of the Sierra is Amazonia, a region in

the country's eastern lowlands which comprises a part of the Amazon jungle's north-eastern expanse (Walker et al. 15).

These four regions are home to several different ethnic groups, including the native indigenous peoples (i.e., from Amerindian lineages, such as the Quechua who descend from the Inca Empire), Afro-Ecuadorians (i.e., descendants of African slaves, such as those commonly imported during the time of Spanish colonization), and Mestizo-Ecuadorians (i.e., those of mixed European and Amerindian ancestry). However, despite the diversity among Ecuador's geography and ethnicities, the country's population as a whole can be found to share an appreciation for food. Through its "consumption... and the social and cultural processes it sustains," food "[contributes] to the creation of collective identities" (Schlüter 91, 91). Accordingly, it is not surprising to find that "food is a very important aspect of the ethnic identity" for many in this Latin American country (Camacho 158). Across Ecuador, one can find a diversity of diets that vary according to altitude, cultural heritage, and other "ecological and socioeconomic factors"; in this way, the different diets and cuisines contain characteristic elements that distinguish a given dish or food item as belonging to the "highland/lowland [or] north/central/south," as "urban/rural [or] "province/capital" fare, as stereotypically pre-Hispanic/Spanish-influenced or traditional/indigenous/mestizo food, etc. (Camacho 156; Weismantel 120, 120). Moreover, these varied diets and their determinants necessarily generate differing nutritional conditions, such that various patterns of health, wellness, and malnutrition can be observed (Camacho 156).

Ethnic, Socioeconomic, & Geographical Diversity: The Shaping of the Ecuadorian Diet

Though there is much richness and pride in Ecuador – as is expressed through Ecuadorian culture, food, etc. – many among the country's heterogenous society are subjected to inequalities

that prohibit the population from sharing “the same general conditions of wellness” (Ortega). Currently, the majority of the Ecuadorian population (approximately seventy-two percent) identifies themselves as mestizo; this social group became the dominant group in Ecuadorian society upon its rebirth and independence from three hundred years of Spanish colonization in 1830 (Ortega). In the Andes in particular, the mestizo people can be characterized by how “white... [they] have become,” while the indigenous people “have “remained” ... [as] shaped by the interaction of relations of power” (Weismantel 38).

Despite the fact that almost two hundred years have passed since Ecuador’s liberation from Spain, the smaller percentage of the republic’s population (which can trace its ancestry back to Amerindian or African roots) maintains a lesser, subjugated position in society – like many cultures globally, the shadow of colonization still holds its grip on Ecuador. Because of a history of abuse, discrimination, and stereotyping (based on religion, skin color, language, etc.) that was born during the Spanish colonization and remains (albeit in different ways and to a varied degree) in Ecuadorian society today, twenty-seven generations of indigenous peoples and Afro-Ecuadorians have lived in static, impoverished conditions; consequently, for over five hundred years, these peoples have experienced limited access to water and land, high levels of food insecurity, and general social discrimination (Ortega). As a result, an “on-going tension in Ecuadorian society” has been established, as “the official ideology of ‘racial democracy’ and the everyday reality of an embedded racial hierarchy” clash (Walmsley 45). Currently, ethnicity plays a particularly important role in the diet of indigenous and Afro-Ecuadorian peoples; because of their recognition of “the discrimination they face in daily life,” these individuals “increasingly express pride in their cultural difference” – particularly in the form of food (Walmsley 45).

Ultimately, because one's diet (and subsequently, nutrition) are "mediated by... socioeconomic factors" in addition to "cultural choices," the history behind these dietary determinants are an interesting consideration when looking at current dietary patterns (Camacho 156). Prior to the Spanish colonization of Ecuador, for instance, the native Andean population consumed a diet containing "many of today's basic products" including tomatoes, maize, beans, potatoes, and other tubers; additionally, quinoa, squash, and a variety of wild fruits, berries, and other plants were consumed regularly (Camacho 157). Upon the Spaniard's colonization, however, the "Andean diet was modified" by "the transplantation of animals and plants ... and new dietary habits" (Camacho 157; Schlüter 91). As new grains (e.g., wheat and barley), protein sources (such as chickens, pigs, cows, and other livestock), and legumes and vegetables (including fava beans, cabbage, and onions) were made available, a "much richer and more varied diet" emerged (Camacho 157; Schlüter 91).

However, this was not without consequence, particularly to indigenous communities. Without access to many of the new products, in addition to "colonial socioeconomic institutions" – such as plantations and sharecropping systems – which "[transformed] the landscape and [exploited] native resources and labor," not all areas of society shared the same "improvements in diet and health" (Camacho 157, 157,167). Furthermore, the availability of both new foodstuffs and new socioeconomic hierarchies, which were established after the arrival of the Spanish conquerors, also led to a decreased consumption of many traditional foods. All over Latin America, "conquest and cultural colonization resulted in... negative cultural stereotypes which clearly influenced the disappearance of traditional [foods]" and ultimately caused the loss of "staple elements" of the traditional Ecuadorian diet (Schlüter 97). For instance, all levels of Ecuador's society were affected as certain foods were deemed "peasant food," and consequently no longer eaten despite their

nutritional density – however, the impact of this newfound notion of “food prestige” most significantly affected those of poorer socioeconomic standing (i.e., the native, indigenous population). Though many of these traditional products have been “rediscovered” and reintroduced into the Ecuadorian diet – primarily in an attempt to reduce the country’s poverty levels and increase its’ nutritional outcomes – many have not been reestablished until somewhat recently (Schlüter 92).

A classic example of the issue of food prestige can be seen in the case of quinoa. This nutritious, protein-rich pseudo-cereal was long disregarded as “animal feed,” and not reintroduced into the Ecuadorian diet until its “rediscovery” in the late 1990s and early 2000s (Ortega et al.). Because quinoa contains all nine essential amino acids, it functions as a nutritious, vegetarian protein source – which is particularly beneficial for those communities that do not readily have access to animal proteins. For thousands of years, the native inhabitants of Ecuador’s Sierra cultivated and consumed quinoa, until the Spanish conquest of the country; this marked a four-hundred-year decline in quinoa production, as the seed was deemed “food for Indians” and later “only fit for animal consumption” (Dobkin; Ortega et al). Ironically and rather unfortunately, the disappearance of this nutritious protein and carbohydrate source was coupled with an increase in malnutrition in the population whose ancestors had originally considered quinoa a dietary staple – the indigenous peoples (Dobkin). It was not until European agricultural researchers “rediscovered” quinoa that it was once again reintroduced into the diet and farming practices of Andean communities (Ortega et al.). Since then, efforts to provide opportunities for the growth of this pseudo-grain have helped improve the lives of farmers and communities in the Andes, “where poverty rates are historically high and nutrition miserably low” (Dobkin). Ultimately, quinoa’s rediscovery has led to increased nutritional and socioeconomic outcomes in the Sierra region, as

the seed once again became a source of both key nutrients and income for many in need of its dietary benefits (viz. the indigenous population).

Today, in the rural portions of the Sierra – and primarily, among the indigenous communities who have resided there for generations – “maize, quinoa, and tubers remain central crops” as they have for centuries (despite quinoa’s lengthy absence); in effect, the “persistence of a diet largely based on native crops” has considerably shaped the Andean diet (Camacho 157, 158). For the “traditional peasant,” a standard diet is characterized by a large presence of starches and carbohydrates (e.g., “cereals, tubers, [and] legumes” such as barley, potatoes, and fava beans, respectively); in fact, the importance of these food types is incorporated not only “into the structure of meals, but [also] into the structure of the landscape” and culture (Camacho 158, 158; Weismantel 117). Grains and starches traditionally held “cultural and symbolic position in the Andean cosmological vision,” and remain “synonymous with food” because of their nutritional properties that provide “a feeling of satiety and strength” (Codesal; Camacho 158, 158-159). Moreover, for those of lower socioeconomic standing, they provide an important source of energy; in fact, for the region’s poor, other nourishing and satiating foodstuffs – viz. proteins sources such as meat, eggs, and dairy products – are only available according to a given community or family’s “economic opportunities” (Camacho 158). Because of this, in the Sierra, and particularly in rural, low-class and/or indigenous villages, nutritional needs are often not met.

However, while these traditional foods are consumed for their affordability, convenience, and cultural significance, there is a marked tension between traditional culinary choices and more modern, mestizo foods. Here, one can once again find traces of the issue of food prestige, despite the fact that, across Ecuador, similar dietary trends can be observed; in effect, though nutritional and dietary studies have resulted in only fragmentary “information on [recent] changes in

consumption patterns,” surveys indicate that “rice and oats, wheat-derived products, potatoes and manioc, sugar, lard and oil, ... cereals” and “plantains [and bananas]” appear to have an important role in the Ecuadorian diet (Camacho 158, 158). But, because of the tie between food and social identity, perceptions of foods can be seen to impact the dietary choices of all class levels. For instance, some children in indigenous communities – such as those which live in Cotacachi, a city in the Sierra that is host to the highest density of indigenous peoples of any city in the country – often prefer “high status mestizo foods” (such as fast foods, foods prepared using more urban approaches, etc.) over their own traditional, rural fare (Camacho 159). This social phenomenon – i.e., the indigenous youth’s desire to reform their identity in part through their choice of food consumption – is seen by some anthropologists as a reaction to their “desire to become mestizo and to assimilate into the master culture (Camacho 159). Ultimately, it conveys the strength of the “language of food” in Ecuadorian culture, and the power of the notion of food prestige² (Camacho 159).

A similar phenomenon can be seen among the middle- and upper-class, albeit in a more elitist manner. For, while certain indigenous peoples choose to align themselves with mestizo culture³, many other Ecuadorians who are well-off (and especially those in urban centers) conversely wish to separate themselves from their lower-class (and namely, indigenous) compatriots. For instance, in Quito – Ecuador’s capital, which is nestled in the highlands among the mountains and volcanos of the Sierra – a tension exists between “competing cuisines” (including that between traditional vs. fast foods); ultimately, a “complex hierarchy of cuisines”

² It is noteworthy to consider that, as a result of neocolonialism spread by food companies such as McDonalds, etc., this phenomenon of food prestige is not limited to solely Ecuadorian food.

³ However, one should recall that this is not the case in all indigenous communities, as many are extremely proud of their own unique culture and the food associated with it (as is previously mentioned).

exposes cultural schisms “between social roles... old and young, man and woman, [and] rich and poor” (Weismantel 121, 122, 121).

As cultural anthropologist Dr. Weismantel observes, many in Quito and other urban centers have an often conflicting desire to not only uphold traditional Ecuadorian cuisine – particularly in reaction to the fear of Western, and specifically American, encroachment on Ecuador’s “integrity as a nation... and unique [food] culture” (e.g., through the establishment of fast food restaurants and the importation of canned goods, snack foods, soft drinks, etc.) – but also both differentiate their diet from that of the traditional cuisine and separate themselves from the people it represents (Weismantel 122). Consequently, Ecuador’s traditional dishes – i.e., “*platos tipicos*” – can represent both the country’s cultural heritage, and “the poor, the ignorant, and the nonwhite: people with whom the elite, for the most part, do not wish to identify” (Weismantel 122). Because “race remains a defining, if often unspoken, feature of social relations” in Ecuador, one’s attempt to identify oneself within their social construct is often affected by societal and cultural perceptions of foods; consequently, many Ecuadorians struggle to “[emphasize] their country’s cultural heritage” while maintaining a discourse of food prestige (Walmsley 46).

However, the issue of food prestige can go beyond “traditional” foods and be applied to any food item deemed not prestigious enough for higher-class consumption. Take baby carrots, for example: from an ethnocentric, American perspective, one could describe this colorful food item as a nutritious source of many vitamins, minerals, and fiber that is considered delicious by many adults and children alike. However, Ecuadorian-born Dr. Marleen Haboud can explain how, in Quito, baby carrots are deemed “animal food,” just as quinoa was for centuries (Ortega et al.). From personal experience, she recalls how this food item is not considered an appropriate snack for children – she was, in fact, reproached by another parent upon giving baby carrots to her

daughter as a snack to take to school – even though baby carrots are a healthful option, unlike many of the processed snack (and often junk) foods that many parents choose to give their kids instead (Ortega et al.). Because baby carrots are not viewed as a “high-class” option (as processed snack food has come to signify, at times) and thus do not fit in with the concept of food prestige that many try to uphold, they are often disdained.

Ultimately, as a result of socioeconomic influences and Ecuador’s history of colonization, repression, and class-stratification, food in Ecuadorian society can be seen to function in a semiotic manner, endowed with meaning according to cultural signification and its dissimilarity from other foods. Accordingly, food and diet necessarily play a large role in the establishment and maintenance of one’s social and cultural identity. However, the significance of the “alimentary language” – which, though not unique to Ecuadorian society, is particularly noteworthy – can also lend itself to the possibility of an amplification and distortion of “rules of exclusion,” “alimentary taboos,” and “rules of association, as can be seen in the case of food prestige” (Weismantel 124).

However, despite the importance of culture and socioeconomics, “ecological [factors] ... [and] local environmental conditions” also contribute to the shaping of the Ecuadorian diet (Camacho 156). Amidst the various considerations that form a population’s food choices, both geography and socioeconomics share similarly significant roles, and can in fact go so far as to form a “relationship between race and place” (Walmsley 45). Such is the case in Ecuador, where “race is understood in terms of place” and “[these] intersecting social constructions” produce a sense of identity – thus, “regional cuisines... often become representative of local [Afro-Ecuadorian], indigenous, or mestizo culture” (Walmsley 43).

Though nationally traditional Ecuadorian foods are characterized by their “substantial, solid” nature, whereby meals are cooked via “a rather limited repertoire of techniques, condiments,

and vegetables” and are often “starchy,” a substantial amount of diversity can be found among regional cuisines (Weismantel 121, 120-121, 121). Containing ingredients such as goat, beef, chicken, rice, potatoes, onions, and eggs, Ecuador’s “*platos tipicos*” often vary by geographic area; for instance, the bland, potato dominated cuisine of the highlands is entirely distinctive from the spicy, rice focused meals served in the coastal region (Weismantel 122). These regional differences can interact with discourses of socioeconomics and culture – and once again lend themselves to an alimentary language and the issue of food prestige – which further shapes “the relationship between race, place and cuisine in Ecuador” (Walmsley 46). Ultimately, a “racial topography” can be mapped upon Ecuador’s natural geography, which creates “racial identities that are spatially located and materially experienced through diverse culinary processes” – and, as a result, establishes a “racial/spatial order” (Walmsley 49, 46, 49). In this way, foods, tastes, smells, and cuisines develop regional and cultural markers that are identifiable as belonging to a “designated cultural and geographical setting” (Walmsley 50).

However, aside from its “racial/spatial” element, geography also has its own unique impact on the Ecuadorian diet. Between the north and south coastal plains, the mountainous Andean highlands, and the Amazon basin, Ecuador is home to “considerable diversity of climate, ecosystems” and elevations – the latter of which can range from sea level to more than twenty-thousand feet above sea level (Walmsley 46). The country’s ecogeographical variations necessarily lend themselves to a diversity of food products in diets, which are associated with different regions. For instance, production zones and land use are ultimately established according to “[variations] in topography, altitude, and climate” (Weismantel 39). Though the transportation of food is not nonexistent, such that “foodstuffs do not, of course, remain within their places of origin,” many specific ingredients are stereotypic to a given region (Walmsley 47). It is commonly

held, for example, that “potatoes and cereals belong to the high Andean mountainsides,” while “seafood... [and] tropical fruits, with their glowing colors and cloying fragrances” evoke the cuisine of coastal lowlands; these associations frequently stem from a food item’s ability to grow and thrive in a region’s ecogeographic landscape (Walmsley 46-47, 47).

Much of the Ecuadorian Sierra, for instance, can be characterized by “high-altitude mountain slopes,” “wind [that] blows cold,” and “sun [that] beats down hard on the bare land” (Walmsley 47). Topography, soil quality, and water access in this region can all affect agricultural production, and thus its populations’ diets and agricultural opportunities (Camacho 160-161). Communities settled in lower altitudes in the Sierra, for example, have the region’s “highest levels of agrobiodiversity given the more benign climatic conditions,” but are faced with issues relating to lower quality, drier soils, and proximity to urban centers (Camacho 161). Moreover, in the more rural highland areas, “the ruggedness of the terrain, the lack of roads, and the extremely dispersed settlement pattern” further intensify the severity of the landscape (Weismantel 39).

This often-harsh environment of the Sierra – and particularly in rural areas – necessarily shapes the diet of the peoples living there, as it can limit options for crop growth and livestock husbandry, decrease opportunities for trade, etc. The rural, poor, indigenous community of Zambagua, for example, lies high up in the Sierra “above the zone of maize cultivation”; accordingly, they are unable to use this crop as a dietary staple and carbohydrate source and instead rely on potatoes as one of the three main crops (Weismantel 118). The predominance of potatoes in rural Andean societies, is not uncommon; in fact, some have observed that “the potato is renowned as the mainstay of the indigenous Andean diet” (Weismantel 92). Because potatoes, tubers, and other starches grow well in the Sierra’s higher zones – potatoes in particular are observed to “grow bigger and better in this zone” – these foods’ prevalence “is written... into the

structure of meals” (Camacho 161; Weismantel 118). Patterns such as this are prevalent across Ecuador, as regional diets are ultimately shaped by geography and ecology – such that “highland/lowland,” “north/central/south,” “urban/rural,” and other distinctions establish dietary elements and nutritional outcomes that are distinct to a given region (Weismantel 120).

External Factors: The Impact of the U.S. on the Ecuadorian Diet

Though many internal factors necessarily shape the dietary choices of Ecuadorians, the country’s diet does not exist without external influences (as has been previously mentioned). While, the importation of new foods and eating habits, the mixing of native and non-local diets and cuisines, etc. have occurred historically (e.g., due to the Spanish conquest of Ecuador), the effect of other cultures (viz. more industrialized countries such as the United States) on the Ecuadorian diet can also be seen today as a result of globalization, urbanization, and an increased exposure to other cultures. Specifically, Ecuador’s diet and nutritional status can be seen to be negatively impacted as a result of “rapid urbanization and the adoption of Western diets high in refined carbohydrates, saturated fats and sugars,” leading to the availability of food types which can lend themselves to obesity and improper nutrient intake – along with other health problems, such as diabetes, that have been correlated with the consumption of highly processed, high fat, high sugar, and/or high salt foods (World Bank).

Across Latin America, for instance, “the influence of ‘junk food’ from the United States” functions as an example of “cultural homogenization” – a phenomenon which often puts an emphasis on “the features of industrialized countries at the expense of local traditions” (Schlüter 90). Accordingly, industrialized foods may become exalted and even function as an indicator of food prestige – though it is also possible for the opposite to occur. In fact, not everyone is as

enthralled with American fast food items in Ecuador (though it is often very popular, especially with the youth); many parents, for instance, feel that “such meals are signposts on the road to perdition,” while others view “the cultural invasion of the north” as an encroachment on Ecuador’s unique gastronomical heritage (Weismantel 122). The influence of the industrialized countries can also be seen through instances of “cross-breeding” between non-local and local foods, whereby foreign tastes are “[adapted] to local tastes” (Schlüter 90). For example, while McDonalds has been noted to generally have a “disinterest in modifying their menu to accommodate local tastes,” their offerings in Ecuador include a “McFiesta” – a “variety burger” topped with guacamole, that is not offered in the U.S. (Oldakowski 46, 42). Burger King, on the other hand, can be seen to “[demonstrate] noticeable deviation from their American Menu” as they attempt to adapt to the local culture, by including menu items such as “a chicken sandwich with Ecuadorian condiments named Pollo Frito” (Oldakowski 43, 44).

However, the effect of industrialized countries on Ecuadorians is not only limited to their diet, but also their dietary practices. For instance, the marketing campaigns of many infant formula companies in developing countries, such as Ecuador, inevitably led to the decrease in breastfeeding – and particularly exclusive breastfeeding – practices. Though breastmilk is known to be essential for children among the American medical community (and especially in the first six months of a baby’s life), many women in Ecuador choose to forgo this natural form of infant feeding – in fact, in the early 2010’s UNICEF determined that only “52% of children of up to one month of life are fed exclusively with breastmilk,” and even fewer are exclusively breastfed as they continue to age (“Breastfeeding: A Win for Life”). Though breastfeeding is popular among indigenous communities – around seventy-seven percent of indigenous women breastfeed their infants because it is cost effective (i.e., free), convenient, and deemed healthful – many others “[resist]

exclusive breast-feeding and [instead partake in] inappropriate complementary feeding” practices which ultimately lead to increased infant mortality (Ortega; Walker et al. xvii, 4).

Recent scrutiny has accredited the decline in breastfeeding in Ecuador (among other developing countries) over the past few decades to “poor understanding [among] doctors, coupled with the commercial promotion of breast milk substitutes” (Walker et al. 38). In effect, “the promotion of infant formula products was ‘rampant and unchecked’” for many years, as American pharmaceutical and European food companies utilized “medical promotion... [and] consumer advertising” to sway mothers towards purchasing infant formula (Gilly et al. 22, 22). Accordingly, many women (who were uneducated on the matter) began to view infant formula as superior to breastmilk as a result of the influence of company marketing from industrialized countries⁴. However, breastmilk is a highly nutritious food source for young babies – and particularly in indigenous and poor households. In fact, it is often times the case that without breastfeeding, many indigenous infants would not survive their first year; for, the malnourishment they would otherwise encounter (that would greatly harm them at such a vulnerable age) instead begins to occur around the age of two, when they are weaned and begin eating solid foods (Ortega). While studies have shown that, when administered correctly, infant formula can be healthful, safe, and nutritious – though still suboptimal to breastmilk – ultimately “manufacturers [failed] to gear the product to a developing society”; thus, by not considering the “environment of poverty, illiteracy, inadequate sanitation, unhealthy water and limited health services” that afflicts many in developing countries (including Ecuador), infant formula companies failed to provide a truly beneficial and viable option – for, ultimately, “as more women [shifted] from breastfeeding to infant formula feeding... more infants [died]” (Zelman 708; Post qtd. in Gilly et al. 23; Zelman 708).

⁴ This influence again functions as an example of neocolonialism’s presence in Ecuador.

Fortunately, while exclusive breastfeeding is not as common, breastfeeding itself is “a common practice in Ecuador” – recent data indicates, for instance, the breastfeeding rate for under-six-month olds has reached almost ninety-six percent in Ecuador (Walker et al. 39). Breastfeeding is particularly important in indigenous populations in particular – which are known for their high levels of malnutrition – as it is the sole way to ensure that children are properly nourished. Recent efforts, including an “International Code of Marketing of Breast-milk Substitutes” and efforts to offer breastfeeding counseling, have increased breastfeeding rates, helped decrease child mortality levels and malnutrition, and created a growing societal understanding of breastmilk’s benefits. In fact, breastfeeding counseling in particular has been shown to decrease stunting rates by around ten percent, particularly in the rural and impoverished regions of the Sierra (Walker et al. 38). Overall, despite the unfortunate advertising influence from the U.S. and Europe, Ecuadorian women are gradually realizing that breastfeeding is the “most effective preventative intervention in preventing child mortality”; moreover, they are becoming more aware of the association between breastfeeding and the prevention of stunting (Walker et al. 38).

Ultimately, because diets do not exist in isolation from outside influences, and are not exempt from the importation of new foods and habits, etc., the Ecuadorian diet can be seen to have been shaped – even to this day – by international (and particularly more industrialized) countries, such as the United States. While this is not without impact to the integrity of national traditions and the health of the population, it necessarily occurs given the globalized nature of the world today. While some aspects of cultural homogenization, cross-breeding, and international advertisement and marketing may have a null or even positive effect on Ecuador’s diet, many (such as the importation of fast-food and junk food, marketing which promoted infant formula, etc.) can be seen to have adverse effects on the country’s health, wellbeing, and malnutrition.

National Patterns of Malnutrition

Though the origin of much of the country's social inequality can be traced back to the period of the Spanish conquest and colonization of Ecuador, history and socioeconomics only tell a part of the story. As a result of geographical, cultural, social, and other factors, Ecuador's four regions – and the ethnic groups within them – have necessarily established very different levels of malnutrition and malnutrition-related conditions. For instance, the World Bank suggests that “limited access to nutritious food,” “poor infant feeding practices,” and “high disease burden” – since malnutrition and disease exist within a vicious cycle – among different populations (and at different levels) have led to the patterns of malnutrition observed across Ecuador (World Bank). Dr. Ortega, an Ecuadorian doctor and cultural anthropologist, also accredits changing dietary and lifestyle habits to the country's nutritional status. Moreover, because Ecuador has failed to “target relevant populations with the right interventions,” this Latin American country is among several in the region “which report persistently high rates of childhood nutritional deficiency” (Walker et al. xiii, xiii). Thus, “in this setting, the deleterious nutritional situation” has arisen (Walker et al. xiii).

For instance, while the mainland regions all struggle with the prevalence stunting (albeit at different levels) the Galapagos Islands region faces a problem on the opposite side of the spectrum, with its high prevalence of obesity. Because of the popularity of fatty and fried foods and many individuals' shift from walking to driving in the Galapagos, this island region has increasingly experienced heightened levels of obesity (Ortega). In fact, though many assess Ecuador's nutritional status from a perspective that focuses on its prevalence of undernutrition, as a country Ecuador faces a double burden of disease, with both overweight and undernourished individuals.

According to the World Bank, among the youth the numbers of overweight and underweight children have been slowly nearing equivalency, as the level of overweight children has steadily risen in the past decade; this is primarily attributed to a general trend of Ecuador's undernutrition levels decreasing at lower rates than the growing levels of overnutrition, but is also related to changing dietary patterns and more sedentary lifestyle habits (World Bank; Freire et al.). Moreover, many also attribute the large role of carbohydrates (such as potatoes and rice) in the Ecuadorian diet to this double burden of obesity and malnutrition; in fact, "30% of the population has an excessive intake of carbohydrates" despite its "low nutrient biodiversity" (Freire et al. 1641S).

However, the double burden is not only limited to an increased prevalence of overweight and obese individuals throughout the entire population, but also the "coexistence of nutritional problems of deficit and excess in the same individuals" (i.e., who are iron and/or zinc deficient in addition to being overweight or obese) (Freire et al. 1641S). For example, an individual whose food consumption pattern includes consuming high levels of carbohydrates "at the same time might promote [their own] overweight and obesity" and suffer from micronutrient deficiency; in effect, recent studies suggest that the likelihood of zinc and/or iron deficiencies is higher in overweight and obese individuals than those who are not (Freire et al. 1641S). Ultimately, a variety of confounding socioeconomic, dietary, cultural, and lifestyle factors (such as those mentioned above) can be seen to affect the double burdening of obesity and malnutrition on individuals and populations in Ecuador.

However, while levels of overnutrition are high (e.g., the total percentage of under-five Ecuadorians who are overweight or obese is around nine percent) it is indubitable that stunting (which affects around twenty-five percent of the under-five year old population) has a greater

effect on the Ecuadorian population – and particularly those in the highland region (Freire et al.). As Figure 2 conveys, when looking at a region’s stunting rates in relation to the national levels of stunting, the Sierra is home to sixty and sixty-three percent of the country’s moderately and severely stunted under-five year olds, respectively; among this stunted population, fifteen to twenty percent live in or around urban centers in the Sierra (such as Quito), as opposed to the remaining forty to fifty percent who live in rural highland areas. In the lowland coastal region, the moderately and severely stunted individuals account for thirty-four and twenty-nine percent of Ecuador’s stunted under-five population, respectively (Figure 2; Walker et al. 12).

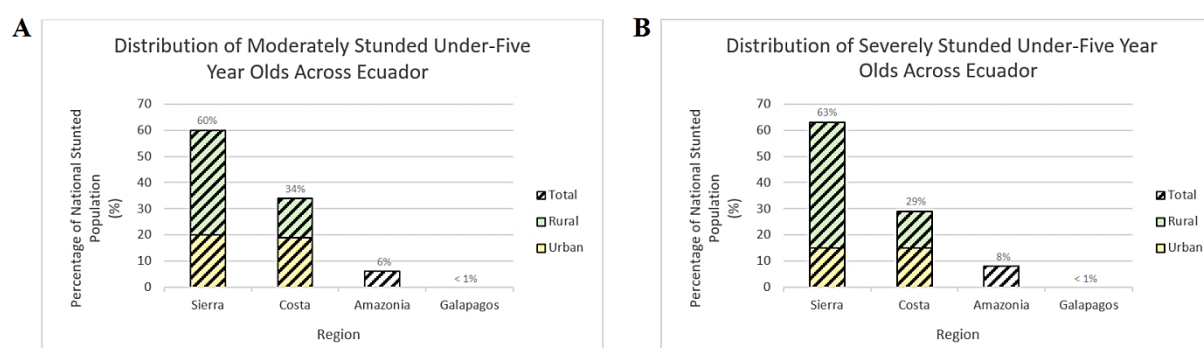


Figure 2: Regional Distribution of Moderately and Severely Stunted Under-Five Year Olds in Relation to the Total Number Nationally. Using data from Walker et al.’s World Bank Case Study of Ecuador, the percentage of the total moderately stunted (A) and severely stunted (B) children under-five across Ecuador’s four regions is depicted; this regional distribution is further broken down according to the prevalence of stunting in urban versus rural areas, specifically in the Sierra and Costa regions (Walker et al. 12).

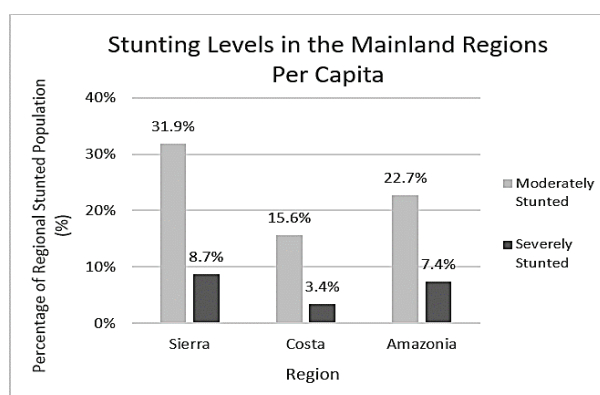


Figure 3: Mainland Region Stunting Levels Per Capita. Using data from Walker et al.’s World Bank Case Study of Ecuador, the percentage of the mainland regions’ populations which are moderately or severely stunted, per capita, is depicted (Walker et al. 15).

In addition to this regional data, it is also interesting to look at the levels of stunting in a given area relative to its population, as can be seen in Figure 3. For instance, though Sierra is known for its high levels of stunting per capita, the Amazonia's rates are almost as high – as the World Bank states, the likelihood of being moderately stunted in the highland population is almost thirty-two percent, and approximately twenty-three percent in the lowland, Amazonia population (Figure 3; Walker et al. 12). In contrast, the Costa has significantly fewer levels of stunting than the other two regions, such that only around sixteen percent of its population is predicted to experience stunting in any form (Figure 3; Walker et al. 15). Ultimately this data (i.e., Figures 1 and 2) indicates that the populace of the Sierra experiences not only much higher levels of stunting relative to the country's population – and, by association, malnutrition – but also larger discrepancies between rural and urban conditions than the other regions. This pattern is not unique to Ecuador, and can also be found among other Latin American countries.

Across Ecuador, stunting (and other-malnutrition associated conditions) levels not only vary by regional and geographic (i.e., rural vs. urban) distribution, but also according to ethnic, socioeconomic conditions – and the interactions between these different factors. Unsurprisingly, disparities among economic status are also notably linked to the prevalence of malnutrition. For instance, there is slightly greater than a ten percent difference in the under-five stunting rate in poor versus well-off families; specifically, thirty percent of under-five children from households “in the bottom quintile of income distribution” are stunted in comparison to only eleven-percent from the top quintile (Walker et al. xv, xv). However, as previously mentioned, “[deep] ethnic and regional disparities... have [also] shaped [Ecuador] from the colonial period,” leading to different dietary and thus nutritional patterns throughout the country (Larrea and Freire 358). Topography,

for instance, has been shown to affect the nutritional conditions of a community beyond broad regional geographies; for example, altitude has been demonstrated to be of “high significance... for stunting outcomes,” due to the “socioeconomic conditions of high-altitude populations (that is, isolation... poor access to services, and limited agricultural potential)” (Walker et al. 20, 30). Additionally, malnutrition and symptoms of “poor nutritional status” are commonly “observed in rural and indigenous populations” (Walker et al. 46, 46). In fact, indigenous communities are noted to have malnutrition rates that are doubled of that of other ethnic groups – according to the World Bank, forty-seven percent of indigenous children are stunted, while around only twenty-one percent of the mestizo youth is faced with these conditions (Larrea and Freire; Walker et al. xv). Given the high concentration of indigenous peoples in the Ecuadorian Sierra (who lack the economic opportunity or desire to leave their inherited, traditional lands) and the region’s high altitudes, it is not surprising that one can observe “a prevalence [of malnutrition] that is substantially above the rate in the lowland regions” (Larrea and Freire 360).

III. Nutritional Conditions, Disease Risks & Consequences in the Ecuadorian Sierra

Ultimately, while a variety of factors inevitably contribute to the nutritional conditions and patterns of malnutrition found across Ecuador, it is clear that the most notable discrepancies can be found in the Sierra region – particularly among indigenous vs. non-indigenous peoples, urban vs. rural areas, higher vs. lower altitude highland communities, etc. As previously mentioned (and is suggested by Figures 2 and 3), the Sierra “lags behind in nutritional and health indicators... compared with the rest of the population” (Camacho 158). Accordingly, the rest of this paper will focus on the prevalence of malnutrition in the Ecuadorian Sierra, ranging from its determinants (including those discussed in Chapter II) and its subsequent health outcomes. Because there is only

limited nutritional information available relating to the Ecuadorian diet – as its actual nutritional status has not been explicitly studied – this chapter will instead focus on the nutritional patterns and outcomes in Ecuador’s highland region (Sanchez-Llaguno et al.). Specifically, the nutritional status of the under-five year old population – since “Ecuador forms a part of a small group of Latin American countries which report persistently high rates of childhood nutritional deficiency” – and women will be considered, given the availability of data for these two population groups (Walker et al. 1).

Because the Sierra has “uniformly high stunting rates compared with the rest of the country,” examining Ecuador’s highland, mountainous region can provide insights into the country’s most malnourished populations, generally speaking (Walker et al. 15-16). Fundamentally, this region’s elevated levels of malnutrition can be attributed to its high altitude – which then exacerbates the problem, as altitude has been shown to have “a strong, negative association with nutritional status” (Walker et al. xv). Moreover, in areas of high altitude, communities can be geographically isolated from each other, healthcare resources, and large marketplaces; on top of this, they are often faced with “poorer crop production,” “lower nutritional value of food,” and “fewer-income generating options” (Walker et al. 30). Because of these factors, many nutritious foods cannot be cultivated and/or consumed, intake of animal foods is often low, and individuals lack access to nutritious food sources that are high in micronutrients (Walker et al. 30). Additionally, populations in the highlands are subjected to cooler temperatures and lower oxygen levels, and are likely required to have increased “physical activity because of the terrain”; consequently, individuals living at higher altitudes often have higher caloric energy needs, which may go unmet (Katuli et al. 6, 8). In effect, as Katuli et al. have observed, there is statistically

significant “nutritional disparity between [individuals] living in the highlands and those living in the lowland areas” (Katuli et al. 8).

However, as is the case in Ecuador’s other geographical regions, the Sierra is host to a diverse number of cultural, geographical, and socioeconomic conditions which necessarily lend themselves to different patterns of malnutrition (including undernutrition, micronutrient deficiency, and obesity). While direct factors – viz., inappropriate nutrient intake, exposure to disease, etc. – immediately cause malnutrition, indirect ones – i.e., those which are influenced by socioeconomics, ethnicity, social inequality, poverty, etc. – also affect those living in the Sierra, albeit to varying degrees; ultimately, all of these factors form an aggregate of conditions that lend themselves to the frequently and traditionally high levels malnutrition in this region.

Urban vs. Rural Concerns & Malnutrition Among Indigenous Peoples

Altitude aside, the Andes, which geographically shape the Ecuadorian Sierra, are host to “various factors that may contribute negatively [to the region’s] nutritional status” (Katuli et al. 8). In effect, as the World Bank’s country study states, “children living in the Sierra, particularly in the rural Sierra and Quito” – the country’s capital– “have a much higher probability of being stunted” than those residing elsewhere in the country (Walker et al. 15, 15). Quito, for example, has been shown to have significantly high levels of childhood malnutrition, with some suggesting that upwards of 47,000 children in Ecuador’s capital are malnourished (Rogers et al. 22). This high rate is particularly noteworthy, especially given that Quito is singled out for its levels of malnutrition – by the World Bank, anthropologists, and other researchers – despite being an urban center (and thus possessing greater economic opportunities, better access to healthcare, etc. than more rural areas). When comparing lowland to highland urban centers, one can come to a distinct

conclusion that living in the latter area “is a predisposing factor for poor nutrition,” as is concluded by Dr. Katuli and her colleagues (3).

Yet, if such a large discrepancy can be found between lowland cities and the Sierra’s urban centers – such as Quito – then the disparity between the former and rural highland areas must necessarily be even greater. In fact, “large rural-urban differences” can be observed across Ecuador and specifically in the Andean region (i.e., the Sierra) (Larrea and Frieria 359). By extrapolating data from the World Bank’s case study of Ecuador, for instance, one can note that rural highland children alone account for approximately sixty-five and seventy-six percent of the Sierra’s stunted and severely stunted under-five year old population, respectively (Walker et al. 12). This is not entirely unsurprising, given the array of socioeconomic opportunities that are inherently unavailable to those who do not live in urban centers. Moreover, the lack of such opportunity is compounded with the fact that, as previously mentioned, many who “live in higher elevations are socially and economically exploited”; in effect, in some instances this exploitation can put such a pressure on the oppressed that they “tend to move to higher elevations,” where they are faced with an even harsher environment that only further exacerbates the root problems (Katuli et al. 6). While Quito’s high number of malnourished children is by no means insignificant, as Rogers et al. reminds us, “areas of high malnutrition prevalence are not always those where the greatest numbers of malnourished children are living” (27). That is to say, the elevated levels of malnutrition in Quito do not necessarily indicate that the capital has an exceptionally high prevalence in comparison to other areas – especially considering that, as a large city, Quito is not exempt from socioeconomic stratification and varying levels of poverty that would lend themselves to a considerable quantity of malnourished individuals.

Thus, though urban areas can have high levels of malnutrition, it is ultimately widely understood that rural areas are more significantly affected by malnourishment; consequently, when strictly looking at the childhood population, it is commonly held that urban children “have much better growth prospects than rural children” (Walker et al. xv). Overall, because “there is growing evidence linking health and socioeconomic status” (SES), it is not surprising to find that a clear correlation can be found between the prevalence of stunting and poverty rates, income levels, and SES – and thus between increased levels of malnutrition and more rural settings as a result (Larrea et al. 360). However, as Drs. Larrea and Freire emphasize, socioeconomics only “[explain] a part (albeit a significant one) of the differences” between rural and urban highland rates of stunting and other forms of malnutrition (361).

For instance, the dietary choices of individuals can also be impacted by their nutrition education – or, lack thereof. Because higher levels of illiteracy can be noted in rural highland areas, the individuals who live there may possess neither the knowledge nor the economic means to change and improve their nutritional status. Additionally, limited access to healthcare and higher levels of poverty – which may manifest itself in the form of poor living conditions, restricted access to clean water, etc. – are often characteristic of rural highland areas (though impoverished individuals in urban centers can also be similarly afflicted by such adverse conditions). Accordingly, those in rural settings have a higher susceptibility to infectious diseases, such as gastrointestinal infections, which are positively correlated to chronic malnutrition. In particular, diarrhea is “one of the most important diseases to affect nutritional status”; in fact, recurrent diarrhea has been linked to increased levels of stunting, “particularly in poor living areas” (Walker et al. 42; Ortiz et al. 2128). However, any illness which “[diminishes] appetite and [reduces] absorption, utilization, and requirements of nutrients” is of concern, as it can initiate a cycle of

malnutrition and disease (as described by Katona et al.) – such that it not only causes malnourishment, but also further exacerbates the issue and facilitates chronic malnutrition (Walker et al. 42).

Dietary patterns also play a significant role in the nutritional status of urban vs. rural settings. While those in urban centers tend to have a more varied diet, individuals living in rural areas are noted to have diets remarkably high in carbohydrates, and low in protein – a common condition for stunting. In the Sierra, rural highlanders (and specifically, the rural poor) often experience food and nutrient insecurity, as a result of altitudinal and topographical limitations to agricultural practices, poor soil and soil erosion, general conditions of poverty, limited economic opportunities, etc. Specifically, unlike other regions – such as the Costa and Amazonia, where “fish and other protein sources” are common “even in poor households” – the Sierra’s poorest individuals, who live primarily in rural areas, generally lack the food security to obtain sufficient protein sources (Larrea and Freire 361). In effect, a “relationship between increased wealth and increased consumption of foods” can be clearly observed in Ecuador’s Sierra (Berti and Leonard 414).

Recent survey findings, for example, note that “poor, rural households in the highland area have a diet [that is] mostly based on carbohydrates from potatoes and flour” and that lacks adequate levels of protein and certain vitamins and minerals (Larrea and Freire 36). Eggs and dairy products (such as cheese), for instance, are considered “luxury products in the highlands,” and meats (ranging from conventional livestock to the often-ceremonial guinea pig) are generally consumed only in celebrations (Walker et al. 50). While “the exceptional value of cereals such as quinoa, [legumes, tubers, and vegetables] has been amply documented,” those living in the highlands suffer from malnutrition (ranging from undernutrition in the form of stunting, to micronutrient

deficiencies in “iodine, iron and vitamin A”) as a result of an imbalanced diet (Camacho 168-169, 168).

According to a study by Berti and Leonard (which analyzed the diet of a small, primarily mestizo, rural highland community), for example, tubers such as potato and oca – which are often consumed more than twice a day – function as a leading source of iron and several B vitamins in the population, while grains are the primary source of caloric energy; in effect, the study observed that the community consumed “approximately 80% of [their] dietary energy... in the form of carbohydrates” (411-412). However, given “the low intake levels of micronutrient-rich animal foods,” many individuals face are malnourished as many key nutrients are “not supplied in sufficient amounts by tubers or grains” (Berti and Leonard 411). In this way, grains and specifically tubers fill the gap in a diet lacking nutrient-dense animal foods – and thus function “as a source of most nutrients” (Berti and Leonard 415). While more well-off, rural families may be able to afford to drink milk – rather than taking it to market – poorer families in rural areas are particularly affected by micronutrient deficiency and general malnourishment.

Thus, those living in rural highland areas, and particularly those of low socioeconomic standing, are frequently subjected to immediate causes of malnutrition that extend beyond general, insufficient food intake. Rather, food and nutrition insecurities – which manifest themselves in the form of a low-protein diet – lend itself to the region’s significant urban-rural differences in stunting levels. Many support the hypothesis that, instead of being “primarily related to the lack of capacity to buy food” (thus causing a shortage of food), Sierra’s high levels of malnutrition are principally caused by a “relative insufficiency of animal protein in the diet”; in the aforementioned study by Berti and Leonard, for instance, it was observed that grains, followed by potatoes, were the largest source of protein in the town’s protein intake (collectively contributing to more than seventy

percent of the community's total protein intake, across all socioeconomic levels), despite being low-protein foods (Walker et al. 44, 45; Berti and Leonard 411).

In effect, a national demographic study of Ecuador has observed that, while food expenditure and “the *composition* of food expenditure” is essentially comparable among highland individuals who are stunted and those who are not, there is a markedly lower level of meat consumption in “households with stunted children at high altitudes” (Walker et al. 45). The lack of animal protein in many rural individuals' diets not only directly causes malnutrition – i.e., according to the hypothesis that a lack of animal protein lends itself to insufficient nutrient and micronutrient consumption – but also indirectly, given that some other food must be consumed instead to fill their stomachs. As previously mentioned, carbohydrate rich tubers are particularly important in the rural diet, as they are readily grown and can take the place of unavailable, higher-nutrient foods such as meat and dairy products. But, given that potatoes and other tubers are both highly satiating and low in nutrient density (the amount of nutrients, both micro- and macro-, present per gram), many individuals – and specifically, children who are in most need of nourishment for proper growth and development – are often “unable to consume sufficient tubers to meet their [nutrient] requirements” (Berti and Leonard 416).

However, while both the socioeconomic and dietary factors affect many of those living in rural areas of the Sierra, they most significantly affect indigenous peoples – most of whom do not live in urban centers, and instead inhabit the rural and often high-altitude areas to which they have been historically assigned. In fact, indigenous peoples constitute a large percentage of the population of the Sierra (the highlands are commonly known to contain the largest concentration of indigenous peoples in Ecuador of all the country's regions) especially in rural areas; according to Ecuador's 2001 census, approximately eighty-two percent of the Sierra's indigenous population

lives in rural areas (“Indigenous Peoples, Democracy and Political Participation”). Because of this large population in the Sierra, the fact that most indigenous individuals remain farmers who follow traditional agricultural practices, and the historical and current exploitation of indigenous peoples in Ecuador, the indigenous communities of the Ecuadorian highlands are faced by a variety of compounding factors that negatively affect their health outcomes. In this way, most comparisons of the conditions and nutritional patterns in urban and rural highland areas also essentially depict the conditions of indigenous peoples – though some indigenous peoples do live in urban settings (e.g., the city of Cotacachi), the large percentage allows for one to view the urban vs. rural discrepancies as a representation of those between non-indigenous and indigenous peoples, respectively, as well.

Like many other Latin American and, specifically, Andean countries, the highest levels of “chronic malnutrition and food insecurity... [can be found] among the indigenous rural areas” in the Andes mountains of the highland region (Camacho 158). Accordingly, the high prevalence of indigenous peoples also lends itself to the Sierra’s overall poor nutritional status. Across the globe, it is frequently common to observe populations of indigenous peoples and ethnic minorities that are “often disproportionately affected by chronic childhood malnutrition” (Walker et al. 32). While some may try to attribute this stunting to genetic predispositions, as the World Bank asserts, “evidence from numerous studies indicates that indigenous children are not genetically programmed to be short”; instead, their short stature (i.e., stunting) is primarily caused by malnutrition early in life, which, in turn, is “driven by socioeconomic status, social and political exclusion, geographic isolation, and cultural practices” (Walker et al. 32). The aforementioned geographic constraints and socioeconomic characteristics of those living in rural areas exacerbate the traditional diet, as its “quality... varies based on wealth and resource endowment (access to

land, altitude, and soil type)” (Walker et al. 50). In rural, indigenous communities, malnourishment is primarily attributed to both the traditional, carbohydrate-rich and low-protein diet – which is particularly “poor and has little variation” in comparison to the general, rural highland diet – and simply a lack of food (Camacho 168). Moreover, “traditional beliefs and behaviors... [may be] inimical to optimal growth outcomes,” and further account for the high levels of malnutrition in indigenous populations (Walker et al. 46).

To clearly illustrate the difference between urban and rural (and specifically, indigenous rural) diets in the Sierra, let us consider an average, daily diet from both the capital, Quito, and Tingo, a small indigenous community high up in the Andes. A well-off, middle-class family in Quito, for instance, might start off their day with some fresh fruit, toast, a cup of coffee, and fruit juice; some yogurt with granola may also be eaten. Alternatively, the toast and/or yogurt might be swapped out for humitas – traditional steamed corn cakes (similar to tamales) that are very popular in the highland region, especially in Quito and other urban cities. A normal evening meal often features a soup– which is usually topped *con palomitas* (with popcorn) – that is served first, and is followed by a plate featuring some animal protein (often chicken), vegetables, and rice (see Figure 4). These meals are all rather diverse, and essentially contain foods from the main food groups – grains, fruits and vegetables, protein, and dairy – necessary to ensure proper nutrition.



Figure 4: An Average Meal in Quito, Ecuador. This photograph illustrates a typical lunch and/or dinner in Quito that would be served by a well-off family. The meal consists rice, marinated chicken, a mix of legumes and vegetables (eggplant, zucchini, peas, and peppers), and pumpkin soup (served first, not pictured); both water and fruit juice are consumed with the meal (Photo Credit – Mary Ladesic, February 2017).



Figure 5: An Average Meal in Tingo, Ecuador. This photograph exemplifies a typical meal in Tingo, that was served as welcoming meal as an expression of community pride. The meal consists of a flavorful starchy soup, fava beans, oca (a potato-like tuber), two eggs, and a sweet beverage made from brown sugar and boiling water; salt was provided to add additional flavor (Photo Credit – Gabija Pileika, June 2014).

The small village of Tingo, conversely, does not have as many opportunities for such well-rounded dishes as those found in Quito; while the diet of a well-off, middle class family in Quito may not be composed of lavish or complex dishes on a day-to-day basis, it is not as unassuming and simple as the diet of those living in a rural, indigenous community. With a population of under 100 individuals, Tingo lacks modern kitchen appliances, sophisticated cooking utensils, running water, and electricity in all housing units (Menzel and D'Alusio 107, 116). Most of the staples in the Tingo diet include starchy soups or porridges, or consist of separate food items that are dispersed on a nondescript metal plate. As is common in rural areas, a lack of resources dictates the dietary options of this community; for instance, according to Menzel and D'Alusio's anthropological study of global food consumption, the Ayme family of Tingo feeds a total of ten people on less than \$5 per day (107). While the consumption of eggs (which are hard-boiled) is not terribly uncommon, they are seen as a valuable food item and are one of the few protein sources (asides from beans and legumes) that are consumed by the community; other animal proteins are rarely eaten – as Menzel and D'Alusio observed in 2005, guinea pig and chicken are eaten “only a few times a year” (107). Like many families in Tingo, the Ayme family primarily live off the foods that they are able to cultivate, such as potatoes, fava beans, corn, wheat, and root vegetables (Menzel and D'Alusio 107).

As Figure 5 illustrates, a typical meal in Tingo is simple and is evidently derived from the resources available given the community's socioeconomic and geographic conditions. Because their “fields are 11,000 feet up in the mountains, far removed from the tropical lowlands” and they cannot afford to buy many foods at the market, the family, like many in Tingo, have limited options for their diet (Menzel and D'Alusio 107). As the family's patriarch, Orlando, states “[the] land is dry, and the wind is harsh... so it's not good for planting”; though more fertile land is available

“farther down [the mountain],” Orlando explains that the family is unable to grow crops there because “it’s too expensive” (qtd. in Menzel and D’Alusio 107). After considering the diet and environmental conditions of Tingo, it is not too surprising that the community suffers high levels of malnutrition, which is primarily exhibited through the incidence of stunting (as can be seen in Figure 6). From his own observations, Dr. Ortega – who has worked with the community for decades to improve its nutritional conditions and health outcomes of the community, despite Tingo’s harsh environment – has noted that most children in Tingo are so significantly stunted, that they often fail to even reach the shoulder height of an Ecuadorian child of normal growth outcomes, when placed side by side (Ortega). As of August 2013, for instance, all of the children under five years old in the community of Tingo were significantly below the average (and healthful) height for their age; this was particularly the case for under-five year old girls, as many are at a height which, relative to their age, puts them in the “red zone,” so to speak, for stunting (see Figure 7).



Figure 6: Visualizing the Stunting Present in Tingo, Ecuador. This photograph, which shows several adults and their children, illustrates the stunting present in the population of Tingo, Ecuador. (Photo Credit – Lindsay Stone, June 2014).

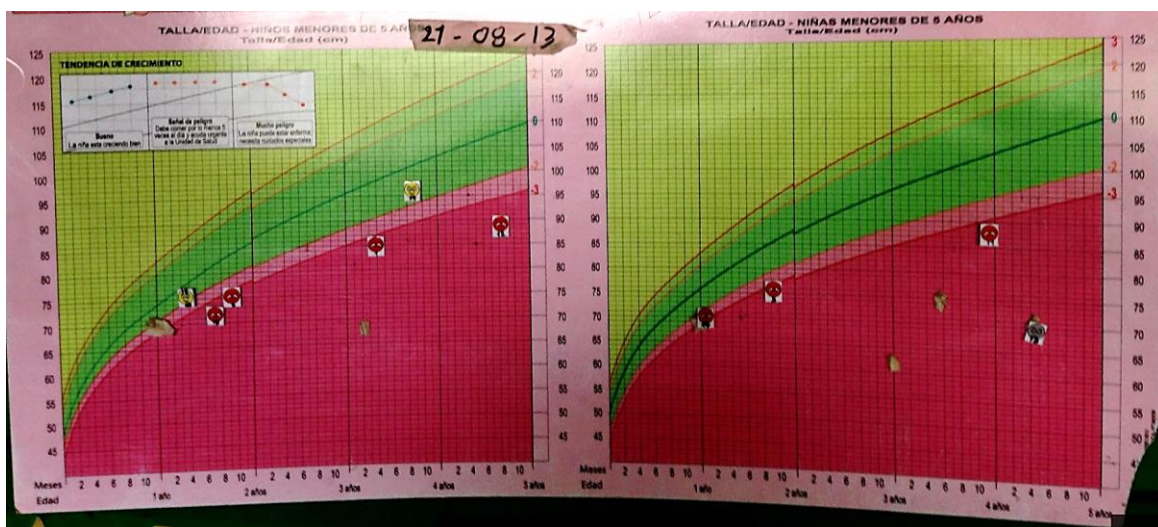


Figure 7: Growth Curve (Height/Age) for Under-Five Male and Female Children in Tingo, Ecuador. The photograph of this graph indicates the height to age ratio of under-five girls and boys in Tingo, as of the 27th of August, 2013. Areas in red indicate stunting and severe stunting, while the green indicates the average height range. Stickers and pieces of paper are used to represent different under-five year old children in the community. As can be seen, most of the youth are in the “red zone,” and are thus stunted (Photo Credit – Lindsay Stone, June 2014).

Ultimately, it is clear that a discrepancy exists between the levels of malnourishment in urban centers versus rural areas, as a result of different diets, socioeconomic opportunities, and topographic constraints; recognizing the impact of these conditions can help one to understand why, as the World Bank states, “the highest rates of chronic malnutrition [(i.e., stunting)]... are concentrated in the rural Sierra,” specifically “among the poorest and indigenous population” – though “large urban inequities” also exist (Walker et al. 44, 44; Ortiz et al. 2123). Given the Sierra’s high altitude, distinct diets, large rural populace, and significant number of indigenous peoples, it is not surprising that this highland region is affected by high levels and often chronic forms of malnutrition.

Overt & Obscured Manifestations of Undernutrition in the Sierra: Chronic & Hidden Hunger

Ultimately, the summation of these factors (i.e., altitude, rural vs. urban settings, socioeconomic status, dietary patterns, etc.) lend themselves to the high levels undernourishment

experienced in the Ecuadorian Sierra. Because the occurrence of severe forms of malnutrition can be expected in developing countries – such as Ecuador, one of the least developed countries in Latin America – it is not surprising that, over the past few decades, Ecuador’s main nutritional concern has steadfastly been that of chronic malnutrition (otherwise known as chronic hunger, i.e., the inability to consume sufficient food to meet one’s energy needs). Though levels of stunting have been essentially halved since the 1980s, Ecuador’s – and particularly the Sierra’s – stunting rate, which strongly indicates the presence of chronic malnutrition, still remains high (Walker et al. 6-8). For instance, the Sierra’s population of chronically malnourished under-five year olds, as previously mentioned, accounts for sixty and sixty-three percent of the country’s stunted and severely stunted population, respectively; accordingly, this equates to a total of almost 227,000 highland children who are afflicted with chronic malnutrition in some form (Walker et al. 12).

Both in the highlands and across Ecuador, the presence of stunting not only indicates the levels of malnourishment, but also denotes its nutritional conditions; overall, chronic malnutrition indicates an unbalanced diet and can point to other factors as well (i.e., socioeconomic deterrents, restricted access to healthcare, disease prevalence, etc.) from which stunting, and chronic hunger, can arise. For instance, as previously discussed, the average diet of a rural individual is often low in protein and high in carbohydrate sources; moreover, it is highly probable that such an individual is limited in their agricultural and socioeconomic opportunities, experiences geographic isolation from other communities, healthcare facilities, etc., and is necessitated to have increased energy expenditure as a result of the altitude, the terrain, and their likely agrarian occupation. Thus, it is to be expected that such individuals are subjected to chronic hunger – and, specifically, protein-energy undernutrition.

Given the high levels of chronic malnutrition (which is represented by the considerable prevalence of under-five year old stunting) in the Sierra, and particularly in the rural areas, it is not surprising to find that hidden hunger levels are also significantly high – for, as one should recall, “stunting is not the only dimension of malnutrition” (Walker et al. 17). Though micronutrient deficiencies are not often always perceptibly expressed, they are often critical public health concerns, as vitamins and minerals are essential for growth, development, and countless physiologic processes. Although altitude, insufficient protein intake, etc. all lend themselves to stunting, many studies also suggest that micronutrient deficiency (which stems from overall “dietary insufficiency”), may also be a significant contributing factor (Walker et al. 44). Even apart from their impact on childhood growth and development, micronutrients are integral to the body’s proper functioning – for instance, zinc is necessary for growth and proper immune functioning, vitamin A for vision and immune function, iron for hemoglobin (the oxygen-carrying unit within red blood cells) production, and iodine for the synthesis of hormones from the thyroid gland (Livingstone 371; Walker et al. 103).

Because of the “hidden” nature of micronutrient deficiencies, an insufficient intake of vitamins and minerals can be difficult to observe and thus be utilized as an indicator of public health. This is the case with Ecuador’s highland region, as data relating to hidden hunger in the Sierra not readily available due to a dearth of national and regional studies on micronutrient deficiencies. While such studies provide relevant information, they “[require] specialized surveys which take [and analyze] blood samples” (Walker et al. 17). Because of the scope of the undertaking needed to collect such data, the most recent national survey (the ENDEMAIN) did not include a representative analysis of the status of the country’s micronutrient deficiencies; accordingly, most data relating to micronutrients are outdated – as the majority is derived from a

national nutrition survey from the late 1980s – and thus does not indicate the effects of subsequent governmental and nonprofit initiatives (assuming their success) aimed at improving Ecuador’s nutritional status (Walker et al. 103). However, some pertinent information is still available relating to the prevalence of deficiencies in key vitamins and minerals essential to human physiology and public health. Though the term “micronutrient deficiency” generally refers to iodine, iron, and vitamin A (collectively known as the “big three,” as they are of most concern to public health and are the main target for intervention and supplementation programs), in Ecuador, zinc deficiency is also a concern and is thus included in studies and reports referencing micronutrient deficiencies (Walker 103). Because information regarding the regional micronutrient deficiencies is so sparse, however, this paper will focus solely on the “big three” micronutrient deficiencies in the Sierra.

Iodine is an important mineral that aids in the regulation of cells’ metabolic activities, as it is necessary for the production of thyroid hormones which regulate cell division and replication (Walker et al. 19, 103). Those with iodine deficiency disorders (IDD) will often develop goiters – an abnormal enlargement of the thyroid gland that may obstruct breathing and/or swallowing. Moreover, IDD is linked to “increases [in] infant mortality, [and impaired] mental capacity”; for, when a child gestates in the womb of a mother with IDD, they are often born with a condition known as “cretinism” (which manifests itself through stunting and mental retardation) as a result of congenital hypothyroidism (Walker et al. 19). Aside from the effects IDD has on the individual, they are also a general societal concern because of the “relationship between [IDDs]... and [reduced] intellectual capacity,” and the fact that “productivity is adversely affected by iodine disorders”; in fact, it has been noted that “people with moderate [iodine] deficiency were consistently paid less for agricultural work” as a result of their diminished productivity (Levin et

al. qtd. in Behrman 1753; Darnton-Hill et al. 1201S). Before the late 1990s, however, this was not the case – especially in the Sierra, where goiters afflicted greater than thirty percent of the population, according to national surveys from 1959, 1970, and 1983 (Moreano Barrgán 22). A study by Dr. Greene in 1977, for example, observed that fifty-three percent of individuals in a rural and remote highland community were afflicted with goiters, and six percent were “deaf-mute cretins” (Behrman 1766). Currently, however, salt fortification and other efforts has allowed for IDD levels to be controlled nationwide; in 1999, for instance, “the country was declared free of iodine deficiency disorders” (Moreano Barrgán 23). Thus, though IDDs have long been incorporated into Ecuador’s history, the country no longer considers iodine deficiency to be a large public health concern – even in the Sierra.

Though IDD incidences have diminished in Ecuador, the same cannot be entirely said for iron deficiencies. This micronutrient deficiency manifests itself in the form of iron deficient anemia, whereby the body lacks sufficient iron stores to produce hemoglobin (and thus maintain a normal healthy red blood cell count); as a result, individuals with iron deficient anemia are unable to efficiently transport oxygen, which is carried by the hemoglobin units within red blood cells. However, though nationwide anemia is viewed as “a serious problem in Ecuador,” it is not specifically a concern in the highlands; in effect, surveys have shown that anemia is most prevalent “in the coastal regions, and at lower altitudes,” and that “while low iron intakes are more prevalent at high altitudes, anemia, per say, is not” (Walker et al. 18, 18-19, 30).

This observation is somewhat surprising, given the body’s natural response to increase hemoglobin and red blood cell levels in response to increased altitude (and the resulting hypoxia); accordingly, one would expect an increase in iron deficient anemia at higher altitudes, as it fails to supply enough iron to meet the body’s increased physiological demands. Moreover, it would be

expected for populations whose diet is poor in meat [to be] more prone to anemia,” such as those in the Sierra, given that the body absorbs heme-iron (that is found in animal protein) more readily than non-heme iron (which is found in vegetables, grains, etc.) (Walker et al. 18). Yet, it is commonly recognized that “higher anemia rates are higher in the lowlands” (Walker et al. 30). Some partially attribute lower parasite levels at higher altitudes to this situation, while others suggest that the large percentage of tubers (which can provide adequate amounts of dietary iron, despite offering only nonheme-iron) and other nutrient rich highland foods (such as quinoa) in the Andean diet may lower the prevalence of iron deficiency anemia in the Sierra; however, the primary reason for the lower anemia levels in the highlands is still up for debate (Walker et al. 30; Berti and Leonard; Berti et al.).

Ultimately, although the Sierra may not have as high levels of anemia as other regions, general iron deficiency and iron deficient anemia still affect a significant portion of the population. In their comprehensive analysis of available data on micronutrient intake in the Ecuadorian highlands, for instance, Berti et al. conclude that iron intake “[is] low, likely resulting in high levels of inadequacy” (314). Because of the negative effects of iron deficiencies on child development and productivity, the prevalence of iron deficiency is not to be disregarded. It is undisputed that a link exists between anemic mothers and the improper development of their offspring; in fact, according to the World Bank, iron deficiency and stunting are positively correlated – which only further exacerbates the effects of undernourishment in the Sierra (Walker et al. 30). Furthermore, from a public health standpoint, iron deficiencies are a societal concern because of the correlation between insufficient iron intake and “[impaired] work performance” (Levin et al. qtd. in Behrman 1753).

Though IDD and iron deficiency are not significantly prevalent in the Sierra relative to the rest of the country, vitamin A deficiency (VAD) is known to be higher in the highland region (Walker et al. 20). Vitamin A is commonly found in plants containing large amounts of beta-carotene such as carrots, sweet potatoes, and dark leafy greens; it is also a lipid soluble vitamin, meaning that it can only be optimally absorbed by the body in the presence of fats. Given that the Andean diet is relatively low fruits and vegetables, and may not include large amount of animal fats and/or oils, it is not surprising that VAD rates are higher in the Sierra. In fact, according to the World Bank, approximately twenty two percent of under-three year old children have VAD, in comparison to fifteen and twelve percent in Amazonia and the Costa, respectively (Walker et al. 20). Moreover, surveys have indicated “a higher prevalence [of VAD] in rural areas”; in this way, VADs only contribute to the long list of problems that afflict the rural population in the Sierra (Walker et al. 20).

Ultimately, several limitations unfortunately prevent more comprehensive conclusions from being made; most notably, as Berti et al. reminds us, “available literature is not statistically representative of the Central Andes” and thus prevents one from accurately interpreting the status of micronutrient deficiencies in the Sierra (321). Yet, despite the lack of suitable dietary data, it is clear that the population of the Sierra is affected by several micronutrient deficiencies. Though more data is needed before making verifiable statements about the Sierra’s hidden hunger levels in comparison to other regions, it does appear that there is a significant prevalence of micronutrient deficiencies in the Sierra. For, as the comprehensive analysis of Berti et al. suggests, there is a “low average [micronutrient] intake” for iron, zinc, calcium, vitamin A, and several B vitamins in the Ecuadorian highlands (314). The occurrence of micronutrient deficiencies in the Sierra is likely in part due to the region’s often constrained diet and the elevated rate of insufficient dietary intake

(as is revealed through the presence of stunting), particularly in rural and indigenous communities; however, as can be seen in the instance of iron deficiencies, the Andean diet (and overall highland environment, too) may somewhat diminish the effect of certain micronutrient deficiencies relative to other regional diets. Additionally, as is the case with chronic hunger, these manifestations of hidden hunger may also be attributed to other contributing factors, such as altitude, poverty, etc. Overall, it appears that a variety of compounding factors, both direct and indirect, lend themselves to the prevalence of undernourishment in all of its various forms – viz., stunting and micronutrient deficiencies – in the Sierra.

Obesity & the Double Burden of Disease

While malnutrition in the Sierra is clearly revealed through the presence of undernourishment, one must not forget to consider the opposite dimension of improper dietary intake – overnutrition. Though “child undernutrition remains Ecuador’s greatest nutrition problem,” abnormally high body weight and obesity are of a growing concern (Walker et al. 33). Overnutrition and the excess body weight it causes are threatening public health issues, as it has been shown to increase one’s risk for hypertension, ischemic heart disease (i.e., insufficient blood flow to the heart muscle itself, often causing chest pain), diabetes, high cholesterol levels, certain cancers; moreover, an association has been made “between high adult Body Mass Indexes (BMIs) and mortality rates” (Walker et al. 34, 36). The high prevalence of overweight and obese individuals is a concern given the causal (and, at times, self-perpetuating) nature of obesity; for, childhood and adolescent obesity is a risk factor for adult obesity, while excessive weight gain and obesity during pregnancy are correlated with later childhood obesity.

Because “increases in rates of overweight and obesity... is a relatively new phenomenon” in Ecuador, many have not yet recognized the threat it poses to public health (Freire et al. 1636S). Thus, as is the case with micronutrient deficiencies, sufficient data relating to overnutrition in Ecuador and its different regions does not exist; unfortunately, only some statistics are available for analysis –particularly concerning pregnant women and mothers. However, despite the lack of studies and surveys, it is abundantly clear that the obesity problem in Ecuador is growing, as it is in many countries globally. Data from the ENDEMAIN examining maternal health, for instance, suggests that almost more than forty percent of mothers are overweight, while almost fifteen percent are obese; yet, a more recent study analyzing overnutrition and excess body weight suggests that more than twenty percent of “women of reproductive age (12–49y)” in Ecuador are obese (Walker et al. 34; Freire et al. 1638S). It is thus understandable why the World Bank characterizes “child and adult overweight and obesity... [as] important threats” to Ecuador’s public health, in addition to undernutrition (Walker et al. 33).

Though obesity appears to be more prevalent outside of the Sierra (according to the World Bank, roughly twelve percent of mothers in the Sierra are obese, while approximately sixteen percent are obese in the Costa), it is certainly an issue in the highland region as well; from a small sampling of women in Quito, for example, Dr. Baldeon observed that one-hundred percent “were either overweight or obese” (Walker et al. 35, 33). Though data is not readily available for overnutrition, as with other forms of malnutrition, one can note that the prevalence of overweight and obese individuals in different population types (i.e., according to gender, class, ethnicity, location, age, etc.) is not uniform. For instance, it appears that rural areas of the Sierra have lower levels of overnutrition than urban centers; according to the World Bank, nearly seventeen percent of the country’s urban population is obese, as opposed to twelve percent of its rural populace

(Walker et al. 34). Though the difference between these area types can depend on the communities in question – e.g., a study comparing rural and urban cantons in the Sierra noted only a three percent difference between the number of overweight and obese individuals among the two populations (eighteen percent in the urban versus fifteen percent in the rural populace) – a distinction can be made between these two area types (Ortiz et al. 2126). This is not too surprising, given that most of the primary causes of overnutrition are associated with industrialization, urbanization (hence the urban-rural discrepancy), and increased adaptation of other cultures' dietary practices. In fact, a global trend has been observed in developing countries, such as Ecuador, whereby “urban areas suffer more acutely... than their rural counterparts” (Walker et al. 36).

The increased prevalence of excess body weight in urban vs. rural areas in Ecuador can in part be accredited to the different lifestyles associated with these two areas. For, individuals living in rural, and primarily agricultural, communities necessarily have higher energy demands than those who live in urban centers and thus partake in largely sedentary lifestyles. Furthermore, fast foods eateries are more common and junk food is more readily available in urban centers than in rural areas; accordingly, urban individuals are more likely to accustom themselves to poorer quality diets. Together, these two factors (among others) can be attributed to the “nutrition transition,” a phenomenon present in developing countries as overnutrition becomes more prevalent due to “changes in diet, activity patterns, health, and nutrition” (Walker et al. 36). As described by the World Bank, the nutrition transition arises when “incomes rise and populations become more urban,” causing individuals to transition away from “energy-intensive work and traditional [foods]” towards “more sedentary work and diets higher in fat and energy” (Walker et

al. 36). In this way, the nutrition transition necessarily lends itself to an increase in overnutrition and “nutrition-related noncommunicable diseases associated with obesity (Walker et al. 36).

Apart from the urban-rural discrepancy, the nutrition transition can help to describe the overall, general trend of increasing rates of overweight and obese individuals in Ecuador. As previously discussed, the nutritional quality of the Ecuadorian diet has deteriorated as a result of cultural homogenization and cross-breeding, as well as the incorporation of high-fat, high-sugar, and other generally processed foods. Moreover, an increased consumption of lower quality foods has resulted due to a perception of food prestige and desire for cultural assimilation – i.e., given the association between mestizo food as fast food or junk food. In the Sierra, for instance, snacks can be seen to exemplify the change in food consumption. For, snack foods “are generally associated with fast food, children’s food, mestizo food or junk food” and are high in sugar, fat, and/or simple carbohydrates; accordingly, they are of low nutritional value, and “only provide energy for a short period” Camacho 167). On top of this, snacks are also often marketed to be eaten on-the-go or as a treat external to one’s core diet. Thus, the consumption of unhealthful snack foods such as candy, ice cream, chips, juice, or manufactured bakery items lend themselves to the possibility of overnutrition (and its most profound manifestation, obesity). On the whole, a variety of changes in diet and eating practices – such as the introduction and popularization of non-nutritious snacks – across all areas of the Sierra (and, by extension, the entire country) can be accredited to the nutrition transition and similar phenomena.

Conversely, while the nutrition transition can be used to rationalize the increasing presence of overnutrition in the Sierra, the lack of this phenomenon in highland indigenous communities – due to their adherence to traditional lifestyles and diets, particularly in more rural areas– can help to explain the low levels obesity observed among indigenous peoples. This is illustrated most

clearly by studies which suggest that indigenous women are less likely to be afflicted with obesity than other ethnic groups. As the World Bank observes, for instance, the national prevalence of obesity among indigenous mothers is about half of the average among other ethnic groups – while obesity levels in non-indigenous mothers is around fifteen percent, only about seven percent of indigenous mothers are obese (Walker et al. 34). Thus, though indigenous communities in the Sierra are not exempt from “obesity, diabetes and cardiovascular problems,” overnutrition is not a serious concern for this population in the highlands – despite the fact that these conditions are generally “characteristic of poor and malnourished populations in the developing world” (Camacho et al. 168).

The lower levels of overnutrition in the Sierra’s indigenous (and primarily rural indigenous) populations is in part due to their “slow diet,” which markedly contrasts the fast food diets made available in more urban centers; unlike the on-the-go preparation and consumption of fast foods which are often less-than-healthy, the traditional slow foods of indigenous communities are made with “filling and strength-giving products,” “involve time-consuming [food preparations],” and “are eaten slowly” (Camacho 166). Though consuming an indigenous diet may result in dietary insufficiencies, as previously discussed, the “slow cooking and nourishing meals” are at least intended to provide sustenance instead of convenience – and thus inherently do not lend themselves to noncommunicable diseases such as obesity, cardiovascular disease, diabetes, etc. (Camacho 167). However, given the steady growth of obesity levels across Ecuador, changing “national consumption patterns [which] follow the global trend toward Western diets,” a recently observed “decline in the availability of [traditional indigenous foods],” and the increasing “availability of fat, cereals and derived products... and sugars,” many are concerned that obesity will “eventually affect” this population group in the Sierra, too (Camacho 168).

Though the distribution of overnutrition and its magnitude among different groups varies across the Sierra, it is clear that – though it is less of an immediate and extensive issue – overnutrition is a “looming problem” (Freire et al. 1636S). However, the Ecuadorian government generally “[continues] to concentrate on undernutrition without addressing [overweight/obesity],” even though strong data points to an “evolving double burden of undernutrition and [overnutrition]” in the country (Freire et al. 1636S). In fact, it is clear that coexistence of overnutrition with chronic malnutrition and/or micronutrient deficiencies “at the individual, household, and national levels” is not uncommon in Ecuador (Freire et al. 1636S). Furthermore, many studies suggest that this double burden (discussed in Chapter I) can further perpetuate the prevalence of both forms of malnutrition. According to international literature, not only can childhood malnutrition (in the form of either under- or overnutrition) increase one’s likelihood of being overweight/obese later in life, but maternal overnutrition can also increase the prevalence of malnutrition in their children. Consequently, by failing to recognize and/or assign sufficient resources to the rising overweight and obesity epidemic, the country will likely inevitably (and ironically) experience increased levels of undernutrition – i.e., as a result of the double burden of malnutrition – in addition to overnutrition.

Nationwide, the so-called double burden of disease is in part ascribed to the fact that the increase in overweight and obese individuals “is greater than the decrease in undernutrition,” such that a “coexistence of nutritional problems of deficit and excess” necessarily arises (Freire et al. 1641S). Consequently, some argue that the coexistence of undernourishment and overnutrition are independent events that inevitably coincide in certain individuals – i.e., that a double burden of stunting, micronutrient deficiencies, and overweight/obesity is simply an expected statistical prospect (Freire et al. 1641S). Yet, as Freire et al. reminds us, “the independence of each condition

does not change the fact that both conditions coexist”; it is important to recognize that the significance of the double burden of disease on the individual lies in its mere existence and the public health concern it creates, rather than the precise linkage between the two conditions (1641S).

Statistics aside, on the individual and household levels, the presence of both excess energy intake and undernourishment is most significantly associated with “food consumption patterns... [that] substantially [contribute] to the double burden” (Freire et al. 1641S). It is not difficult to consider how diets that are characterized by both an “excessive intake of carbohydrates” and “low nutrient bioavailability” will “promote overweight and obesity” in addition to macro- and/or micronutrient deficiencies (Freire et al. 1641S). This is particularly the case in the Sierra, where (as previously discussed) diets are generally high in carbohydrates and often low in fresh fruit and vegetables, animal proteins, and sources of key micronutrients. Additionally, many of the aforementioned dietary patterns that are associated with overnutrition – viz., those which have arisen due to urbanization and the nutrition transition, such as the consumption of fast foods, junk and snack foods, etc. – can also lend themselves to the progression of undernutrition as well.

Thus, given the dietary factors causing both over- and undernutrition, one can logically consider how a double burden of disease can be manifested on the individual level. Unfortunately, because of the limited amount of statistical evidence for both overnutrition and micronutrient deficiencies, an analysis of the double-burden of these two conditions requires a largely theoretical discussion rather than one based on statistical evidence; however, enough data on the levels of stunting can be used to analyze the double burden of chronic malnutrition and overnutrition. Thus, while the coexistence of hidden hunger and overnutrition necessarily occurs, it will not be discussed

at length in this paper. Instead, a focus will be placed upon the double burden of stunting and overnutrition at the individual and household levels.

On the individual level, the double burden of malnutrition is interesting as it can occur not only simultaneously, but also over the course of a person's lifetime – that is to say, one can be classified as a double-burdened individual for being concurrently undernourished and overweight/obese, or for experiencing each of these two conditions separately over the course of their lifetime. Though the latter expression of the double burden of under- and overnutrition may seem somewhat paradoxical, it has been widely acknowledged that stunting in early childhood can “predispose individuals... to other forms of malnutrition and noncommunicable diseases later in life” (Walker et al. 34). Many suggest that this phenomenon arises when stunted or otherwise undernourished children “become ‘programmed’ to conserve fat” and reduce the efficacy of body's ability to burn fat; accordingly, these individuals are at a higher risk for overnutrition as they age (Walker et al. 36). Regardless of the mechanism, the body's physiological adaptations in response to childhood undernutrition can clearly be seen to have the possibility to function as a positive feedback loop – whereby malnourishment in one's youth may increase the amount of malnutrition that the individual faces as they age (albeit in forms that lie on the opposite end of the malnourishment spectrum).

However, the progression of malnutrition in the individual due to childhood undernourishment only tells a part of the story. Interestingly, this “physiological interaction between childhood stunting and the production of adult obesity” not only further perpetuates the malnourishment one faces on the individual level, but can also increase the double burden of disease within their household (Walker et al. 36). As with the evolution of under- to overnutrition

in individuals, double-burdened households⁵ can also generate a perpetuation of malnutrition – i.e., as overweight/obese mothers give birth to stunted children. This is particularly the case in the Sierra, where the prevalence of households with cohabitating overweight/obese mothers and stunted children is significantly greater than in the country’s other regions (Walker et al. 37). In fact, according to the World Bank, stunted children can be found in approximately thirty-two percent of highland households with overweight or obese mothers; in the other regions, these data points are significantly lower, as they range anywhere from approximately nine to twenty-four percent and average around sixteen percent (Walker et al. 37).

Though studies have made note of this phenomenon in double-burdened households with overweight/obese mothers, many studies also suggest that it is particularly exacerbated in the instance of double-burdened mothers (i.e., who are both stunted and overweight). In fact, the World Bank suggests that “a possible feedback loop” of malnutrition from double-burdened mothers to “the stunting of their children” (Walker et al, 34). This relationship is likely associated with “the physical constraint on intrauterine growth during pregnancy” – due to the mother’s excess body mass, and specifically in both short-statured and overweight/obese mothers – in addition to other developmental problems caused by overweight/obesity-induced maternal health problems (Walker et al. 37). These low-birth weight children are in turn subjected to a higher risk of becoming double-burdened individuals themselves, given that “low birthweight may also lead to increased obesity and noncommunicable disease... later in life” (Darnton-Hill et al. 1202S).

Thus, the feedback loop characterizing the double burden of malnutrition at the household level (i.e., whereby an obese mother gives birth to a stunted child) could, in turn, also initiate the aforementioned feedback loop at the individual level (i.e., whereby the stunted child becomes more

⁵ Double-burdened households can be characterized by the presence of both undernutrition (i.e. stunting or micronutrient deficiency) and overnutrition in different individuals within the same family unit.

vulnerable to obesity later in life). Given the high prevalence of stunting in children born to overweight/obese mothers and the low levels of overall overnutrition in the Sierra in comparison to the other regions, one could suggest that only the former feedback loop significantly affects the highland population; however, additional data analyzing the relationship between stunting and obesity would be necessary before making such conclusions. Regardless, it is clear that the double burden of over- and undernutrition at the household level does significantly impact the highland population, as is displayed through the co-occurrence of “maternal [overweight or obesity] and children’s stunting” (Walker et al. 34).

Conclusion

Though eating is a daily activity whose significance is not necessarily given much thought, one can obtain important insights into an individual’s cultural and social settings, economic conditions, cultural heritage, and physiological wellbeing by observing the cuisines, foods, and meals that they consume. For, food is a very personal experience. A variety of factors unique to each individual or population group can impact how it is prepared, what one chooses (or does not choose) to eat, how it is perceived culturally or socially, what parameters dictate why it is eaten, and in what matter it is eaten. Consequently, analyzing the nutritional status – which is above all dependent upon the foods consumed, in addition to other secondary factors – in a country, region, or single community is an important method of understanding the many aspects of the population’s socioeconomic circumstances, environmental settings, and, particularly, their overall physical and mental health.

When looking at Ecuador, and specifically its highland, Andean region (the Sierra), one can identify a variety of conditions which lend themselves to different food consumption patterns

– and thus ultimately the nutritional state of the individuals who prescribe to them. Among these conditions, several in particular remain central to the development of Ecuador’s current nutritional status: the country’s ongoing urbanization, the influence of industrialized countries on the traditional diet, the existence of a nutritional transition, the implications of Ecuador’s colonial history, the presence of distinct ethnic groups, and other key factors can all be attributed to the high (although, in some cases, improving) levels of malnutrition.

In particular, Sierra is noteworthy as it is a geographically intense region within a developing country. Urban-rural discrepancies in this region cause acute differences in the prevalence of malnutrition, as those in rural communities often endure more extreme environmental conditions, experience more energy-demanding lifestyles, and consume less nutrient-rich diets. Moreover, the large percentage of indigenous peoples – who have a history of exploitation (which continues today) – living in the Sierra are exposed to a variety of dietary, environmental, and socioeconomic factors which promote malnourishment. Accordingly, it is not surprising to find that this highland region experiences the highest levels of chronic malnutrition in the country (as is manifested through the presence of stunting). Though micronutrient deficiency (with the exception of Vitamin A) and obesity levels are lower in this region, they nonetheless impact this population (sometimes in the form of a double burden of disease), as well.

However, in spite of the concern for the Sierra and the entire country’s levels of undernutrition – and, slowly but increasingly, of overnutrition as well – progress in alleviating the burden of malnutrition has been made thanks to governmental and nonprofit efforts. The Ecuadorian government’s decades long work to decrease the rates of undernutrition in the country, and particularly in the Sierra, has indubitably led to improvements in certain population groups. The rural, indigenous community of Tingo, for instance, exemplifies how, when given a proper

opportunity, change is possible in even the most malnourished communities. Since Menzel and D'Alusio's observations in 2005, non-profit work in the community (largely coordinated by Dr. Ortega) has increased the consumption of animal protein, thanks to community education (e.g., murals of food that encourage better food choices, even for those who are illiterate) and through the installation of a rainwater-maintained fish pond, which is accessible to the entire community.

However, despite efforts made by the Ecuadorian government and those such as Dr. Ortega, significantly high levels of stunting and growing levels of obesity in urban and rural areas of the Sierra indicate that progress is still needed in both the region and across the country. Discrepancies among the food security and nutritional conditions affecting different ethnic groups, rural vs. urban communities, etc. will by no means allow such change to occur quickly or facilely. However, one can hope that the levels of undernutrition will continue to decline and obesity levels begin to slow their growth rate, such that the population of the Ecuadorian Sierra (and the country overall) is able to experience more productive and healthful lives.

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