CHARACTERIZATION OF NUTRITION KNOWLEDGE, ATTITUDES, AND PRACTICES AMONGST AGRICULTURAL EXTENSION AGENTS AND THEIR BENEFICIARIES IN THE DRY CORRIDOR OF HONDURAS

BY

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THESIS

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ABSTRACT

BACKGROUND: Sixty-six percent of Hondurans live in poverty and 14% suffer from undernutrition. This disproportionately affects rural inhabitants, such as those living in the Dry Corridor of Honduras. Agricultural extension agents are lifelines for rural farming communities, offering knowledge and resources to support agricultural productivity. Integration of nutrition-specific and nutrition-sensitive programs into agricultural extension services (AES) has shown some prior success to improve nutrition indicators for beneficiaries. However, the success of integration presupposes that AES beneficiaries and agents have the knowledge, drive, and capacity to take on this integrated approach.

OBJECTIVE: The purpose of this study was 1) to characterize what people involved with AES (beneficiaries and extension agents) know, think, and do in relation to nutrition in the Dry Corridor of Honduras and 2) to examine the potential to integrate nutrition topics into AES via extension agent capacities.

METHODS: A convenience sample of beneficiary farmers (n=86) were surveyed in-person, in-home in rural Honduras. A convenience sample of extension agents (n=62) self-selected to complete surveys via online Qualtrics platform or written format. Surveys include: demographics, coping strategies index (CSI), housing quality score (HQS), Minnesota Satisfaction Questionnaire (MSQ), nutrition KAP (constructs: dietary guidelines, iron deficiency anemia, vitamin A deficiency, overweight/obesity, hygiene, water sanitation), and household dietary diversity (HDDS).

RESULTS: Most AES beneficiaries (86%) reported primary school as their highest level of education, while the majority of AES agents (>78%) earned at least a high school diploma. Beneficiaries largely suffered moderate to severe food insecurity (75.6%) yet most homes had formal flooring (88.4%), a durable roof (65.1%), and access to electricity (95.3%). Agents had good satisfaction with their work, with highest satisfaction intrinsically sourced. Awareness of the Honduran dietary guidelines and vitamin A deficiency was sub-optimal among agents and beneficiaries, with <70% of the population having heard of these constructs ($p<0.05$; $p>0.05$,

respectively). Awareness of iron deficiency anemia was moderate among agents and beneficiaries ($p>0.05$); however, knowledge was suboptimal for both groups. Fewer beneficiaries were aware of overweight/obesity compared to agents ($p<0.001$). However, those beneficiaries who had heard of overweight and obesity showed higher knowledge than agents ($p<0.001$). Nutrition practices showed evidence of the nutrition transition, with beneficiaries having poorer practices pertaining to iron and vitamin A deficiency and agents having poorer practices pertaining to the dietary guidelines and overweight and obesity. HDDS was lower for beneficiaries than extension agents (8.7 ± 1.7 versus 10.4 ± 1.1; $p<0.001$), with major discrepancies in meat, dairy, and egg consumption ($p<0.001$ for all). No awareness questions were posed for the hygiene or water sanitation constructs. Beneficiaries and agents both scored >95% for hygienic knowledge but only about 70% in water sanitation ($p>0.05$). Hygiene and sanitation practices were optimal amongst both groups. Beneficiaries and agents shared variable nutrition attitudes across all measures. No differences in awareness, knowledge, attitudes, or practices were found amongst different agency groups ($p>0.05$).

CONCLUSION: Urgent nutrition education is needed for both beneficiary and extension agent populations, especially in the areas of the dietary guidelines of Honduras, iron deficiency anemia, and vitamin A deficiency. Nutrition topics pertaining to overweight and obesity are also advocated to combat the nutrition transition that Honduras is currently undertaking. Prioritizing targeted nutrition education for agents would potentiate their capacity to disseminate this information to beneficiaries. A train-the-trainer may be a viable option for this endeavor.

To my best friend, Eva, for sticking with me through the rollercoaster we call life.
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CHAPTER 1: INTRODUCTION

Honduras is a low-middle income country in Central America with a population of over 9.1 million people[1]. Close to 90% are literate, however, the average Honduran has only completed 6 years of school[2]. It is estimated that 2/3 of the population lives in poverty and nearly 40% live in extreme poverty[3].

Malnutrition is prevalent in Honduras taking many forms, ranging from undernutrition (macronutrient or micronutrient deficiency) to overnutrition[4–7]. Close to 15% of the population is undernourished, 21% of pregnant women suffer from anemia, and 11% of children under 5 suffer from vitamin A deficiency[2,6]. Furthermore, 48% and 16% of the Honduran population are overweight and obese, respectively[8]. Honduras is considered a country in *nutrition transition*[9]. This phenomenon is an emerging nutritional paradox seen in low and middle-income countries. In these countries, the rates of overweight and obesity are steadily increasing as diets become more westernized through exposure to cheap, processed foods[9–12].

Undernutrition has devastating long-term effects, including poor physical growth, diminished intellectual capacity, and reduced earning potential, with probable intergenerational impacts across these measures[1,13–18]. Immediate causes of individual undernutrition include inadequate dietary intake and disease (such as parasitic infection)[1,5,17]. Individual causes of undernutrition fit within larger contexts, at the household (e.g. food security, feeding and care practices, and supportive environment) and societal level (e.g. cultural norms, infrastructure, access to services, economic and political atmosphere)[17].

Consequences of overnutrition include type 2 diabetes, cardiovascular diseases, certain cancers, osteoarthritis, poor quality of life, and premature death[4,19,20]. Factors associated with higher risk of overweight and obesity are genetic, behavioral (e.g. energy over-consumption, sedentary lifestyle, inadequate sleep), and environmental (e.g. high stress, low socioeconomic status)[11,20,21].

Undernutrition and overnutrition may occur simultaneously, within a country, community, household, and even an individual[1,10,11,18,19]. All forms of malnutrition are

associated with poverty and food insecurity[10–12,20,21]. Poverty and malnutrition perpetuate one another in a vicious cycle, ultimately affecting economic outcomes on a national and global scale[1,11,13,17].

As defined by the Food and Agriculture Organization of the United Nations (FAO), food security "exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"[22]. Four dimensions support this definition of food security: availability, access, utilization, and stability[23]. Availability refers to food physically being present in a community, from a market perspective. Access is a household's ability to purchase the food (i.e money, transportation), regardless of its availability in the market. Utilization is the individual's ability to make use of any food that is acquired (i.e. ability to absorb nutrients that are ingested, knowledge and skills to prepare healthy and safe meals, and food distribution amongst household members). Stability is a necessary underlying factor to these dimensions[23,24].

Food security is further supported by a concept of nutrition security. This acknowledges that although food availability, access, utilization, and stability are important, they are not the only determinants contributing to an individual's nutritional status. Nutrition security emphasizes that health (i.e. disease, health care access), social welfare (i.e. cultural norms, feeding practices, inequalities), and environment (i.e. sanitation, hygiene, access to clean drinking water) also contribute to nutritional status[24–26]. Although not officially accepted by the FAO, *food and nutrition security* is a unified term widely used to cover this gamut[24–27].

Nutrition-specific and nutrition-sensitive programs are key points of strategic intervention to address food and nutrition insecurity from multiple angles simultaneously. Nutrition-specific programs "address the immediate determinants of malnutrition"[28]. These interventions address nutrition issues directly, by tackling inadequate dietary intake. Examples include the provision of nutritional supplements and/or food aid, diversification of diet, and consumption of fortified foods[17,25,29]. In contrast, nutrition-sensitive programs "address the underlying and systemic causes of malnutrition," thus affecting nutrition outcomes indirectly[17,28–30]. These interventions are more diverse; examples include increased access to

health services, sanitation and hygiene education, development of infrastructure, policy change, expansion of economic markets, gender empowerment, and improved agricultural practices[17,25,29–31].

According to the World Bank Group, "agriculture is one of the most powerful tools for raising poor peoples' incomes"[32]. This is critical in solving food and nutrition insecurity as poverty is a major contributing factor to malnutrition[10–12,20,21]. Agriculture is uniquely positioned to tackle food and nutrition insecurity from both nutrition-specific and nutrition-sensitive angles. As such, agricultural extension is a natural avenue to mobilize agriculture in pursuit of food and nutrition security.

In Honduras, food and nutrition insecurity persists with higher rates occurring in rural areas, where 43% of the population resides. More than half of these people live in extreme poverty and 60% engage in agriculture[2,3,33–36]. Rural farmers living in the Dry Corridor of Honduras suffer considerable agricultural challenges as this region has poor soil quality and is highly susceptible to drought, flooding, erosion, and landslides[36,37]. Many Honduran farmers engage in agricultural extension services (AES) in an effort to improve agricultural yields and, ultimately, their lives. Poor nutrition undermines these efforts. Globally, integration of nutrition-sensitive and nutrition-specific programs within agricultural programming has shown potential to improve nutritional status of beneficiaries through improved food access, utilization, and stability[38–46].

Major assumptions underlie potential gains in food and nutrition security through agriculture: 1) that increased incomes automatically yield improved nutrition and health outcomes; 2) that agricultural extension beneficiaries have the knowledge, drive, and capacity to make optimal nutrition-related decisions; and 3) that agricultural extension agents have the knowledge, drive, and capacity to teach beneficiaries about nutrition. Unfortunately, these perspectives cannot be taken for granted[29,31,47,48]. Considering that many agricultural extension beneficiaries live in rural areas where access to formal education may be limited, prior knowledge of nutrition cannot be assumed[49]. As far as the author is aware, no prior studies

have examined the nutrition-related knowledge, attitudes, or practices amongst AES agents or beneficiaries, or the potential capacity of agents to discuss nutrition concepts within AES.

Study Hypothesis

Nutrition-related knowledge, attitudes, and practices amongst agricultural extension agents and their beneficiaries in the Dry Corridor of Honduras are sub-optimal, by FAO standards.

Objectives

1. To characterize what people involved with agricultural extension services (beneficiaries and extensions agents) know, think, and do in relation to nutrition in the Dry Corridor of Honduras.

2. To examine the potential to integrate nutrition topics into agricultural extension services via extension agent capacities.

CHAPTER 2: LITERATURE REVIEW

2.1 MALNUTRITION

Malnutrition may present itself in a variety of clinical contexts and settings, according to life-stage, disease-state, lifestyle, social isolation, poverty, and larger-scale cultural and political environments[5–7,10,17,50]. For the purpose of this thesis, the discussion will focus on malnutrition in the context of food insecure populations in developing countries.

Malnutrition is a term that spans a broad range of nutritional imbalances, including undernutrition and overnutrition[4–7]. Although often used interchangeably with malnutrition, undernutrition is more specifically the "result of prolonged low level… food intake and/or poor absorption of food consumed"[51]. This can present as macronutrient deficiency (i.e. protein-energy malnutrition) or micronutrient deficiency (i.e. hidden hunger, vitamin/mineral malnutrition)[7,11,50,52]. Furthermore, malnutrition may present as overnutrition, characterized by overweight and obesity. These varied states of malnutrition may occur simultaneously, within a country, community, household, and even an individual, especially in the context of poverty[1,10,11,18,19]. Certain populations are at higher risk for malnutrition, including women, children (especially during the critical first 1000 days of life), and people living in poverty[7].

In 2014-2016, an estimated 10.7-13.6% of the world's population was undernourished, with 22.9-29.9% of children (under 5 years) stunted and 6-7.7% of children (under 5 years) wasted. Nearly half of all deaths among children (under 5 years) are associated with undernutrition[1,2,6]. Undernutrition is often characterized by stunting and wasting in children, as their vulnerable life stage uniquely positions them to impacts of physical growth and development, which is easily detectable via height and weight measurements[52]. Stunting is defined as low height-for-age and is a measure of chronic and/or recurrent undernutrition[1,51]. Wasting is low weight-for-height and is a measure of acute undernutrition, which may be immediately life-threatening[1,51]. Both stunting and wasting are associated with devastating long-term effects, including poor physical growth, poor cognitive development, diminished

intellectual capacity, as well as reduced socioeconomic status and earning potential, with probable intergenerational impacts across these measures[1,13–18].

Micronutrient deficiency rates are more prevalent globally, however many of them go undiagnosed as they require more demanding tests for proper assessment, such as blood and urine samples. This is especially challenging in low resource settings[52]. The most common global micronutrient deficiencies persist as iron, vitamin A, zinc, and iodine[4,7,50,52,53].

Iron deficiency is the most prevalent micronutrient deficiency worldwide. This is of particular concern amongst women of reproductive age (15-49 years) and children (under 1 year) due to increased nutrient requirements during these life stages. Consequences of iron deficiency include: hindered work performance, lethargy, fatigue, decreased immune function, impaired cognitive and psychomotor development in children, and poor pregnancy outcomes (premature birth, low infant birth weight, increased risk of maternal and infant death)[4,11,52,54,55]. In 2016, estimated global rates of anemia among children under 5 were 36.5% and 32.8% among women of reproductive age (29.5% among non-pregnant women and 34.9% among pregnant women, 15-49 years)[2,6].

Data regarding global vitamin A deficiency rates are limited. The most recent global reports are from 1995-2005 and are only available for low-income countries considered to be at risk for deficiency. At that time, an estimated of 33.3% of children (under 5) and 15.3% of pregnant women were considered deficient in vitamin A[56]. Pregnant women and children are at higher risk of vitamin A deficiency due to physiologically increased needs during these critical periods of growth and development[11,57]. Consequences of vitamin A deficiency include: xerophthalmia, night blindness, blindness, reduced immune function (and therefore increased risk of infection and mortality), impaired growth, and poor pregnancy outcomes (increased risk of birth defects, miscarriage)[4,11,56–60].

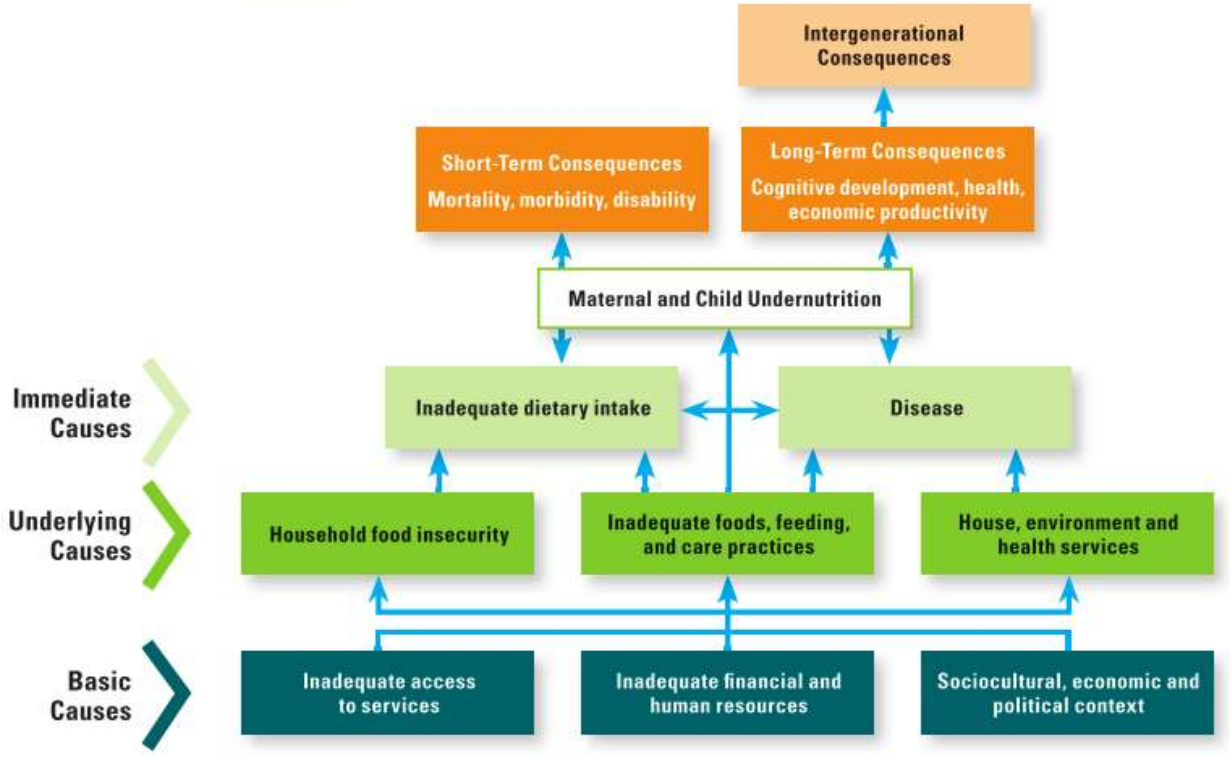
Zinc deficiency estimates are also sparse. In 2005, 1/3 of the world population was regarded as having some degree of zinc deficiency[52]. Consequences of zinc deficiency include: impaired growth and development (which may be associated with stunting), delayed sexual maturation, alopecia, poor appetite, diarrhea, reduced immune function (and therefore

increased risk of infection and mortality), impaired healing, acrodermatitis, and poor pregnancy outcomes (birth defects, increased risk of infant mortality)[11,52,53,61,62]

Current global iodine deficiency estimates are based upon approximations of insufficient iodine intake. The most recent report is from 2003, estimating that more than 1/3 of the general population do not consume sufficient quantities of iodine and therefore may be iodine deficient[63]. Consequences of deficiency include goiters, cretinism, impaired growth and development, reduced mental capacity, and poor pregnancy outcomes (low birth weight, birth defects, and increased risk of miscarriage). Due to its association with growth and birth outcomes, iodine deficiency is especially critical amongst children and pregnant women[11,52,53,63,64].

Malnutrition has many causes. Undernutrition can best be described by the UNICEF conceptual framework (Figure 1)[17]. Immediate causes of individual undernutrition include inadequate dietary intake and disease. More specifically, this could include insufficient intake of energy, macronutrients, or micronutrients. Furthermore, diseased states (such as parasitic infection) could alter nutritional requirements and the ability to absorb sufficient nutrients[1,5,17]. Individual causes of undernutrition fit within larger contexts, at the household (food security, feeding and care practices, and supportive environment) and societal level (cultural norms, infrastructure, access to services, economic and political atmosphere, and income poverty)[17].

Figure 1. *UNICEF conceptual framework of malnutrition*[17].



Shifting to the other end of the malnutrition spectrum, overnutrition occurs as "a result of excessive food intake relative to dietary nutrient requirements"[6]. In adults, the body mass index (BMI) is used to assess overnutrition. An adult is overweight when 25≤BMI≤30 and obese when BMI≥30. In children, weight-for-height growth charts are utilized to define overweight (>2 standard deviations above median) and obesity (>3 standard deviations above median)[6,10,19]. In 2016, an estimated 39% of adults were overweight, 13% of adults were obese, and around 7% of children (under 5 years) were overweight[1,2,6,19]. Consequences of overnutrition include type 2 diabetes, heart disease, hypertension, stroke, certain cancers, pulmonary disorders, sleep apnea, fatty liver disease, gallstones, osteoarthritis, poor quality of life, and premature death[4,19,20]. Currently, overnutrition contributes to greater global mortality than does undernutrition[19]. Factors associated with higher risk of overweight and obesity are genetic, behavioral (e.g. energy over-consumption, sedentary lifestyle, inadequate sleep), and environmental (e.g. high stress, low socioeconomic status)[11,20,21].

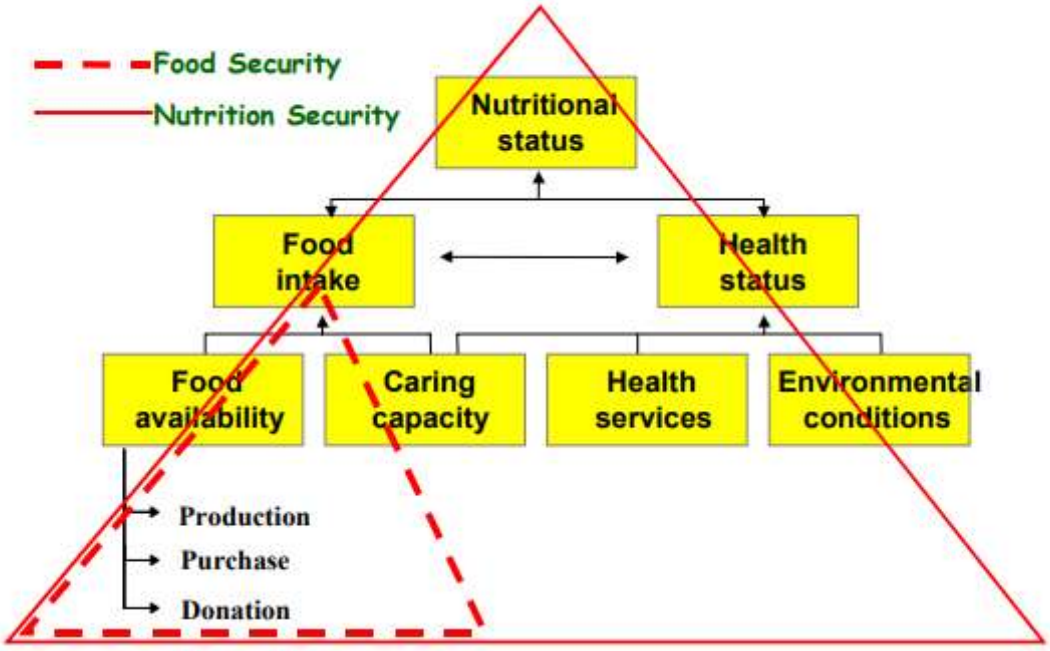
It is significant to note that both undernutrition (macro- and micro-nutrient deficiency) and overnutrition are associated with poverty and food insecurity[10–12,20,21]. Poverty and malnutrition perpetuate one another in a vicious cycle, ultimately affecting economic outcomes on a national and global scale[1,11,13,17].

2.2 FOOD INSECURITY

As defined by the Food and Agriculture Organization of the United Nations (FAO), food security "exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"[22]. Four dimensions support this definition of food security: availability, access, utilization, and stability[23]. Availability refers to food physically being present in a country or community, from a market perspective. Access is a household's ability to purchase the food, regardless of its availability in the market. This includes financial as well as physical accessibility (i.e. transportation). Utilization is the individual's ability to make use of any food that is acquired. This includes the ability to absorb nutrients that are ingested, knowledge and skills to prepare healthy and safe meals, and food distribution amongst household members. Stability is a necessary underlying factor to these dimensions, incorporating time into this equation. If availability, accessibility, and utilization are present today, but their presence tomorrow is uncertain, food security cannot be established[23,24].

Food security is further supported by a concept of nutrition security. This acknowledges that although food availability, access, utilization, and stability are important, they are not the only determinants contributing to an individual's nutritional status. Nutrition security emphasizes that health (i.e. disease, health care access), social welfare (i.e. cultural norms, feeding practices, inequalities), and environment (i.e. sanitation, hygiene, access to clean drinking water) also contribute to nutritional status[24–26]. Figure 2 depicts this intertwined relationship[24]. Although not officially accepted by the FAO, *food and nutrition security* is a unified term widely used to cover this gamut[24–27].

Figure 2. *Food and nutrition security framework for nutritional status*[27].



A lack of food and nutrition security (also known as food and nutrition insecurity), is a major contributing factor to malnutrition of all kinds (macronutrient deficiency, micronutrient deficiency, and overnutrition)[10,17,23,26]. The multi-dimensional issues of food and nutrition insecurity cannot be measured directly, but they can be characterized, by type, severity, and vulnerability. Type refers to the incidence, predictability, and duration of food and nutrition insecurity, and may be defined as chronic (long-term, predictable), transitional (short-term, unpredictable), or seasonal (short-term, predictable)[23]. Severity refers to a ranking scale of how dramatically the food and nutrition insecurity impacts the health and nutritional status of an individual[23,65]. Vulnerability refers to relative risk and how susceptible a population may be to the insult of food and nutrition insecurity within given circumstances.[23]

Identifying potential underlying causes of the incidence of food and nutrition insecurity is also critical to characterization. Food and nutrition insecurity may find diverse and broad roots, ranging from individual, household, community, country, and global fronts. Examples include disease, poverty, limited education, cultural or gender inequalities, poor infrastructure,

limited access to health care and contraception, poor governance, political instability, conflict, natural disasters, climate change, and global economic recession, to name a few[10,11,17,23,25,66–69].

2.3 STRATEGIES TO ADDRESS FOOD AND NUTRITION INSECURITY

Characterizing food and nutrition insecurity within a specific, local context is vital to the development of strategic solutions. Considering the wide array of underlying causes, solutions must also be diverse, broad-reaching, and timely. For example, issues of transitional food and nutrition insecurity require immediacy (i.e. food aid), while long-term solutions (i.e. education, social empowerment, development of economic markets, improved policy, etc.) are required to address chronic and seasonal food and nutrition insecurity, as they are more predictable[10,23,25,66,67]. Furthermore, solutions should be multi-dimensional, recognizing that food and nutrition insecurity is also multi-dimensional[17,25,66,69].

Nutrition-specific and nutrition-sensitive programs are key points of strategic intervention to address food and nutrition insecurity from multiple angles simultaneously. Nutrition-specific programs "address the immediate determinants of malnutrition"[28]. These interventions address nutrition issues directly, by tackling inadequate dietary intake. Examples include the provision of nutritional supplements and/or food aid, diversification of diet, consumption of fortified foods, and breastfeeding practices[17,25,29]. In contrast, nutrition-sensitive programs "address the underlying and systemic causes of malnutrition," thus affecting nutrition outcomes indirectly[17,28–30]. These interventions are more diverse; examples include increased access to health services, sanitation and hygiene education, development of infrastructure, policy change, expansion of economic markets, gender empowerment, and improved agricultural practices[17,25,29–31].

According to the World Bank Group, "agriculture is one of the most powerful tools for raising poor peoples' incomes"[32]. This is critical in solving food and nutrition insecurity as poverty is a major contributing factor to malnutrition[10–12,20,21]. Agriculture is uniquely positioned to tackle food and nutrition insecurity from both nutrition-specific and nutrition-sensitive angles.

For example, biofortification yields crops with higher micronutrient content (e.g. orange-fleshed sweet potatoes, golden rice). Consumption of biofortified foods can therefore address micronutrient deficiencies directly. As such, biofortification serves as a nutrition-specific intervention in the household. Growth and sale of these biofortified crops, on the other hand, could also yield greater income streams, enabling higher purchasing power and investment on other household needs (e.g. medical services, nutritious and diverse foods, investment in home or farming infrastructure). In turn, nutritional status can be improved indirectly. Thus, biofortification can also function as a nutrition-sensitive intervention[28–30,70]. This example also addresses malnutrition through the pillars of food insecurity, increasing: availability (orange-fleshed sweet potatoes in local markets), access (income to purchase nutritious and diverse foods; growth of biofortified crops for personal consumption), utilization (consumption of nutritious, diverse, and/or biofortified foods; increased incomes may yield better financial access to medical treatment for parasitic infection), and stability (reinvestment to develop farming infrastructure or to diversify agricultural assets)[23,30].

2.4 AGRICULTURAL EXTENSION SERVICES (AES)

Agricultural extension is a natural avenue to mobilize agriculture in pursuit of food and nutrition security. Agricultural extension services are widespread, employing more than 1,000,000 people globally, across the public (government based) and private sectors (non-governmental organizations, private companies)[71–74].

Agricultural extension functions as a lifeline for farmers across the globe, who often struggle with poverty. In general, AES work to improve livelihoods through education and training. Traditionally, AES have focused on improvement of agricultural outputs (crop yields, animal husbandry). Examples of traditional services include: maximizing resiliency of crops and livestock to disease, maintenance of soil health, irrigation techniques, and introduction of new farming technologies[29,66,71,73,75–77]. Educational techniques vary but typically include lecture, discussion, and hands-on training activities. Services provided are customized at the community and individual level to maximize potential impact for beneficiaries (i.e. farmers and their

families)[31,72,74,78].

Extension agents are on the ground, working with people one-on-one to improve their lives. They develop personal connections with beneficiaries and harness this power to see that real, effective, individualized solutions are possible. However, agricultural gains are not sustainable in isolation. Outside influences impact the success of their beneficiaries, especially for those living in poverty, and extension has responded accordingly[17,25,31,79,80]. In recent years, agricultural extension has expanded its reach, broadening the scope of programming to include complementary issues: business management, enhanced access to markets, diversification of assets, development of infrastructure, hygiene and sanitation programs, women's empowerment, and nutrition. A lack of attention to these confounding factors ultimately hinders agricultural productivity, thus undermining the basic goals of agricultural extension[25,66,71,73].

2.5 INGENAES

The United States Agency for International Development (USAID) "advances U.S. national security and economic prosperity, demonstrates American generosity, and promotes a path to recipient self-reliance and resilience"[81]. Under this mantra, USAID launched the Feed the Future campaign in 2010 with the goal of addressing hunger and poverty worldwide[82]. INGENAES (Integrating Gender and Nutrition within Agricultural Extension Services) is a USAID-funded Feed the Future initiative working in 9 countries (Bangladesh, Honduras, Liberia, Malawi, Nepal, Sierra Leone, Tajikistan, Uganda, and Zambia) from 2014-2018[83]. As the name indicates, INGENAES strives to integrate concepts of gender and nutrition into agricultural extension services in an effort to address food and nutrition insecurity in a sustainable manner. INGENAES works amongst the most vulnerable populations in these countries, identified by USAID as strategic "zones of influence"[83,84].

INGENAES "harness[es] technical expertise and resources of multi-disciplinary teams to provide capacity development, technical assistance, applied research, access to networks, and knowledge that respond to real-world problems in agricultural extension systems"[83]. INGENAES

works to develop training materials, fact sheets, technical notes, best-practice guides, workshops, and webinars to potentiate the capacity of extension agencies to engage gender and nutrition topics within preexisting service provisions[83,85,86]. INGENAES also composes research reports, case studies, discussion papers, tools, and frameworks as contributions to the development and research communities at large[85].

2.6 GENDER INTEGRATION TO ADDRESS FOOD AND NUTRITION INSECURITY

Women are marginalized worldwide. Global gender norms dictate that women remain at home, maintaining the household and raising the family. Consequently, women attain lower levels of education, are unable to contribute to household economic earnings, and have little to no input on financial decisions for their families[25,47,87]. Moreover, in many countries household food distribution dictates that females eat last. In food insecure households this can dramatically impact the quantity and quality of food that women consume[88]. Even in 2017, the FAO found that women were "more likely to be food insecure than men in every region of the world"[6].

From a physiological perspective, unequal access to food can be devastating. If a woman is malnourished during pregnancy, her baby will likely have poor health outcomes, which may persist through childhood and into adulthood, especially in an impoverished and food insecure household. This leads to a vicious cycle of diminished cognitive and physical development, working capacity, and earning potential which only perpetuates issues of poverty and food insecurity for future generations[25,88,89].

Although limiting, a home-based existence does offer the opportunity for the development of small-scale agricultural initiatives. For example, home gardening and chicken-rearing can increase accessibility of diverse and nutritious foods for household consumption as well as offer the potential to increase income streams[30,47,70,90]. Thus, enacting nutrition-specific and nutrition-sensitive interventions through AES might be able to tackle multiple pillars of food and nutrition insecurity, especially when those interventions focus on women. Furthermore, since women are primary caregivers for their families, they advocate spending

that contributes to food and nutrition security of their household (i.e. investment in diverse crops for home consumption and health care provision for children)[47]. As such, the FAO asserts that "gender equality is an essential component of sustainable economic growth and poverty reduction"[91].

2.7 NUTRITION INTEGRATION TO ADDRESS FOOD AND NUTRITION INSECURITY

Major assumptions underlie potential gains in food and nutrition security through agriculture: 1) that agricultural extension beneficiaries have the knowledge, drive, and capacity to make these nutrition-related decisions; and 2) that increased incomes automatically yield improved nutrition and health outcomes. Unfortunately, neither of these perspectives can be taken for granted[29,31,47,48].

Considering that many agricultural extension beneficiaries live in rural areas where access to formal education may be limited, prior knowledge of nutrition cannot be assumed[49]. Therefore, integrated nutrition education is advocated to potentiate impact of agricultural interventions on poverty, food and nutrition insecurity, and malnutrition[17,25,30,92]. Expecting changes in nutritional behaviors without engaging nutritional education is unrealistic. Looking at the example of biofortified foods, some discussion of the benefit of these crops should be implemented to encourage household consumption (a nutrition-specific activity)[93]. Looking further at the potential for biofortification to increase incomes, education pertaining to strategic use of that income to enhance food and nutrition security is essential (i.e. reinvestment in nutrition-specific and nutrition-sensitive activities)[31,70].

Agricultural development programs are proposed to impact nutrition and health mainly through strategies of agricultural diversification, enhanced production, and improved income streams. The expectation is that these household improvements should positively impact nutritional status, dietary diversity, and finances (mobilized towards nutrition and health benefit). Many nutrition-specific and nutrition-sensitive programs have been implemented worldwide (biofortified crops, home-gardening, raising livestock, dairy production), with promising findings[48].

Consumption of biofortified foods (e.g. iron in beans and millet, vitamin A in orange-fleshed sweet potatoes and maize) has been shown to increase micronutrient status of women and children[38]. In Mozambique, nutrition-specific agricultural programs supplying biofortified orange-fleshed sweet potato vines showed increased vitamin A intake and improved dietary diversity for children (0-3 years) and improved knowledge of vitamin A amongst their mothers, with greatest effects seen amongst households that also received nutrition education[39].

In South Africa, a home-gardening initiative promoting the growth and consumption of vitamin-A rich foods has shown improved nutritional knowledge pertaining to vitamin A among mothers, increased intake of vitamin A, and their children showed improved vitamin A status[41]. In Bangladesh, a home-gardening initiative promoting the growth and consumption of vegetables found increased consumption of vegetables at the household level[40]. A home-gardening program in India focused agricultural efforts on vegetable production and chicken rearing. The nutrition education component included traditional training as well as cooking demonstrations to enhance practical skills. Nutritional impacts showed increased household consumption of leafy greens and eggs as well as improved nutrition knowledge among women[42].

In Rwanda, animals (cows, goats) were supplied to agricultural families. Raising livestock was associated with increased household dietary diversity and consumption of animal-source protein foods (meat, dairy). Households that received goats showed increased weight-for-height z-scores in children (less than 5 years). Those households that received dairy cows showed increased height-for-age z-scores for children (less than 5 years)[43].

In Burkina Faso, an engendered nutrition-specific agricultural program supplying seeds, saplings, chicks, and gardening tools yielded a wide array of child nutritional outcomes: reduced wasting, reduced incidence of diarrhea, reduced anemia, and increased hemoglobin levels. However, no impacts on stunting were observed during the 2-year study. Maternal nutrition impacts (improved quality of diet and reduction of underweight) were also observed[44]. A similar engendered nutrition-specific agricultural program in Nepal also found improvements in

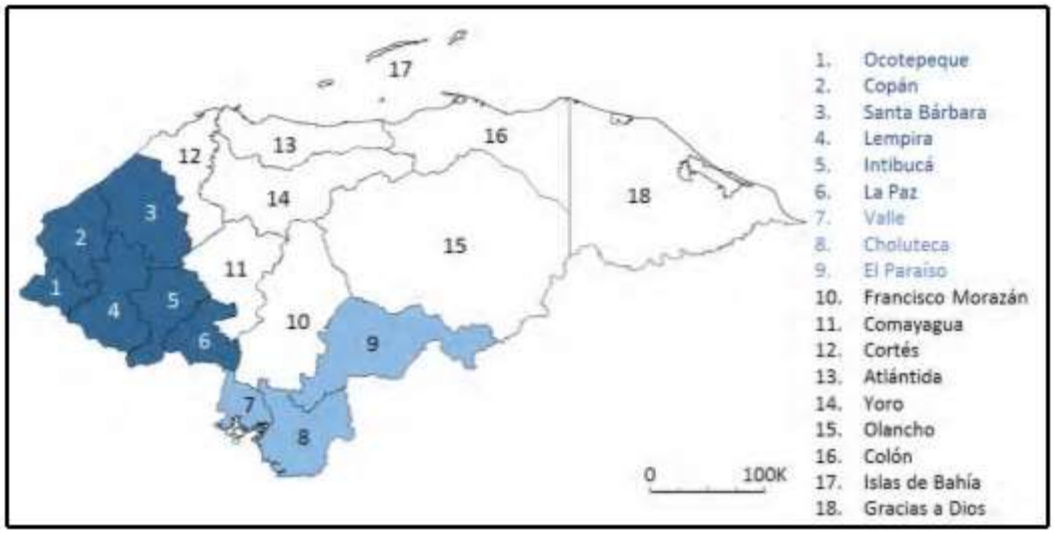
maternal and child nutritional outcomes such as: reduced anemia in women and children, reduced underweight in women, and increased household food security[45].

Improving individual markers of nutritional status or food access are only small pieces of the larger food and nutrition security puzzle. Therefore, combining multiple nutrition-specific and nutrition-sensitive agricultural tactics is advisable[29,48]. INGENAES takes this a step further to capitalize on the synergistic intersection between gender, nutrition, and agriculture to address food and nutrition insecurity from multiple angles. INGENAES strives to facilitate this development and integration in agricultural extension services worldwide[17,25,47,88].

2.8 HONDURAS

In Honduras, the USAID Feed the Future "zone of influence" is located in the southwestern region of the country (see Figure 3) where poverty, food insecurity, and undernutrition are most prevalent [33–35]. Southwest Honduras is part of the *Dry Corridor* region that stretches through Guatemala, El Salvador, and Nicaragua. The Dry Corridor is so-called due to high susceptibility to drought, flooding, erosion, and landslides[36,37]. Incidence and severity of these environmental disasters are exacerbated by climate change[33]. Furthermore, the Dry Corridor has poor farming soils with yields far less than in other regions of Honduras. Thus, people living in the Dry Corridor are more susceptible to poverty, food insecurity, and undernutrition, as their livelihoods are often dependent upon a productive growing season[36]. This is especially significant, as one study by the World Food Programme found that the majority of households in this region spend at least 65% of their income on food, compared to the national average of 33%[2,37].

Figure 3: *Map of Honduras indicating the USAID Feed the Future's zone of influence*[35].



Primary (dark blue) and secondary (light blue) zones of influence. Primary zone of influence is considered higher priority for intervention.

Honduras is a developing country in Central America with a population of over 9.1 million, with 43% of the population living in rural areas[2,94]. Close to 90% of the population is literate, however, the average Honduran has only completed 6 years of school[2]. Over 88% of the Honduran population has access to electricity (76.3% in rural areas) and an estimated 30% of adults use the internet[2]. It is estimated that about 2/3 of the population lives in poverty and nearly 40% lives in extreme poverty; in rural areas more than half of the population lives in extreme poverty[3]. Honduras is a low-middle income country (World Bank classification) with primary economic markets consisting of services, manufacturing, and agriculture[94,95]. Close to 30% of the population works in agriculture, with 60% of the rural population engaging in agriculture[2,36]. It is estimated that 60% of the population is food insecure[33].

With high incidence of poverty and food insecurity, it is not surprising that undernutrition persists in Honduras. An estimated 14% of the population is undernourished, 23% children (under 5 years) are stunted, and 1.4% of children (under 5 years) are wasted [2,6]. Micronutrient deficiencies are prevalent in Honduras across the life cycle, with 31% of children (under 5) and 18% of women of reproductive age (17.6% of non-pregnant women and 21.3% of

pregnant women, age 15-49) suffering from anemia (as of 2016)[2,6]. Less current data reveals that 11% of children (6-59 months) have vitamin A deficiency (as of 2013), 31.6% of the population is estimated to have insufficient zinc intake (2011), and mild iodine deficiency was present at undefined rates among children (5-19 years) in the mid-1990s[2,6,96,97]. Honduras is considered a country undergoing a *nutrition transition*[9]. This phenomenon is an emerging nutritional paradox seen in low and middle-income countries. In these countries, the rates of overweight and obesity are steadily increasing as diets become more westernized through exposure to cheap, processed foods high in fats and sugars[9–12]. As of 2016, 48% and 16% of the Honduran population was overweight and obese, respectively, and 5.2% of children were overweight [6,8].

2.9 AES IN HONDURAS

Nationally, the agricultural sector contributes to 14% of the Honduran GDP[75]. AES are integral to the success, development, and innovation of agriculture in Honduras, especially for small-scale farmers. Despite this, lack of policy and poor institutional governance of AES limit its effectiveness at a national scale[72,75,98]. In Honduras, AES are largely pluralistic, existing mainly in the NGO and private sector. More than 50 AES organizations exist in Honduras, the majority of which are internationally based or have international stakeholders. Examples of organizations providing AES in Honduras include: Catholic Relief Services, World Vision, Heifer International, and USAID[35,72,75].

There are no regulations governing the focus and program content of AES in Honduras. Therefore, AES organizations cover a broad range of topics, according to individual provider initiatives. As such, educational content disseminated to farmers is not uniform[75]. Specific educational techniques and focus of educational efforts include lectures, discussion, and practical learning through farmer field schools, demonstration plots, and field days. A few organizations engage information and communication technology (i.e. radio, text messages), but this modality is extremely limited in Honduras. Agricultural education varies by organization and may include: technical assistance, introduction of new technologies, and improved market

access[72,75]. Like other areas of the world, AES in Honduras also cover a wide variety of topics that impact agricultural productivity, including: sanitation, gender empowerment, and natural disaster resilience[75]. Due to the fractured nature of AES in Honduras, information pertaining to specific breadth, dimension, and details of the full extent of agricultural extension services is limited[72].

Although food and nutrition security is a recognized concern for many AES, nutrition is not a topic formally addressed[75]. Those AES that do focus on food and nutrition security, address it through nutrition-sensitive applications (i.e. irrigation to increase incomes and thereby access to healthy foods, and improved sanitation efforts to decrease disease)[99]. However, these efforts may be in vain without complementary nutrition education[31,70]. Furthermore, one study found that only 50% of AES monitor and evaluate beneficiary progress within normal protocols[75]. Ultimately, efforts to address food and nutrition security without the tools to implement and measure program outcomes may be futile. As such, there is great opportunity for the development of AES in Honduras through integrated programming and the use of measurement tools to track progress of food and nutrition security interventions.

2.10 MEASURES OF FOOD AND NUTRITION INSECURITY

2.10.1 Coping Strategies Index

The Coping Strategies Index (CSI) was developed through a collaborative effort between Feinstein International Center, Tufts University, and TANGO International (Technical Assistance to NGOs) as a rapid proxy measure of food insecurity[100]. It was originally developed for use in emergencies, to determine where aid was needed most acutely[101]. The CSI can be used as a situation analysis to characterize the presence of food insecurity. It can also be used periodically to assess progress (improvement or decline) of household food insecurity over time[101].

The CSI assesses a household's experience of food insecurity, by asking "What do you do when you don't have enough food, and you don't have enough money to buy food?"[101]. The CSI survey consists of 14 different coping behaviors that a household may engage in during times of

food insecurity.

Coping behaviors are assessed based on severity and frequency of practice to reach a CSI score. Each coping strategy is weighted according to relative severity, with higher numbers reflecting more severe experiences of food insecurity. For example, "*skipping an entire day without eating"* is considered more severe than "*reducing the number of meals eaten in a day."* In this case, the former is weighted more heavily than the latter. Frequency refers to the number of times per week that a family engaged in a coping behavior during the previous 30 days. This is also weighted, with more frequent engagement having higher numbers. The CSI is then calculated by multiplying severity weight by frequency weight for each coping behavior and summing all 14 products together. Higher numbers reflect more serious degrees of food insecurity[100,101].

Engagement in any of these 14 coping behaviors reflects some degree of food insecurity[100]. Households can be compared to one another based upon relative CSI scores. Different degrees of food insecurity are also delineated by CSI score, as food secure, mildly food insecure, moderately food insecure, and severely food insecure[102].

2.10.2 Knowledge, Attitudes, and Practices Survey

The knowledge, attitudes, and practices (KAP) survey has long been used to determine what people know, think, and do in relation to a variety of topics. While it is a versatile instrument, it is highly variable and not well-comparable across the literature. In an effort of uniformity, the FAO developed a nutrition-related KAP survey covering 13 pertinent nutrition-topics. These topics include: feeding infants younger than 6 months, feeding young children (6-23 months), diet of school-aged children, nutrition during pregnancy and lactation, undernutrition, iron-deficiency anemia, vitamin A deficiency, iodine deficiency, food safety, personal hygiene, water and sanitation, food-based dietary guidelines, and overweight and obesity. The FAO KAP survey serves as a baseline for survey development. Selection of specific nutrition topics should be customized per investigatory purposes. The FAO KAP survey has been

validated in Cambodia, Malawi, Mexico, and El Salvador; however, further validation within specific local context is also crucial to effective KAP survey use[93].

The KAP survey may be used for situation analysis or outcome evaluation. A KAP situation analysis is conducted once, characterizing the current nutrition-related knowledge, attitudes, and practices in a population. This is used to inform the development of a nutrition education program. Contrarily, KAP is conducted twice for outcome evaluations. In this case, the KAP is conducted before and after an intervention to determine its efficacy[93].

Nutrition knowledge "is the understanding of any given topic… including the intellectual ability to remember and recall food- and nutrition-related terminology, specific pieces of information, and facts"[93]. Nutrition attitudes "are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behavior or practice of an individual"[93]. Nutrition practices "are observable actions of an individual that could affect his/her or others' nutrition, such as eating, feeding, washing hands, cooking, and selecting foods"[93].

Assessment of knowledge and practices is straightforward. They inform what people know and do in relation to nutrition. Attitude questions dig deeper, lending insight into disconnects between knowledge and behavior[93]. These questions are based on the Health Belief Model (HBM), a theoretical framework for behavior change. The HBM poses that health-related behaviors are based on health perceptions (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy)[103]. Perceived susceptibility refers to one's "beliefs regarding own or other's vulnerability to a health or nutrition problem," perceived severity refers to one's "beliefs regarding the severity of a health or nutrition problem," perceived benefit refers to one's "beliefs regarding the benefits an individual would gain from a practice," perceived barriers refers to one's "beliefs regarding the difficulties arising from engaging in a practice," and self-efficacy refers to one's "beliefs regarding own ability to perform a practice or confidence in doing so"[93,103]. Identifying psychological motivations behind nutrition behaviors facilitates the potential impact of customized education programs[93]. The

FAO recommends using the nutrition-related KAP survey as an integrative technique to help bring nutrition into agricultural extension services[92].

2.10.3 Household Dietary Diversity Score

Food and Nutrition Technical Assistance (FANTA) developed the household dietary diversity score (HDDS) survey as a proxy measure of household food access and socioeconomic status. The HDDS serves as a simplified 24-hour dietary recall assessment and is meant to be a snapshot of typical dietary habits. Analysis of the quantity and quality of food groups consumed informs diet adequacy[104–106].

The HDDS assesses consumption of 12 core food groups: grains, roots/tubers, vegetables, fruits, meat/poultry/offal, eggs, fish/seafood, pulses/legumes/nuts, milk/milk products, oils/fats, sugar/honey, and miscellaneous (herbs/spices/condiments). Food groups can be further disaggregated to explore consumption of specific nutrient containing foods. For example, fruits may be broken down into 2 sub-groups: vitamin A rich fruits and non-vitamin A rich fruits. Each food group is defined by a list of foods, which should be customized to regional context of survey implementation. If at least one food from a food group list was consumed in the prior 24 hours, that food group is scored as "1." If the household did not consume any of the foods from a food group list in the previous 24-hour period, the food group is scored as "0." The scores are then summed across all 12 core food groups to obtain the HDDS. Higher scores reflect more diverse diets[105,106].

Assessing consumption of food groups rather than individual foods provides information about the nutritional quality of the diet that is easily comparable across households in a population. Consideration of data collection timeframe (such as seasonality, natural disaster, or conflict) is key to data analysis, especially in the context of food and nutrition insecurity[106]. Increased dietary diversity is associated with improved nutritional adequacy (Calories, protein), health outcomes (birth weight, child height and weight measures, hemoglobin status), and household income[107].

CHAPTER 3: METHODS

3.1 HUMAN SUBJECTS

3.1.1 Beneficiaries

In-home, in-person oral surveys (demographics, KAP, HDDS, CSI, HQS) were conducted by trained, Spanish-speaking interviewers (n=6) in the Dry Corridor of Honduras (USAID primary zone of influence, see Figure 3) in August 2016. A sample of households (n=51) receiving agricultural technical assistance from non-USAID affiliated organizations were interviewed. Male and female heads of household were interviewed whenever possible (n=86). Beneficiaries were recruited through a multi-stage, nonprobability convenience sampling technique. An in-country coordinator used purposive sampling to recruit AES agencies (n=2), who connected this research group with their beneficiaries, who self-selected to participate.

3.1.2 Agents

Online surveys (demographics, KAP, HDDS, job satisfaction) were conducted via Qualtrics survey platform from November 2016 to January 2017. Agents were recruited through a multi-stage, nonprobability convenience sampling technique. An in-country coordinator used purposive sampling to recruit AES agencies (n=4) who serve the Dry Corridor of Honduras (USAID primary zone of influence, see Figure 3). These AES agencies provided email addresses for their employees. Qualtrics surveys were sent to all email addresses provided (n=251); however, some failed to send (n=9) for a total of 242 surveys successfully sent. Two reminder emails were sent to maximize response rates[108]. A convenience sample of agents self-selected to engage with the study (n=73) with the majority agreeing to participate (n=52), completing the: KAP survey (n=52), HDDS survey (n=52), and job satisfaction survey (n=42).

Self-administered written surveys were conducted in March 2017 at two AES agencies. A convenience sample of agents self-selected to complete the survey set (n=10). These agencies were initially solicited via Qualtrics, but no agents completed the surveys. Considering that the beneficiaries interviewed receive services from these two institutions, a second attempt at

administering surveys to these agencies was deemed essential for comparison between groups (beneficiaries and agents).

3.2 DATA MANAGEMENT

All oral survey data were transcribed to paper surveys by interviewers during the interview. It was later entered into Microsoft Excel and double-checked for accuracy. Self-administered written survey data were input to Qualtrics, double-checked, and synced with Qualtrics surveys that were self-administered directly online. Qualtrics survey data were extracted to Excel and cleaned.

3.3 SURVEY INSTRUMENTS

3.3.1 Demographics

A basic demographic survey was used for beneficiary and agent groups. Data was nominally coded prior to analysis.

3.3.2 Coping Strategies Index (CSI)

The CSI was validated for use in Honduras[110]. The CSI was translated to Spanish by one of the investigators. Face validity was asserted in Honduras by two members of the Centro Hondureño de Español (CEHDE). These members reviewed that both the level of Spanish as well as the wording was adequate for a low-income setting in Honduras.

The CSI consists of 14 different coping strategy behaviors. The frequency that a household engaged in each behavior over the past 30 days was recorded. Possible frequencies include: every day, 3-6 times per week, 1-2 times per week, less than once a week, and never. Each frequency has an associated weight. Each behavior also has an associated weight, based upon severity of the coping strategy behavior. Higher weight reflect more frequent engagement of behavior and more severe coping strategies[111].

The CSI was calculated according to these weights, based upon FAO guidelines[101]. The household CSI score is the sum of the products of the severity and frequency weights for all 14 behaviors. Higher numbers reflect more serious degrees of food insecurity. The maximum possible CSI score is 238. Minimum possible score is 0. CSI scores were compared to CSI standards for food security ranking (food secure, mildly food insecure, moderately food insecure, and severely food insecure)[102].

3.3.3 Housing Quality Scale (HQS)

HQS was administered via rapid visual assessment for beneficiary households. HQS was previously validated for use in Honduras[110]. HQS was coded with higher numbers reflecting better housing quality and analyzed per HQS standards[112]. HQS index consists of six measures (walls, floors, roof, electricity, sewage, and piping system). Maximum possible score is 13, minimum possible score is 0.

3.3.4 Minnesota Satisfaction Questionnaire (MSQ)

The short form (20 question) job satisfaction survey was administered to extension employees. Job satisfaction survey was previously translated to Spanish[113]. The survey was reviewed by 1 native Honduran and 1 native Spanish-speaker for use in Honduras.

Respondents reported satisfaction with each parameter on a 5-point Likert scale (1=very dissatisfied, 2=satisfied, 3=neither dissatisfied nor satisfied, 4=satisfied, 5=very satisfied). Survey data were analyzed per MSQ standards[114]. An index for overall satisfaction summed all 20 responses, with maximum score of 100 and minimum score of 20. Intrinsic satisfaction index summed 12 questions (1,2,3,4,7,8,9,10,11,15,16,20) with maximum score of 60 and minimum score of 12. Extrinsic satisfaction index summed 6 questions (5, 6, 12, 13, 14, 19) with maximum score of 30 and minimum score of 6. Higher scores reflect higher levels of satisfaction. Satisfaction indices with average score percentiles below 25% reflects low satisfaction, 25-75% reflects average satisfaction, and more than 75% reflects high satisfaction.

3.3.5 Knowledge, Attitudes, and Practices (KAP) Survey

KAP survey was previously translated to Spanish and validated for use in El Salvador by the FAO[93]. KAP survey was further validated for use in Honduras via review by 1 native Honduran and 1 native Spanish speaker who lived in Honduras for several years. Specific nutrition modules were selected based upon topics most pertinent to current nutritional concerns for the Dry Corridor of Honduras and the scope of agricultural extension services (food-based dietary guidelines, iron deficiency anemia, vitamin A deficiency, overweight and obesity, personal hygiene, and water sanitation).

Prior to implementation at agent population, minor KAP survey revisions were made based upon experiences during oral KAP implementation. Best-survey methods were used to improve quality of data obtained. For example, the multiple-choice question "Choose the food(s) that aid iron assimilation" presupposes that the respondent has knowledge of iron assimilation. This assumption introduces potential response error as respondents may guess the answer. Therefore, the qualifying question "Have you heard of the assimilation of iron?" was added to the survey prior to this question. If the respondent had not heard of iron assimilation, skip-logic bypassed the second question asking what foods aid iron assimilation. In this way, quality of data was maintained[115]. Revised KAP survey was validated by 2 native Hondurans and 2 native Spanish speakers who lived in Honduras for several years.

KAP survey data were analyzed per FAO guidelines[93]. Knowledge, attitude, and practice questions were coded dichotomously with optimal knowledge, attitudes, and practices being "1" and less than optimal KAP being coded as "0."

All awareness, attitude, and practice questions were analyzed individually. The percent of population that had heard of each nutrition concept, had a desired/positive attitude, or an optimal practice was determined by: summing total number of people who answered "yes" to a qualifying question divided by total number of respondents to that question, then multiplied by 100. This population proportion was then compared to the suggested threshold levels indicated by the FAO KAP manual (Table 1)[93]. This was done separately for beneficiary and agent groups.

Table 1. *Suggested threshold levels indicating the need for a nutrition-education intervention, according to the FAO KAP Manual[93].*

Nutrition education strategy	Percentage of "correct answers," "optimal practices" or "desired/positive attitudes" in survey population
Is urgent	≤70%
Should be considered	71-89%
Is not needed or difficult to justify	≥90%

Knowledge questions were summed to an index for each nutrition module. Maximum possible scores per module are food-based dietary guidelines (12), iron deficiency anemia [18, for beneficiary survey; disaggregated for agent survey to iron deficiency anemia (9), iron in foods (3), assimilation of iron (6)], vitamin A deficiency [10 for beneficiaries; disaggregated for agent survey to vitamin A deficiency (6), vitamin A in foods (4)], overweight and obesity (4), personal hygiene (3), water and sanitation (7). Minimum score for all module indices is 0. Average knowledge scores (%) for each nutrition module were calculated by dividing mean knowledge index score for a module by maximum possible score for that module, then multiplying by 100. This was done for beneficiary and agent groups separately.

3.3.6 Household Dietary Diversity Score (HDDS)

The HDDS survey was validated for use in Honduras[110]. It was translated to Spanish by one of the investigators. Each food group was updated to local context with common Central American foods based upon prior use of HDDS in Guatemala[121]. The HDDS face validity was asserted in Honduras by two members of the Centro Hondureño de Español (CEHDE). These members reviewed that both the level of Spanish as well as the wording was adequate for a low-income setting in Honduras.

HDDS survey was developed and analyzed following the disaggregated model set forth by FAO[106]. Twelve main food groups (grains, roots/tubers, vegetables, fruits, meats, eggs, fish/seafood, pulses/legumes/nuts, milk/milk products, oils/fats, sweets,

miscellaneous/herbs/spices/condiments) were broken down to 17 total food groups (vegetables: vegetables/roots rich in vitamin A, leafy greens, other vegetables; fruits: fruits rich in vitamin A, other fruits; meat: organ meats, muscle meats; sweets: sweeteners, sweet drinks/foods). Each food group consists of culturally relevant foods. If an individual indicated that anyone from his/her household consumed a food from a food group list in the previous 24-hour period, that food group was coded as "1." If no foods were consumed from a food group list, that food group was coded as "0." Each dichotomously coded sub-group was then aggregated back to their main food groups. If any sub-group was coded as "1," the main food group to which it belongs was coded as "1." Finally, the code for each main food group was summed to achieve the household dietary diversity score. Higher scores reflect more diverse diets. Maximum possible HDDS is 12. Minimum possible score is 0[105]. Index for vitamin A rich fruits and vegetables was summed via disaggregated food groups (vegetables/roots rich in vitamin A, fruits rich in vitamin A). This index was dichotomized to "1" consumed and "0" did not consume.

3.4 STATISTICAL ANALYSIS

3.4.1 Quantitative Analysis

Statistical analyses were conducted with IBM SPSS 24. Missing data were handled with pooled data from multiple imputation (5x) prior to creating indices and conducting statistical analyses[109]. A threshold of significance for all statistical analyses was set at $p<0.05$. Descriptive statistics (mean, standard deviation, range, frequency) and comparative tests (Pearson's chi-square, Fisher's exact test, T-test, Mann-Whitney U-test, one-way ANOVA, Kruskal-Wallis) were conducted as appropriate. Comparisons of beneficiary versus agent and across agency group (non-USAID affiliate, USAID affiliate, unknown affiliation) were conducted.

3.4.2 Qualitative Analysis

Open-ended KAP questions were assessed individually following descriptive and thematic analytical techniques[93,116,117]. All qualitative survey data were analyzed in Spanish to

avoid possible biases imposed by translation[118]. A coding team (n=3; JL, DA, AW) of Spanish-speakers analyzed survey data. Survey responses were read by coders individually, with concepts of potential codes devised for each survey question. Initial coding schemes were developed via thorough discussion between all 3 coders. A process of re-reading survey responses, re-defining existing codes, and developing new codes took place over 6 meetings, until a final codebook was agreed upon. Individually, coders applied this final codebook to all survey data via Atlas.ti 8. Data were extracted to Microsoft Excel, cleaned, and two-way random inter-coder reliability was assessed with IBM SPSS 24. Intra-class correlation coefficient (ICC) was determined among coders for all survey response codes. Agreement ranges: <0.5 poor, 0.5-0.75 moderate, 0.75-0.90 good, and >0.90 reflects excellent agreement[119,120]. Finally, comprehensive discussion between coders yielded 100% agreement for all data. Frequency and percent of population was determined for each code. Comparisons of beneficiary versus agent and across agency groups (non-USAID affiliate, USAID affiliate, and unknown affiliation) assessed via Pearson's chi-square and Fisher's exact tests.

CHAPTER 4: RESULTS

4.1 DEMOGRAPHICS

Overall, the beneficiary and extension agent populations were quite different (Table 2). Beneficiaries spanned a broad age-range (17-70+ years old) with roughly half of those surveyed being female. Agents were 19-39 years old and only 18% of those surveyed were female. Beneficiaries were less educated compared to the extension agent group, with over 86% having their highest level of educational attainment as grade school and 9% never having attended formal schooling. In comparison, nearly 2/3 of extension agents completed some type of advanced schooling beyond high school. Furthermore, beneficiaries came from larger households, close to 1/4 of the population had more than 5 children living with them. In contrast, only 6% of agents had more than 2 children in their households; ($p<0.001$ for all described demographic characteristics).

Table 2. *Demographic characteristics of AES beneficiaries and agents.*

		Beneficiary n=86		**Agent** n=62		
Characteristic		***n***	***%***	***n***	***%***	***p-value***
Gender	Male	38	44.2%	41	66.1%	<0.001
	Female	48	55.8%	11	17.7%	
	Unspecified	0	0.0%	10	16.1%	
Age	<18	1	1.2%	0	0.0%	<0.001
	18-29	11	12.8%	30	48.4%	
	30-39	19	22.1%	22	35.5%	
	40-49	21	24.4%	0	0.0%	
	50-59	23	26.7%	0	0.0%	
	60-69	5	5.8%	0	0.0%	
	>70	6	7.0%	0	0.0%	
	Not Specified	0	0.0%	10	16.1%	
Number of People in Household	1-3	22	25.6%	23	37.1%	0.006
	4-6	39	45.3%	25	40.3%	
	7-10	19	22.1%	3	4.8%	
	>10	6	7.0%	0	0.0%	

Table 2 (cont.)

	Not Specified	0	0.0%	11	17.7%	
Number of Children in Household	0	8	9.3%	16	25.8%	<0.001
	1	15	17.4%	17	27.4%	
	2	17	19.8%	9	14.5%	
	3	14	16.3%	3	4.8%	
	4	13	15.1%	1	1.6%	
	>5	19	22.1%	0	0.0%	
	Not Specified	0	0.0%	16	25.8%	
Number of Children	0	2	2.3%	20	32.3%	<0.001
	1	10	11.6%	15	24.2%	
	2	12	14.0%	13	21.0%	
	3	12	14.0%	3	4.8%	
	4	9	10.5%	1	1.6%	
	>5	41	47.7%	0	0.0%	
	Not Specified	0	0.0%	10	16.1%	
Education Level	No Schooling	8	9.3%	0	0.0%	<0.001
	Grade School	74	86.0%	3	4.8%	
	High School	3	3.5%	9	14.5%	
	Beyond High School	1	1.2%	40	64.5%	
	Not Specified	0	0.0%	10	16.1%	
Organization	Non-USAID Affiliate	86	100.0%	9	15.0%	<0.001
	USAID Affiliate	0	0.0%	35	56.0%	
	Unknown Affiliation	0	0.0%	18	29.0%	

Statistical comparisons assessed via Pearson chi-square and Fisher's exact tests.

4.2 COPING STRATEGIES INDEX

Food insecurity was present in the beneficiary population, with over 3/4 of the population being moderately to severely food insecure (average CSI score of 36.0 ± 31.9; Tables 3 and 4). Most common coping strategies include buying less preferred foods, buying food on credit, consuming wild foods, limiting portions for everyone, and rationing money to buy food. Uncommon coping strategies include asking household members to eat elsewhere, begging for food on the street, and going an entire day without eating (Table 5).

Table 3. *Coping strategies index (CSI) for beneficiaries.*

	Beneficiary n=86			
	Mean	***S.D.***	***Min***	***Max***
CSI	36.0	(31.9)	0	157.5

CSI is an index of 14 coping strategy behaviors (outlined in Table 5). Minimum possible score is 0. Maximum possible score is 238. Higher numbers reflect more severe experiences of food insecurity.

Table 4. *Degree of food insecurity by CSI score.*

		Beneficiary n=86	
Food Insecurity Ranking	***CSI Score***	***n***	***%***
Food secure	0-2	6	7.0%
Mildly food insecure	3-12	15	17.4%
Moderately food insecure	13-40	35	40.7%
Severely food insecure	>40	30	34.9%

Percent of population in each food security ranking, based upon CSI score[102].

Table 5. *Frequency of engagement in coping strategy behaviors.*

	Beneficiary n=86				
Coping Strategy Behavior	***Every Day***	***3-6x /week***	***1-2x /week***	***<1x /week***	***Never***
Buy Less Preferred Foods	26%	19%	23%	16%	16%
Borrow Food	5%	7%	19%	21%	49%
Buy Food on Credit	10%	21%	23%	17%	28%
Consume Wild Foods	9%	13%	23%	13%	42%
Consume Seed Stock	6%	15%	8%	16%	55%
Household Members Eat Elsewhere	2%	0%	3%	1%	93%
Beg for Food on the Street	0%	0%	2%	2%	95%
Limit Portions Everyone	14%	9%	30%	6%	41%
Restrict Adult Intake	9%	8%	19%	6%	58%
Prioritize Consumption for Laborers	7%	3%	6%	8%	76%
Ration Money to Buy Food	16%	12%	16%	9%	47%
Reduce Number of Meals per Day	7%	10%	12%	12%	59%
Eat Once a Day	2%	5%	8%	10%	74%
Do Not Eat for Entire Day	1%	5%	5%	3%	86%

Percent of beneficiary population reporting frequency of engagement of coping strategy behaviors in the past 30 days.

4.3. HOUSING QUALITY SCORE

Visual assessment of housing quality showed the majority of homes were constructed with durable materials, had running water, and either an outhouse or formal waste disposal systems (septic tank or piped system). The vast majority of homes were wired for electricity, but there was no follow-up question pertaining to reliability or accessibility of electricity (Table 6). Average HQS score was 11.3±1.6 (Table 7).

Table 6. *Housing quality for beneficiaries.*

		Beneficiary n=86	
Characteristic		***n***	***%***
Walls	Waste materials	1	1.2%
	Semi-durable materials	1	1.2%
	Durable materials	84	97.7%
Floors	Informal flooring	10	11.6%
	Formal flooring	76	88.4%
Roof	Waste materials	10	11.6%
	Semi-durable	20	23.3%
	Durable roof	56	65.1%
Electricity	Does not have electricity	4	4.7%
	Has electricity	82	95.3%
Waste Disposal System	No system	2	2.3%
	Outhouse	37	43.0%
	Piped system, septic tank	47	54.7%
Source of Drinking Water	Well water, no plumbing	10	11.6%
	Open air plumbing	17	19.8%
	Interior plumbing	59	68.6%

Percent of population with specific housing characteristics.

Table 7. *Housing quality score (HQS) for beneficiaries.*

	Beneficiary n=86			
	Mean	***S.D.***	***Min***	***Max***
HQS	11.3	(1.6)	6	13

HQS is an index of 6 housing quality dimensions (walls, floors, roof, electricity, waste disposal system, source of drinking water). Minimum possible score is 0. Maximum possible score is 13. Higher numbers reflect higher quality home construction materials.

4.4 AGENT DEMOGRAPHICS AND JOB SATISFACTION

Non-USAID agencies employ more women, part-time employees, and offer lower wages than USAID contracted agencies (Table 8). However, no major differences in job satisfaction were seen across agency groups. Overall, intrinsic, and extrinsic scores indicate high levels of job satisfaction, with no differences across agency groups[114]. Average job satisfaction across all MSQ items was 3.5-4.4, indicating a tendency towards satisfaction rather than dissatisfaction across all job aspects. Lowest levels of satisfaction were extrinsic factors: salary and opportunities for job advancement. Highest points of satisfaction included intrinsic factors: "the chance to do something for other people," "the chance to do something that makes use of my abilities," and "the feeling of accomplishment I get from the job." The only point of statistical difference is that employees of non-USAID affiliated organizations had lower satisfaction for "the way company policies are put into place" (Table 9).

4.4.1 Agent Demographics

Table 8. *Demographic characteristics of AES agents.*

		Non-USAID n=9		USAID Affiliate n=35		Unknown Affiliation n=18		
Characteristic		***n***	***%***	***n***	***%***	***n***	***%***	***p-value***
Gender	Male	2	22.2%	32	91.4%	7	38.9%	<0.001
	Female	7	77.8%	3	8.6%	1	5.6%	
	Unspecified	0	0.0%	0	0.0%	10	55.6%	
Type of Employment	Full-Time	7	77.8%	34	97.1%	6	33.3%	0.002
	Part-Time	2	22.2%	0	0.0%	0	0.0%	
	Prefer Not to Respond	0	0.0%	0	0.0%	2	11.1%	
	Not Specified	0	0.0%	1	2.9%	10	55.6%	
Length of Employment	<3 Months	1	11.1%	0	0.0%	0	0.0%	0.284
	3-6 Months	1	11.1%	1	2.9%	0	0.0%	
	6-12 Months	0	0.0%	4	11.4%	0	0.0%	
	1-3 Years	3	33.3%	18	51.4%	4	22.2%	
	3-6 Years	1	11.1%	9	25.7%	2	11.1%	
	>6 Years	3	33.3%	3	8.6%	1	5.6%	
	Prefer Not to Respond	0	0.0%	0	0.0%	0	0.0%	
	Not Specified	0	0.0%	0	0.0%	11	61.1%	
Years of Experience in the Field	<1 Year	2	22.2%	1	2.9%	0	0.0%	0.266
	1-3 Years	2	22.2%	18	51.4%	2	11.1%	
	3-5 Years	1	11.1%	4	11.4%	1	5.6%	
	>5 Years	4	44.4%	12	34.3%	4	22.2%	
	Prefer Not to Respond	0	0.0%	0	0.0%	0	0.0%	
	Not Specified	0	0.0%	0	0.0%	11	61.1%	
Daily Working Hours	<8 Hours	2	22.2%	2	5.7%	1	5.6%	0.007
	8 Hours	4	44.4%	2	5.7%	1	5.6%	

Table 8 (cont.)

	>8 Hours	3	33.3%	31	88.6%	6	33.3%	
	Prefer Not to Respond	0	0.0%	0	0.0%	0	0.0%	
	Not Specified	0	0.0%	0	0.0%	10	55.6%	
Monthly Income	Less Than Minimum Wage	2	22.2%	0	0.0%	1	5.6%	<0.001
	5000-8000 Lempiras	0	0.0%	0	0.0%	0	0.0%	
	8000-10,000 Lempiras	0	0.0%	0	0.0%	0	0.0%	
	10,000-15,000 Lempiras	5	55.5%	2	5.7%	0	0.0%	
	15,000-20,000 Lempiras	2	22.2%	29	82.9%	5	27.8%	
	20,000-30,000 Lempiras	0	0.0%	1	2.9%	0	0.0%	
	>30,000 Lempiras	0	0.0%	1	2.9%	0	0.0%	
	Prefer Not to Respond	0	0.0%	3	8.6%	2	11.1%	
	Not Specified	0	0.0%	0	0.0%	10	55.6%	

Comparisons assessed via Pearson chi-square and Fisher's exact test.

4.4.2 Minnesota Satisfaction Questionnaire

Table 9. *Comparison of job satisfaction amongst AES agencies.*

	All Agents n=52				Non-USAID n=9		USAID Affiliate n=35		Unknown Affiliation n=8		
Job Satisfaction	**Mean**	***S.D.***	***Min***	***Max***	***Mean***	***S.D.***	***Mean***	***S.D.***	***Mean***	***S.D.***	***p-value***
1. Being able to keep busy all the time	4.1	(1.1)	1	5	4.1	(1.3)	4.1	(1.2)	4.5	(0.5)	0.618
2. The chance to work alone on the job	4.1	(1.2)	1	5	4.0	(1.3)	4.1	(1.3)	4.1	(1.0)	0.979
3. The chance to do different things from time to time	4.1	(1.1)	1	5	4.0	(1.3)	4.1	(1.2)	4.4	(0.5)	0.765
4. The chance to be "somebody" in the community	4.3	(1.2)	1	5	4.4	(1.3)	4.2	(1.3)	4.5	(0.8)	0.708
5. The way my boss handles his/her workers	3.7	(1.2)	1	5	3.7	(1.6)	3.7	(1.2)	3.9	(1.2)	0.935
6. The competence of my supervisor in making decision	3.9	(1.2)	1	5	3.9	(1.5)	4.0	(1.2)	3.8	(1.3)	0.898
7. Being able to do things that don't go against my conscience	3.8	(1.4)	1	5	3.9	(1.5)	3.7	(1.4)	4.3	(1.4)	0.600
8. The way my job provides for steady employment	3.9	(1.3)	1	5	3.4	(1.3)	4.0	(1.3)	4.0	(1.4)	0.493
9. The chance to do things for other people	4.4	(1.1)	1	5	4.0	(1.5)	4.5	(1.1)	4.6	(0.5)	0.402
10. The chance to tell people what to do	4.2	(1.3)	1	5	4.3	(1.3)	4.2	(1.3)	4.0	(1.3)	0.858
11. The chance to do something that makes use of my abilities	4.4	(1.0)	1	5	4.2	(1.3)	4.4	(1.0)	4.5	(0.5)	0.935

Table 9 (cont.)

12. The way company policies are put into practice	4.0	(1.1)	1	5	3.2	(1.3)	4.1	(1.1)	4.5	(0.5)	0.034
13. My pay and the amount of work I do	3.6	(1.3)	1	5	3.1	(1.2)	3.7	(1.3)	3.9	(1.2)	0.403
14. The chances for advancement on this job	3.5	(1.4)	1	5	3.2	(1.1)	3.4	(1.5)	4.3	(0.7)	0.256
15. The freedom to use my own judgment	3.8	(1.3)	1	5	3.4	(1.5)	3.8	(1.2)	4.0	(1.3)	0.657
16. The chance to try my own methods of doing the job	4.1	(1.2)	1	5	3.6	(1.5)	4.1	(1.1)	4.4	(0.7)	0.313
17. The working conditions	4.0	(1.3)	1	5	3.6	(1.5)	4.0	(1.2)	4.4	(1.1)	0.411
18. The way my co-workers get along with each other	4.2	(1.0)	1	5	4.1	(1.4)	4.2	(1.0)	4.3	(1.0)	0.962
19. The praise I get for doing a good job	3.8	(1.3)	1	5	3.8	(1.4)	3.8	(1.3)	3.8	(1.5)	0.995
20. The feeling of accomplishment I get from the job	4.3	(1.0)	1	5	4.1	(1.5)	4.3	(1.0)	4.5	(0.8)	0.816
Overall Satisfaction	80.3	(18.1)	20	100	76.1	(24.7)	80.4	(18.1)	84.4	(8.3)	0.994
Intrinsic Satisfaction	48.8	(11.0)	12	60	46.3	(14.8)	48.7	(10.9)	52.1	(4.8)	0.888
Extrinsic Satisfaction	23.8	(5.6)	6	30	22.2	(7.3)	24.0	(5.6)	24.6	(3.6)	0.816

Each MSQ question has a range of 1-5, with a lowest possible score of 1 and a highest possible score of 5. Overall satisfaction is an index of all 20 MSQ questions, with minimum score of 20 and maximum score of 100. Intrinsic satisfaction is an index of 12 questions (1,2,3,4,7,8,9,10,11,15,16,20), with minimum score of 12 and maximum score of 60. Extrinsic satisfaction is an index of 6 questions (5, 6, 12, 13, 14, 19), with minimum score of 6 and maximum score of 30. Higher scores reflect higher satisfaction. Satisfaction indices with average score percentiles below 25% reflects low satisfaction, 25-75% reflects average satisfaction, and more than 75% reflects high satisfaction. Statistical comparisons assessed via one-way ANOVA, Kruskal-Wallis, and Mann-Whitney U tests.

4.5 KNOWLEDGE, ATTITUDES, AND PRACTICES

4.5.1 Knowledge and Awareness

Awareness of the Honduran dietary guidelines "*la Olla*" ("the cooking pot") was quite low, with less than 50% of the beneficiaries and less than 65% of the extension agents having heard of the dietary guidelines ($p<0.05$; Figure 4). According to the FAO KAP assessment guidelines, this, in and of itself, deems urgent nutrition education as being necessary in this area for both beneficiaries and extension agents[93]. For those beneficiaries and extension agents who had heard of the dietary guidelines, average nutrition knowledge scores were 52% and 78%, respectively ($p<0.001$; Figure 4).

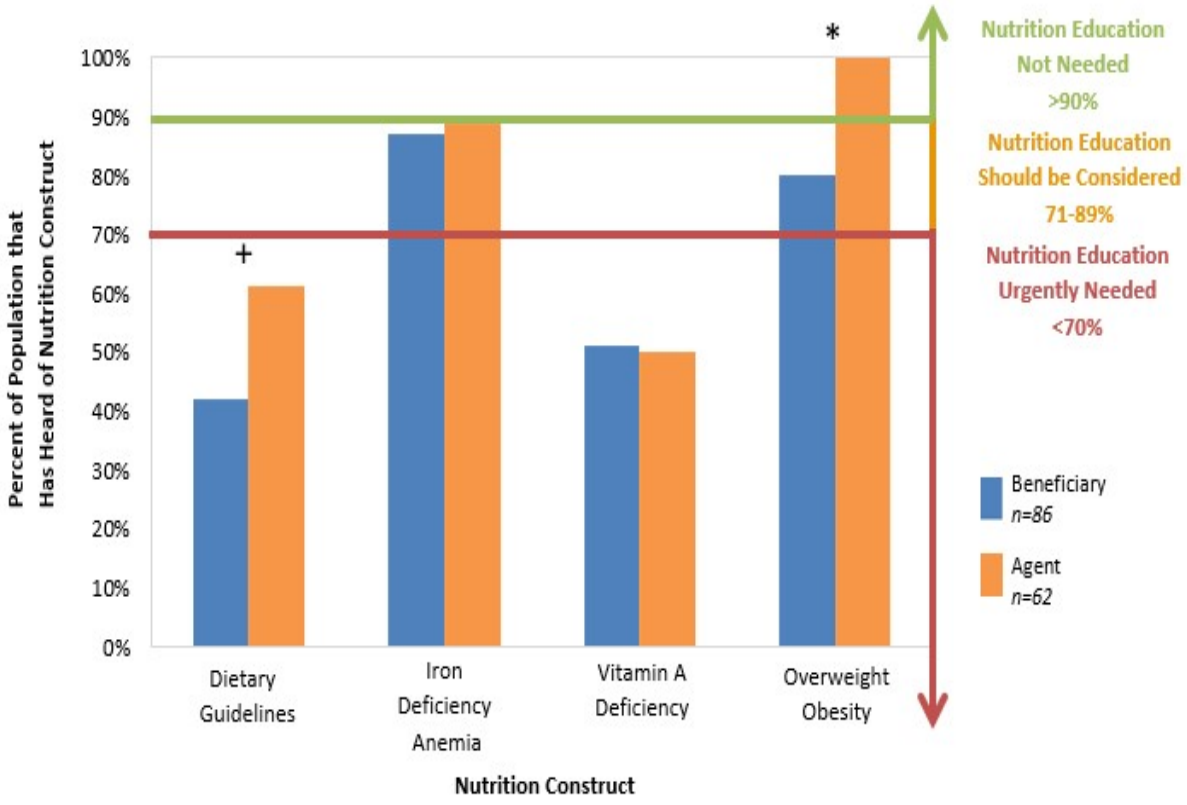
Beneficiaries and agents showed moderate awareness of iron deficiency anemia ($p>0.05$). However, when asked further details, those beneficiaries who had heard of iron deficiency anemia scored less than 60% on their knowledge "exams" (Table 10). Though not statistically comparable, topics pertaining to iron were disaggregated for the agency group, to attain better quality data according to different areas of iron knowledge: iron deficiency anemia, iron in foods, and iron assimilation. Agents were generally aware of iron deficiency anemia and iron in foods, but largely unaware of iron assimilation, denoting urgent need for nutrition education in these areas[93] (Figure 5). Those agents who had heard of these iron sub-topics did not know much about these areas scoring less than 70% across all areas (Table 11). Awareness and knowledge of iron fortification was low amongst beneficiaries and agents (13% and 47%, respectively; $p<0.001$). Of those who had heard of iron fortification, only 2 beneficiaries and 13 agents were able to list iron fortified foods ($p>0.05$; Table 12).

As outlined in Table 13, only about half of beneficiaries and agents were aware of vitamin A deficiency ($p>0.05$). This calls for urgent nutrition education in both groups[93]. For those beneficiaries who had heard of vitamin A deficiency, their average knowledge score was less than 64% (Table 10). Like the iron-deficiency anemia portion of this survey, vitamin A deficiency was also disaggregated to investigate more nuanced knowledge of vitamin A sub-topics. While only about half of the agent population had heard of vitamin A deficiency, close to 80% was familiar with the concept of vitamin A in food (Figure 5). Knowledge scores followed a

similar pattern, with those aware of vitamin A deficiency only scoring about 50%, but those who were aware of vitamin A in foods scored close to 70% (Table 11). Awareness of vitamin A fortification was extremely low in both beneficiary and agent populations (17%, 36%, respectively; $p<0.05$; Table 12). Of those who had heard of vitamin A fortification, only 5 beneficiaries and 10 agents were able to list foods fortified with vitamin A ($p>0.05$).

All agents were aware of overweight and obesity, while only about 80% of beneficiaries were familiar ($p<0.001$; Figure 4). However, those beneficiaries who had heard of overweight and obesity scored higher on the knowledge portion of this survey, compared to agents ($p<0.001$; Table 10). No awareness questions were posed for the hygiene or water sanitation constructs. Beneficiaries and agents both scored >95% for hygienic knowledge but only about 70% in water sanitation ($p>0.05$; Table 10). No differences in any awareness or knowledge sector were found amongst different agency groups ($p>0.05$).

Figure 4. *Awareness of nutrition constructs amongst AES beneficiaries and agents.*



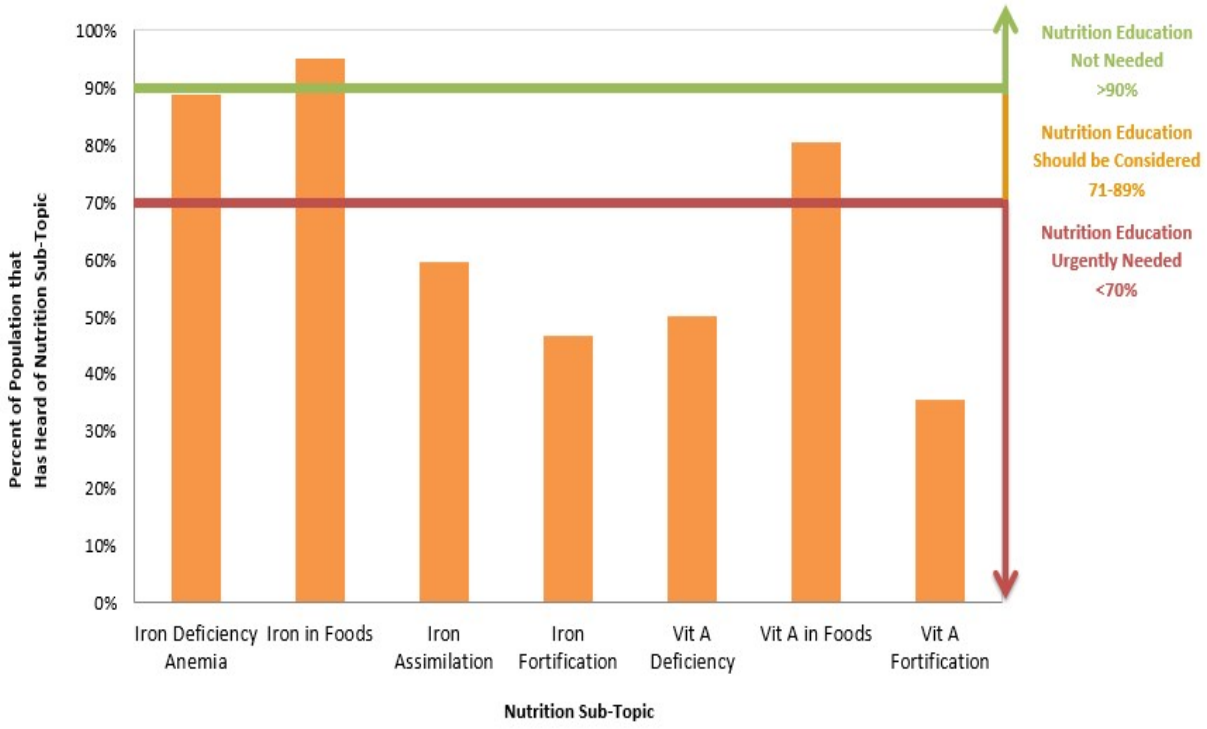
Percentage of population with awareness of nutrition constructs. According to the FAO, if less than 70% of a population has optimal knowledge of a nutrition construct, nutrition education is urgently needed to address these topics. If 71-89% of the population has optimal knowledge of a nutrition construct, nutrition education should be considered. If more than 90% of a population has optimal knowledge of a nutrition construct, nutrition education is not needed. Pearson chi-square tests of comparison were conducted. No differences ($p>0.05$) were found in nutrition construct awareness amongst agency groups. *$*p<0.001$, $+p<0.05$.*

Table 10. *Average knowledge score for AES beneficiaries and agents who have heard of nutrition construct.*

	Beneficiary				Agent					
Nutrition Construct	***Mean***	***S.D.***	***Average Score (%)***	***n***	***Mean***	***S.D.***	***Average Score (%)***	***n***	***Max Possible Score***	***p-value***
Dietary Guidelines	6.19	(1.80)	51.6%	36	9.40	(1.94)	78.3%	38	12	<0.001
Iron Deficiency Anemia	10.55	(3.54)	58.6%	75	-	-	-	-	18	-
Vitamin A Deficiency	6.36	(2.75)	63.6%	44	-	-	-	-	10	-
Overweight/Obesity	3.30	(1.24)	82.4%	69	2.52	(1.18)	63.1%	62	4	<0.001
Hygiene	2.85	(0.47)	95.0%	86	2.94	(0.40)	97.9%	62	3	0.070
Water Sanitation	4.59	(1.76)	65.6%	86	5.15	(1.17)	73.5%	62	7	0.051

Statistical comparisons assessed via T-test for parametric and Mann-Whitney U test for non-parametric nutrition constructs. Iron deficiency anemia and vitamin A deficiency constructs were disaggregated for agents and therefore are not statistically comparable to beneficiary scores. "-" denotes not comparable as these constructs were disaggregated for agent survey. Scores less than 70% reflect inadequate knowledge of a nutrition construct[122]. *n reflects those aware of nutrition construct that were subsequently asked knowledge questions pertaining to those constructs.

Figure 5. *Agent awareness of nutrition sub-topics.*



Percentage of population with awareness of nutrition sub-topic. According to the FAO, if less than 70% of a population has optimal knowledge of a nutrition sub-topic, nutrition education is urgently needed to address these topics. If 71-89% of the population has optimal knowledge of a nutrition sub-topic, nutrition education should be considered. If more than 90% of a population has optimal knowledge of a nutrition sub-topic, nutrition education is not needed. Pearson chi-square tests of comparison across agencies were conducted. No differences ($p>0.05$) were found in nutrition construct awareness amongst agency groups.

Table 11. *Average knowledge scores for agents who have heard of nutrition sub-topic.*

Nutrition Sub-Topic	*Mean*	*S.D.*	*Max Possible Score*	*n**	*Average Score (%)*	*Possible Score (%)*
Iron Deficiency Anemia	4.60	(1.71)	9	55	51.1%	100.0%
Iron in Foods	1.61	(1.40)	3	59	53.7%	100.0%
Assimilation of Iron	3.89	(1.39)	6	37	64.8%	100.0%
Vitamin A Deficiency	3.10	(1.25)	6	31	51.6%	100.0%
Vitamin A in Foods	2.76	(1.51)	4	50	69.0%	100.0%

Comparison of agencies assessed via one-way ANOVA. No differences ($p>0.05$) were found in nutrition knowledge amongst agency groups. *n is the number of agents who have heard of each sub-topic and were therefore asked knowledge questions pertaining that sub-topic. Scores less than 70% reflect inadequate knowledge of a nutrition construct[122].

Table 12. *Awareness and knowledge of fortification amongst AES beneficiaries and agents.*

		Beneficiary			**Agent**			
Nutrition Sub-Topic		*n**	*N+*	*%++*	*n**	*N+*	*%++*	*p-value*
Iron Fortification	Awareness	10	75	13.3%	29	62	46.8%	<0.001
	Knowledge	2	10	20.0%	13	29	44.8%	0.142
Vitamin A Fortification	Awareness	8	44	18.2%	22	62	35.5%	0.028
	Knowledge	5	8	62.5%	10	22	45.5%	0.682

Percentage of population with awareness of nutrition construct. According to the FAO, if less than 70% of a population has optimal knowledge of a nutrition construct, nutrition education is urgently needed to address these topics. If 71-89% of the population has optimal knowledge of a nutrition construct, nutrition education should be considered. If more than 90% of a population has optimal knowledge of a nutrition construct, nutrition education is not needed. Pearson chi-square tests of comparison were conducted. +N reflects those beneficiaries and agents who were asked about awareness and knowledge of fortification. *n reflects those who were aware or had knowledge of fortification. %++ is the proportion of those who were aware or had knowledge of fortification from the total (i.e. n^*/N^+).

4.5.2 Attitudes

Both beneficiaries and agents had good attitudes across most nutrition constructs (Table 13). Most prevalent suboptimal attitudes relate to susceptibility and severity. Around half of surveyed groups thought they were susceptible to iron deficiency anemia ($p>0.05$) and just over half thought they might have vitamin A deficiency ($p>0.05$). Half of agents and 30% of beneficiaries thought they were susceptible to overweight or obesity ($p<0.01$). Significantly more beneficiaries believe they are susceptible to illness if they do not engage in proper handwashing and water sanitation practices, compared to agents ($p<0.001$ and $p<0.01$, respectively).

Around 80% of beneficiaries and agents see consequences of iron deficiency anemia as being severe ($p>0.05$) and less than 70% think consequences of vitamin A deficiency are severe ($p>0.05$). A high proportion of those surveyed believe consequences of overweight and obesity are severe ($p>0.05$). More beneficiaries believe diarrheal illness has severe consequences, compared to agents ($p<0.05$). Close to 90% of beneficiaries and agents believe it is beneficial to engage in positive behaviors pertaining to each nutrition construct ($p>0.05$).

Table 13. *Attitudes amongst agricultural extension beneficiaries and agents.*

		Beneficiary			Agent			
Nutrition Construct	***Health Belief Model Component***	***n****	***N**⁺*	***%**⁺⁺*	***n****	***N**⁺*	***%**⁺⁺*	***p-value***
Dietary Guidelines	Benefit	33	36	91.7%	57	62	91.9%	0.620
Iron Deficiency Anemia	Susceptibility	44	75	58.7%	26	55	47.3%	0.198
	Severity	61	75	81.3%	43	55	78.2%	0.657
	Benefit	67	75	89.3%	53	59	89.8%	0.926
Vitamin A Deficiency	Susceptibility	27	44	61.4%	17	31	54.8%	0.572
	Severity	30	44	68.2%	19	31	61.3%	0.537
	Benefit	43	44	97.7%	44	50	88.0%	0.078
Overweight/Obesity	Susceptibility	21	71	29.6%	33	62	53.2%	0.006
	Severity	60	71	84.5%	56	62	90.3%	0.316
	Benefit	69	71	97.2%	61	62	98.4%	0.551
Hygiene	Susceptibility	78	86	90.7%	39	62	62.9%	<0.001
	Severity^	81	86	94.2%	51	62	82.3%	0.021
	Benefit	86	86	100.0%	62	62	100.0%	No variation
Water Sanitation	Susceptibility	77	86	89.5%	44	62	71.0%	0.004
	Severity^	81	86	94.2%	51	62	82.3%	0.021

Percentage of population with an optimal nutrition attitude, per KAP survey nutrition construct. Each nutrition attitude corresponds to a section of the health belief model (susceptibility, severity, and benefit). According to the FAO, if less than 70% of a population has an optimal nutrition attitude, nutrition education is urgently needed to address these topics. If 71-89% of the population has an optimal attitude, nutrition education should be considered. If more than 90% of a population has an optimal attitude, nutrition education is not needed. Pearson chi-square and Fisher's exact tests of comparison were conducted. No differences ($p>0.05$) were found in nutrition attitudes amongst agency groups. ^Same question relates to severity of illness pertaining to diarrheal disease, asked only once in the survey, but the reponse applies to both hygiene and water sanitation constructs. $^{+}$N reflects those beneficiaries and agents who were asked each attitude question. *n reflects those who had a desired/positive attitude for each question. $\%^{++}$ is the proportion of those who were aware or had knowledge of fortification from the total (i.e. n^{*}/N^{+}).

4.5.3 Practices and Household Dietary Diversity Score

Agents had higher HDDS than beneficiaries (10.4±1.1 and 8.7±1.7, respectively; $p<0.001$; Table 15). More agents reported consumption of tubers, meats, eggs, dairy, and fats compared to beneficiaries ($p<0.05$, $p<0.001$, $p<0.001$, $p<0.001$, $p<0.01$, respectively; Table 16). More agents reported eating out during the previous 24 hours than beneficiaries ($p<0.001$), in which half of those foods consumed were from the sweets food group (Table 17).

Overall, iron and vitamin A related practices were better amongst agents compared to beneficiaries (Table 14). Less than 60% of the beneficiary population consumes citrus regularly, while 100% of agents engage in this behavior ($p<0.001$). The majority of beneficiaries and agents consume coffee or tea every day, but agents less so ($p<0.01$). Less than half of beneficiaries reported consumption of meat, while 86% of agents reported consumption in the previous 24 hours ($p<0.001$). Assessment of vitamin A intake from the HDDS showed higher consumption of eggs and dairy amongst agents ($p<0.001$) and similar consumption of vitamin A containing fruits or vegetables (more than 75% of the populations, $p>0.05$) during the previous 24-hour period. However, diversity of vitamin A rich fruits and vegetables was higher amongst beneficiary populations.

Per HDDS, beneficiaries and agents both met dietary guidelines of daily fruit and vegetable consumption ($p>0.05$; Table 15). However, consumption of junk food (e.g. sweets, fried food, and soda) was more frequent among agents ($p<0.05$). Furthermore, beneficiaries were more physically active than agents, with more than 95% engaging in at least 30 minutes of physical activity per day, compared to only 74% of the agent population ($p<0.001$; Table 14).

Nearly all beneficiaries and agents mentioned using soap when washing their hands ($p>0.05$). However, less than 70% of the beneficiary and agent populations reported washing their hands for at least 20 seconds ($p>0.05$). Less than 70% of beneficiaries and less than half of agents reported treating their water before consuming it ($p<0.01$). Most common methods of treatment include boiling and chlorinating. All agents who did not treat water before consumption stated that it was already potable (Table 14).

Table 14. *Nutrition-related practices amongst agricultural extension beneficiaries and agents.*

		Beneficiary			Agent			
Nutrition Construct	***Nutrition Practice***	***n****	***N**+***	***%**++***	***n****	***N**+***	***%**++***	***p-value***
Iron Deficiency Anemia	Citrus (consumes regularly)	44	75	58.7%	62	62	100.0%	<0.001
	Coffee or Tea (not every day)	11	75	14.7%	21	62	33.9%	0.008
	Meat (consumed in prior 24 hrs)	40	86	46.5%	53	62	85.5%	<0.001
Vitamin A Deficiency	Eggs (consumed in prior 24 hrs)	64	86	74.4%	61	62	98.4%	<0.001
	Dairy (consumed in prior 24 hrs)	43	86	50.0%	60	62	96.8%	<0.001
	Vit A Fruit / Veg (consumed in prior 24 hrs)	66	86	76.7%	48	62	77.4%	0.923
	Eats at least 1 Vit A food every week	43	44	97.7%	62	62	100.0%	0.415
	Liver (eaten weekly)	1	44	2.3%	2	62	3.2%	0.627
	Eggs (eaten weekly)	42	44	95.5%	61	62	98.4%	0.373
	Milk (eaten weekly)	28	44	63.6%	28	62	45.2%	0.060
	Cheese (eaten weekly)	29	44	65.9%	54	62	87.1%	0.009
	Carrot (eaten weekly)	27	44	61.4%	31	62	50.0%	0.247
	Mango (eaten weekly)	33	44	75.0%	6	62	9.7%	<0.001
	Melon (eaten weekly)	11	44	25.0%	7	62	11.3%	0.064
	Papaya (eaten weekly)	9	44	20.5%	17	62	27.4%	0.412
	Watermelon (eaten weekly)	11	44	25.0%	9	62	14.5%	0.174
	Spinach (eaten weekly)	13	44	29.5%	2	62	3.2%	<0.001
Overweight/Obesity & Dietary Guidelines	Soda (not every day)	83	86	96.5%	53	62	85.5%	0.015
	Churro (not every day)	86	86	100.0%	55	62	88.7%	0.002
	Bread, sweet bread (not every day)	58	86	67.4%	42	62	67.7%	0.969
	Sweets, sugar (not every day)	15	86	17.4%	25	62	40.3%	0.002
	Oil, lard (not every day)	43	86	50.0%	14	62	22.6%	0.001
	Fried food (not every day)	64	86	74.4%	26	62	41.9%	<0.001
	Exercise at least 30 mins/day	82	86	95.3%	46	62	74.2%	<0.001
Hygiene	Uses soap	81	86	94.2%	56	62	90.3%	0.527
	Washes hands (≥20 seconds)	60	86	69.8%	43	62	69.4%	0.957

Table 14 (cont.)

	Washes hands (<20 seconds)	3	86	3.5%	7	62	11.3%	0.095
	Did not indicate time	21	86	24.4%	9	62	14.5%	0.139
Water Sanitation	Treats before consumption	59	86	68.6%	28	62	45.2%	0.004
	Treats water - boils	51	86	59.3%	21	62	33.9%	0.002
	Treats water - chlorine	14	86	16.3%	9	62	14.5%	0.770
	Treats water - filters	7	86	8.1%	2	62	3.2%	0.217
	Treats water - solar treatment	2	86	2.3%	2	62	3.2%	0.559
	Sometimes treats before consumption	6	86	7.0%	1	62	1.6%	0.129
	Does not treat before consumption	21	86	24.4%	32	62	51.6%	0.001
	Water already potable	11	27	40.7%	33	33	100.0%	<0.001

Percentage of population with an optimal nutrition practice, per KAP survey nutrition construct. According to the FAO, if less than 70% of a population has an optimal nutrition practice, nutrition education is urgently needed to address these topics. If 71-89% of the population has an optimal practice, nutrition education should be considered. If more than 90% of a population has an optimal practice, nutrition education is not needed. Meat, dairy, eggs, vit A fruit/veg consumption in prior 24 hours from HDDS survey. Statistical comparison assessed via Pearson chi-square and Fisher's exact test. No differences found across agency groups ($p>0.05$). $^{+}$N reflects those beneficiaries and agents who were asked each practice question. *n reflects those who had an optimal practice for each question. $\%^{++}$ is the proportion of those who were aware or had knowledge of fortification from the total (i.e. n^{*}/N^{+}).

Table 15. *Household dietary diversity score (HDDS) for AES beneficiaries and agents.*

	Beneficiary N=86				Agent N=62				
	Mean	***S.D.***	***Min***	***Max***	***Mean***	***S.D.***	***Min***	***Max***	***p-value***
HDDS	8.73	(1.73)	4	12	10.40	(1.11)	5	12	<0.001

HDDS is an index of 12 food groups (grains, roots/tubers, vegetables, fruits, meats, eggs, fish/seafood, pulses/legumes/nuts, milk/milk products, oils/fats, sweets, miscellaneous). Minimum possible score is 0. Maximum possible score is 12. Higher numbers reflect more diverse diets. P-values assessed via t-test. No differences (p>0.05) were found in HDDS amongst agency groups.

Table 16. *Reported household dietary diversity for AES beneficiaries and agents.*

	Beneficiary N=86		Agent N=62		
Food Group	***n***	***%***	***n***	***%***	***p-value***
Grains	86	100.0%	61	98.4%	0.419
Roots/Tubers	44	51.2%	44	71.0%	0.015
Vegetables	78	90.7%	59	95.2%	0.244
Fruits	73	84.9%	58	93.5%	0.103
Meats	40	46.5%	53	85.5%	<0.001
Eggs	64	74.4%	61	98.4%	<0.001
Fish/Seafood	8	9.3%	5	8.1%	0.793
Pulses/Legumes/Nuts	82	95.3%	61	98.4%	0.301
Milk/Milk Products	43	50.0%	60	96.8%	<0.001
Oils/Fats	69	80.2%	60	96.8%	0.003
Sweets	85	98.8%	62	100.0%	0.581
Misc. (Herbs, Spices, Condiments)	79	91.9%	61	98.4%	0.082
Vitamin A Rich (Fruits and Vegetables)	66	76.7%	48	77.4%	0.923

Percentage of beneficiary and agent populations that reported household consumption of each food group in the previous 24 hours. P-values assessed via Pearson chi-square and Fisher's exact test. No differences (p>0.05) were found in consumption of any food group amongst agency groups.

Table 17. *Food groups reported being eaten from store or restaurant among AES beneficiaries and agents.*

	Beneficiary N=86		Agent N=62		
Food Group	***n***	***%***	***n***	***%***	***p-value***
Ate Out During Previous 24 hours	4	4.7%	49	79.0%	<0.001
Grains	3	3.5%	18	29.0%	<0.001
Roots/Tubers	0	0.0%	2	3.2%	0.174
Vegetables	0	0.0%	3	4.8%	0.071
Fruits	0	0.0%	4	6.5%	0.029
Meats	0	0.0%	12	19.4%	<0.001
Eggs	0	0.0%	6	9.7%	0.005
Fish/Seafood	0	0.0%	0	0.0%	No variation
Pulses/Legumes/Nuts	0	0.0%	7	11.3%	0.002
Milk/Milk Products	0	0.0%	9	14.5%	<0.001
Oils/Fats	0	0.0%	4	6.5%	0.029
Sweets	2	2.3%	30	48.4%	<0.001
Misc. (Herbs, Spices, Condiments)	0	0.0%	0	0.0%	No variation

Percentage of beneficiary and agent populations that reported household consumption of each food group in the previous 24 hours. P-values assessed via Pearson chi-square and Fisher's exact test. No differences ($p>0.05$) were found in consumption of any food group amongst agency groups.

4.5.4 Intra-Class Coefficient

Intra-class correlation coefficient (ICC) was determined among coders for all survey response codes to determine quality of coding schemes (Table 18). Good to excellent agreement was found across the majority of coding schemes. After this assessment, comprehensive discussion between coders yielded 100% agreement for all data. These agreed upon data are present in practices and nutrition concepts (Tables 14 and 18).

Table 18. *Intra-class coefficient (ICC) for qualitative survey questions, including individual codes.*

Question	***Code***	***ICC***
Nutrition Definition	At Risk Group - Children	0.987
	At Risk Group - Elderly	1.000
	Daily Life Activities	0.953
	Dietary Intake - Bad foods	0.931
	Dietary Intake - Balance	0.988
	Dietary Intake - General	0.659
	Dietary Intake - Good foods	0.905
	Dietary Intake - Nutrients	0.924
	Dietary Intake - Quality	0.823
	Dietary Intake - Quantity	0.801
	Dietary Intake - Variety	1.000
	Food Insecurity - Death	1.000
	Food Insecurity - Life	0.854
	Food Insecurity - Malnutrition Defined	0.927
	Food Insecurity - Uncertainty/Lacking Food	0.783
	Important	0.953
	Mental Wellbeing	0.763
	Physical Wellbeing/Health	0.798
Overweight Definition	BMI Concept	0.954
	Causes - Imbalanced Eating	0.949
	Causes - Sedentary Lifestyle	0.836
	Consequences - Decreased Mobility	0.936
	Consequences - Health - General	0.873
	Consequences - Mental Health	0.749
	Consequences - Physical Health - Specific Problem	0.882
	State of Being Fat	0.891
Iron Fortified Food	Fe Fortified Food	0.944

Table 18 (cont.)

	Excellent Source of Fe Food	0.818
	Not a Significant Source of Fe Food	0.925
Vitamin A Fortified Food	Vit A Fortified Food	0.864
	Excellent Source of Vit A Food	0.915
	Not a Significant Source of Vit A Food	0.949
Handwashing	<20 Seconds	0.977
	≥20 Seconds	0.986
	Did Not Specify Time	0.961
	Uses Soap	0.958
Water Treatment	Treat Water	0.923
	Sometimes Treat Water	0.676
	Do Not Treat Water	0.935
	Water Treatment: Boil	0.978
	Water Treatment: Chlorine	0.965
	Water Treatment: Filter, Not Specified	0.915
	Water Treatment: Filter, with a Cloth	0.832
	Water Treatment: Solar Treatment	1.000
	Water Already Potable, Bottled	0.982
	Water already potable, Not Specified	0.921

ICC assessed for 3 independent coders. Agreement ranges: <0.5 poor, 0.5-0.75 moderate, 0.75-0.90 good, >0.90 excellent[119,120]. Codebook with complete code definitions in Appendix A.

4.6 NUTRITION CONCEPTS

When asked “What does nutrition mean to you?” beneficiaries and agents defined aspects of dietary intake, with qualitative and quantitative considerations, identifying “good” and “bad” foods to consume (Table 19). They also relayed its importance for dimensions of wellness (mental and physical health, as well as the ability to engage in everyday life activities). More beneficiaries mentioned children, good foods to consume, malnutrition, and alluded to food insecurity ($p=0.001$, $p<0.01$, $p=0.001$, $p<0.01$; respectively) and more agents mentioned balancing dietary intake and the idea of nutrients ($p<0.001$, $p<0.001$, respectively).

When asked “What is overweight and obesity, to you?” those surveyed mentioned body mass index (BMI) or related concept, causes of overweight (imbalanced eating and sedentary lifestyle), consequences of overweight (health, well-being, and mobility), and generally the concept of “fatness” (Table 19). More beneficiaries defined overweight and obesity as someone being fat ($p<0.001$) while more agents described a BMI concept ($p<0.001$).

Table 19. *Personal definitions for nutrition concepts amongst AES beneficiaries and agents.*

		Beneficiary			Agent			
Survey question	***Response Code***	***n****	***N**+*	***%**++*	***n****	***N**+*	***%**++*	***p-value***
What does nutrition mean to you?	At Risk Group - Children	19	86	22.1%	2	62	3.2%	0.001
	At Risk Group - Elderly	0	86	0.0%	1	62	1.6%	0.419
	Daily Life Activities	3	86	3.5%	7	62	11.3%	0.062
	Dietary Intake - Bad Foods	5	86	5.8%	1	62	1.6%	0.401
	Dietary Intake - Balance	0	86	0.0%	23	62	37.1%	<0.001
	Dietary Intake - General	12	86	14.0%	3	62	4.8%	0.070
	Dietary Intake - Good Foods	17	86	19.8%	3	62	4.8%	0.009
	Dietary Intake - Nutrients	7	86	8.1%	24	62	38.7%	<0.001
	Dietary Intake - Quality	26	86	30.2%	18	62	29.0%	0.875
	Dietary Intake - Quantity	4	86	4.7%	5	62	8.1%	0.391
	Dietary Intake - Variety	4	86	4.7%	1	62	1.6%	0.400
	Food Insecurity - Death	3	86	3.5%	1	62	1.6%	0.640
	Food Insecurity - Life	4	86	4.7%	1	62	1.6%	0.400
	Food Insecurity - Malnutrition Defined	15	86	17.4%	0	62	0.0%	0.001
	Food Insecurity - Uncertainty/Lacking Food	9	86	10.5%	0	62	0.0%	0.009
	Important	3	86	3.5%	3	62	4.8%	0.695
	Mental Wellbeing	3	86	3.5%	1	62	1.6%	0.640
	Physical Wellbeing/Health	50	86	58.1%	44	62	71.0%	0.110
What is overweight and obesity, to you?	BMI Concept	2	69	2.9%	25	62	40.3%	<0.001
	Causes - Imbalanced Eating	11	69	15.9%	17	62	27.4%	0.110
	Causes - Sedentary Lifestyle	2	69	2.9%	1	62	1.6%	0.623
	Consequences - Decreased Mobility	8	69	11.6%	3	62	4.8%	0.164
	Consequences - Health - General	13	69	18.8%	11	62	17.7%	0.871
	Consequences - Mental Health	0	69	0.0%	2	62	3.2%	0.222
	Consequences - Physical Health – Specific Problem	4	69	5.8%	8	62	12.9%	0.159
	State of Being Fat	56	69	81.2%	28	62	45.2%	<0.001

Table 19 (cont.)

Final 100% agreement amongst 3 coders, via qualitative data analysis. Statistical comparisons assessed via Pearson chi-square and Fisher's exact tests. No differences ($p>0.05$) were found in amongst agency groups. Codebook with complete code definitions in Appendix A. ^{+}N reflects those beneficiaries and agents who were asked each question. $^{*}n$ reflects the number of respondents associated with each code. $\%^{++}$ is the proportion of those who were aware or had knowledge of fortification from the total (i.e. n^{*}/N^{+}).

CHAPTER 5: DISCUSSION

5.1 NEED FOR EDUCATION

5.1.1 Presence of Food Insecurity

Food insecurity was present in the beneficiary population, with over 3/4 of the population being moderately to severely food insecure (per CSI analysis). Similarly, analysis of food insecurity in Santa Maria and Montaña de la Flor, Honduras found that 75.8% of the population was moderately to severely food insecure. This study utilized the Latin America and Caribbean Food Security Scale, which has been used to measure food insecurity but does not examine specific coping behaviors as does the CSI[123,124].

Further CSI analysis revealed that the most common behaviors beneficiaries engaged in to cope with food insecurity were buying less preferred foods, buying food on credit, consuming wild foods, limiting portions for everyone in the household, and rationing money to buy food. Least common behaviors included very severe coping strategies, such as, asking household members to eat elsewhere, begging for food on the street, and going an entire day without eating. A pilot study in Santa Lucia, Honduras found lower rates of coping strategy behaviors. However, the most common (buying less preferred foods, limiting portions of everyone in the household) and least common behaviors (asking household members to eat elsewhere, begging for food on the street, and going an entire day without eating) align with this research group's findings[110].

When asked "What does nutrition mean to you?" many beneficiaries responded describing real-life experiences of undernutrition and food insecurity. Many showed particular concern for children being at risk for consequences pertaining to food and nutrition insecurity. One beneficiary described only negative associations and experiences, saying nutrition means "children being underweight and not able to eat, children being sad, [and] nothing makes them happy." While another responded in a positive light, saying that nutrition means "health [and] life." These findings further support the CSI results, in which the majority of the beneficiary population suffered moderate to severe food insecurity.

5.1.2 Lack of Nutrition Knowledge

Overall, nutrition knowledge was low amongst beneficiaries and extension agents, varying by construct. Based purely on an assessment of awareness, both beneficiaries and extension agents urgently require education pertaining to the Honduran dietary guidelines and vitamin A deficiency[93].

Low awareness of vitamin A (roughly 50%) aligns with micronutrient awareness amongst postpartum women in Honduras, where only 46% had heard of folic acid[125]. In contrast, nearly 90% of beneficiaries and extension agents were aware of iron deficiency anemia. Further disaggregation of vitamin A and iron concepts amongst agents revealed high awareness of general micronutrient contents in foods, but low awareness of more nuanced nutritional concepts, such as assimilation and fortification. However, awareness does not equate knowledge. Both beneficiaries and agents had low nutrition knowledge across all iron and vitamin A constructs and sub-topics. According to current education standards, scores ≤70% reflect inadequate knowledge[122]. Therefore, nutrition education pertaining to iron topics is also advisable.

Surveyed populations were generally aware of overweight and obesity; however, fewer beneficiaries had heard of these concepts compared to extension agents. Considering that most beneficiaries suffer from food insecurity, a lack of attention to overweight and obesity is understandable. One beneficiary even stated, “we don’t have it in our community.” Surprisingly, beneficiaries scored significantly higher in the overweight knowledge domain, as compared to agents. This is likely due to limitations of imbalanced survey construction and social-desirability bias. The overweight 4-point knowledge domain is based in 1 multiple-choice question. If an individual responded affirmatively to all 4 points, they scored 100% on this section. Considering that surveys were conducted orally for the beneficiary group, it is likely that social desirability bias played a role in the data results from this question[126]. This probability is affirmed by group differences in response to the question “What is overweight and obesity to you?” The majority of beneficiaries defined overweight and obesity with a general description, saying it is “being really fat.” Contrarily, agents described a BMI concept,

"overweight is being over the appropriate weight according to the height of the person." Therefore, agents demonstrated a deeper understanding of overweight and obesity than beneficiaries.

Compared to other areas, knowledge of hygiene was relatively high among beneficiaries and agents. Water sanitation was lesser known, which is concerning considering that consumption of contaminated water puts one at risk for parasitic infection, which negatively impacts nutritional status and working capacity[17,127].

Although beneficiary and agents both had low knowledge, with knowledge actually being equivalent in some cases (i.e. awareness of vitamin A, knowledge of iron fortification, knowledge of vitamin A fortification), qualitative data analysis reveals more profound differences. When asked the open-ended question "What does nutrition mean to you?" beneficiaries offered general statements, such as "eating" or "eating meats, fruits, [and] vegetables." Contrarily, the extension agent group showed a deeper understanding, noting that nutrition is not just about the foods, but rather the composition of those foods that is important. Nutrition "provid[es] the necessary and balanced nutrients an organism needs in order to be able to perform basic functions." This finding offers further insight to some nutritional understanding amongst agents, beyond the quantitative measures of the KAP survey.

5.1.3 Varied Nutrition Practices and Attitudes

Although overall nutrition knowledge was low across most constructs, attitudes and practices varied. Awareness and knowledge of the Honduran dietary guidelines were low amongst beneficiaries, but their reported behaviors were adequate. In contrast, agent behaviors may require nutrition education[93,122]. Low physical activity and frequent consumption of junk food (sweets, fried food, and soda) in the agent population is of particular concern because these are major contributing factors to the development of overweight and obesity[19]. These behaviors support the *nutrition transition* seen in developing countries across the world,

in which improved economic stability yields increased consumption of western foods, higher incidence of overweight/obesity, and increased rates of chronic disease[9–12].

Considering that a common goal of AES is to improve beneficiary livelihoods, as incomes increase there is potential for issues of overweight and obesity to encroach on the beneficiary population. When asked "What does nutrition mean to you?" one beneficiary simply said, "eating all you can." This shows the context of food and nutrition insecurity that these people live in, but also shows the potential for overconsumption of nutrients when given the opportunity to do so. The nutrition transition in Honduras is further supported by the finding that half of those individuals with the economic ability to eat out (from a restaurant or a store), spent their money on sweets while only a few spent it on fruits or vegetables. A potential consequence of the development of overweight or obesity in the beneficiary population is diminished physical productivity, which would ultimately undermine AES efforts[21]. Therefore, inclusion of overweight and obesity nutrition concepts within AES should be carefully considered.

Integration of overweight and obesity nutrition education into AES may also be advantageous from the agency perspective, from the perspective of corporate wellness. Education pertaining to the dietary guidelines and overweight and obesity may empower employees to improve personal health and wellness, which may yield better productivity in the workplace, and ultimately better outcomes for beneficiaries[128,129]. This is particularly relevant considering that more than half of agents reported that it is somewhat or very likely that they are overweight or obese.

Overall, iron-related practices were better among agents than beneficiaries. However, quality information pertaining to iron-related nutritional practices from this survey is limited. Although consumption of citrus (which contains vitamin C that aids non-heme iron assimilation) and coffee/tea (which contain phytates that inhibit non-heme iron assimilation) are relevant, questions were not sensitive enough to assess proximity of consumption to non-heme iron food sources (e.g. plants). Although less than 60% of beneficiaries consume citrus and nearly all consume coffee or tea every day, this is insufficient evidence to qualify whether these

behaviors might aid or inhibit iron status of an individual. More solid, and concerning, information is derived from the HDDS survey, showing that less than half of beneficiaries consumed meat in the prior 24-hour period. This is relevant as meat contains heme iron, which is more bioavailable than non-heme iron. Furthermore, its absorption is not affected by other dietary components such as vitamin C and phytates[11].

More extension agents consumed vitamin A containing foods from animal sources, while beneficiaries consumed more pro-vitamin A from plant-based sources. Animal-sources yield retinoids (preformed, active vitamin A) with roughly a 90% absorption rate. Plant-sources yield carotenoids (pro-vitamin A), of which 5-60% is absorbable. Despite this difference in absorption rate, many plant-foods are excellent sources of vitamin A and are viable options for adequate intake (e.g. carrots, mangoes, orange-fleshed sweet potatoes)[11]. Interestingly, diversity of vitamin A rich fruits and vegetables was higher in beneficiary than agent populations, further supporting the nutrition-transition Honduras is currently undertaking.

Overall, beneficiaries had less diverse diets than agents, with deficits in quality protein sources (meats, eggs, dairy), sources of heme iron (meats), and food sources necessary for the absorption of vitamin A (oils/fats). Considering that HDDS is a proxy measure of food access and socioeconomic status, lower HDDS among beneficiaries was not unexpected. Increased dietary diversity (eating more food groups) is associated with improved nutritional adequacy and health outcomes[107]. As such, dietary diversity is a viable focal point for AES integration as both a nutrition-sensitive and nutrition-specific initiative.

Hygienic practices are not of significant concern. Nearly all beneficiaries and agents mentioned using soap when washing their hands. Although less than 70% of the beneficiary and agent populations reported washing their hands for ≥20 seconds (CDC standards for safe handwashing), this is not necessarily alarming. Self-reports of handwashing are notoriously inaccurate. Triangulation of data via observation is advisable to verify accuracy of estimates[130–133]. Many of the responses reported in this dataset were stated as ≥5 minutes, with one respondent reporting regular handwashing duration of 15 minutes. While these estimates are technically safe, they are likely gross overestimates of actual practice. Therefore, information

gleaned from this dataset is limited. Likewise, water sanitation is not a critical concern since safe water sanitation techniques were reported and most of those people that do not treat their water indicated that they consume water that is already potable.

The FAO advocates specific nutrition education strategies according to KAP findings. Disconnects between nutrition knowledge and practices may be explored via attitudinal assessment. This is especially relevant considering that increased knowledge does not necessarily yield improved practices. Specific nutrition-related attitudes may be harnessed as an anchor for strategic nutrition education techniques through principles of the Health Belief Model[93,103,134]. For example, perceptions of low susceptibility to iron deficiency anemia, vitamin A deficiency, and overweight/obesity found amongst beneficiaries and agents can be addressed through discussions pertaining to regional incidence and causes of these forms of malnutrition. Lack of concern over severity of vitamin A deficiency can be addressed through lecture and discussion pertaining to the consequences of vitamin A deficiency[93].

Although attitudes pertaining to hygiene and water sanitation were positive amongst beneficiaries, agents may benefit from reminders of risks and consequences pertaining to poor practices. They themselves may not be at risk (presumably due to higher socioeconomic status, better access to health care, etc.), but they are often examples to their beneficiaries. Therefore, reminders about hygiene and water sanitation during their interactions with beneficiaries, who are likely at higher risk for contraction, are merited and should be encouraged.

5.2 METHODS FOR EDUCATION

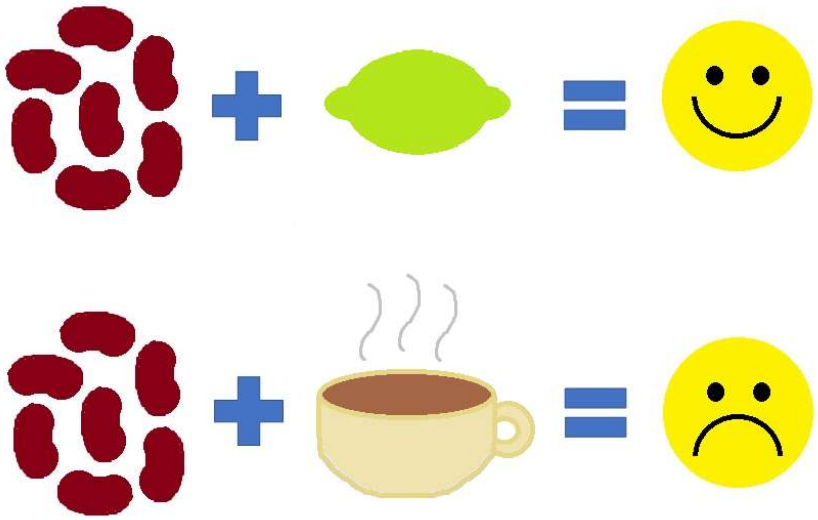
Integration of nutrition into agriculture offers great potential to address food and nutrition security through various educational techniques. Agricultural extension agencies are in a unique position to enhance dietary diversity and food access from two fronts: education and production. Integration of basic nutrition concepts (i.e. eating more diverse and nutritious foods) into agricultural programs aimed at improving beneficiary income streams is a natural avenue for impact. Improving the nutritional status of farmers and their families may improve their physical, emotional, and financial wellness[13]. Based upon this study's findings, the most

pertinent points of nutrition education should focus on: iron, vitamin A, and the dietary guidelines of Honduras (overweight and obesity concepts are naturally present within the Honduran dietary guidelines topics).

Interventions should be based upon prior research yet maintain an innovative edge. Nutrition-sensitive and nutrition-specific agricultural interventions that implement practices such as improved agricultural and home-gardening techniques, introduction of biofortified crops, high egg-yielding hens, and animal husbandry have shown great promise to improve nutrition-related knowledge, practices (dietary diversity, increased micronutrient intake, increased consumption of animal-sourced foods: meat, dairy, eggs), and ultimately improved nutritional biomarkers (hemoglobin status, vitamin A status, weight and height measures in children)[38–46]. Nevertheless, engaging the expertise of extension employees to customize nutrition-sensitive and nutrition-specific agricultural interventions to their individual beneficiary groups is critical to the development of culturally competent and relevant programs[78,135,136].

Diversifying programs to include a balance of lecture, discussion, and hands-on activities is ideal to address deficits in nutrition knowledge, attitudes, and practices[93]. Customized programming including visual, picture-based educational materials, such as those offered by the Academy of Nutrition and Dietetics resource hub, should be utilized to reach low-literacy beneficiaries[137,138]. For example, building visual instructions for concepts of iron assimilation could be easily accomplished, as outlined in Figure 6. The complementary education is that consumption of citrus at the same time as beans is “good,” while consuming coffee and beans at the same time is “bad” for one’s health. An agricultural component aimed at the production of vitamin C (i.e. citrus or other vitamin C rich fruits or vegetables) and/or non-heme source iron foods (i.e. beans) could go along with this nutritional message. Thus, complex nutrition messages may be simplified to easily digestible and actionable concepts within the agricultural arena. Additionally, hands-on nutrition-integrated AES education methods such as home-gardening techniques and cooking classes have yielded improvements in nutritional knowledge and/or practices[40,42].

Figure 6. *Non-heme iron graphic for low literacy populations.*



The reiteration of key concepts through multiple educational techniques is crucial to reaching people with diverse learning styles[139]. In Bangladesh, one study found that provision of reference dietary guidelines plates to extension agent households was associated with improved food consumption score (FCS; a measure of dietary diversity and adequacy). Greater improvements in FCS were found among those who received both the plate and participatory nutrition education workshop interventions. However, no trickle-down effects to measure this impact on beneficiaries was conducted[140]. More research is needed to determine the most effective combination of nutrition-integrated AES methods to impact nutrition outcomes[71].

5.3 CAPACITY FOR EDUCATION

5.3.1 Extension Agent Capacity

The high educational attainment among agricultural extension agents bodes well for their intellectual capacity to expand agricultural expertise to include integrated nutrition concepts. Since many agricultural extension employees work long days (>8 hours per day) the potential to add another task (nutrition education) to their plates is an obvious concern.

Considering the overall high satisfaction found across these employees, with highest satisfaction amongst intrinsic factors, this author argues that integration of nutrition education into agricultural extension services is a viable option.

Job satisfaction was high (overall=80.3±18.1, intrinsic=48.8±11.0, extrinsic=23.8±5.6) for surveyed agricultural extension agents, with no major differences in satisfaction across any measures. A direct comparison for satisfaction levels is not available for agricultural extension employees. One study that assessed job satisfaction in extension services in North Dakota found average satisfaction. However, this study utilized the long-form MSQ survey, so values are not directly comparable[141]. Closest relative comparisons for the short-form MSQ relate to engineers who had good satisfaction (overall=77.9±11.9, intrinsic=48.5±7.5, and extrinsic=21.32±4.4)[114].

5.3.2 Training-the-Trainers

The ultimate goal of nutrition-integrated AES is to improve livelihoods and nutritional status of beneficiaries. However, an underlying assumption to this goal is that agricultural extension agents are already equipped for this job. An investigatory survey by USAID of AES in Honduras did not rate "lack of awareness of understanding of nutrition among AES planners" as a primary concern in the integration of nutrition into AES[99]. This research study asserts that a lack of nutrition knowledge amongst AES agents is in fact a relevant issue in the development of nutrition-relevant programming within AES in Honduras. Although some extension agents are more knowledgeable of nutrition than beneficiaries, their overall knowledge and awareness of nutrition are inadequate. Therefore, nutrition education efforts should be targeted towards agricultural extension employees, using a *train-the-trainer* model to potentiate their capacity to propagate this information to their beneficiaries[78,142,143].

According to the CDC, the train-the-trainer model "build[s] a pool of competent instructors who can then teach the material to other people"[143]. The train-the-trainer model has been found to be a cost-effective, practical approach to public health education, with no differences in teaching efficacy found between those educated by original trainers or those

educated by secondary trainers[142,144]. Train-the-trainer techniques have been successfully applied via in-person workshops and videoconference training sessions[142,144,145].

The train-the-trainer model has been used within AES in Honduras in the development of a dairy extension project that has successfully increased incomes for many beneficiaries[146]. However, this project did not integrate nutrition concepts, nor did it measure nutritional outcomes for beneficiaries. In Ethiopia, the ENGINE (Empowering New Generations to Improve Nutrition and Economic Opportunities) project has successfully utilized the train-the-trainer model to integrate nutrition into AES, with positive behavioral change for beneficiaries, including increased dietary diversity and fruit and vegetable intake[136]. Recently, train-the-trainer models of nutrition for AES have developed through pre-service and in-service modalities. Pre-service training refers to integration of nutrition topics through the curriculum of postsecondary agricultural institutions to train students before they begin work in AES, while in-service training refers to training of pre-existing AES agents[147].

Starting with nutrition education at the extension level will equip AES agents with the tools they need to develop nutrition-sensitive and nutrition-specific integrated programs that meet their beneficiaries' needs. Specific depth and breadth of nutrition education necessary for AES agents is debated, however customization of efforts to individual contexts is generally accepted[136]. Recently, USAID released a Nutrition-Sensitive Agriculture Training Resource Package. These materials include digital slides, session guides, handouts, activities, experiential advice for implementation, and additional references to assist AES with the integration of nutrition topics into agricultural lessons appropriate for the beneficiaries' needs[148]. Studies evaluating the short and long-term impacts of different nutrition-focused train-the-trainer models on AES agent and beneficiary outcomes (i.e. nutrition KAP, health, economic) are warranted.

5.4 LIMITATIONS

5.4.1 Research Design

5.4.1.1 Surveys

Nutrition knowledge, attitudes, and practices amongst agricultural extension agents and beneficiaries were assessed according to six different constructs: dietary guidelines of Honduras, iron deficiency anemia, vitamin A deficiency, overweight and obesity, hygiene, and water sanitation. The sheer breadth of this survey serves as a limitation in and of itself. Due to survey length limitations, in-depth KAP information could not be gleaned across all constructs[149]. Some areas were deemed more important (dietary guidelines of Honduras, iron deficiency anemia, and vitamin A deficiency) and were given more points of assessment within survey design. Unfortunately, this yielded imbalanced survey construction, which makes KAP between nutrition constructs less comparable. As such, this research serves, although limited in size, as a broad investigatory baseline study for nutrition KAP amongst AES beneficiaries and agents in the Dry Corridor of Honduras.

Following the FAO KAP manual offered stability in terms of survey design, implementation, and interpretation. However, the specific wording of FAO KAP questions is not ideal, according to current survey methods. The survey utilizes leading questions that yield poor quality data. For example: "*How important is it to follow the dietary guidelines of Honduras?" i*s a leading question because it implies that there is some degree of importance to following the guidelines. Instead, forming the question as "*Do you think it is important to follow the dietary guidelines?"* offers a more open opportunity for unbiased response[93,149,150]. This is a recurrent issue throughout the attitudes portion of the FAO KAP survey, limiting quality of data derived from these questions. Future efforts should be made to update KAP survey questions according to best survey methodology.

A major limiting factor to quality of data obtained is the limitation of self-reporting of behaviors throughout the practices portion of this survey. Self-reported behaviors are typically inaccurate, either accidentally or purposefully. Triangulation of data via observation would be

ideal for future studies; however, resources (time and funds) for such studies at scale would be considerable[131,151,152].

5.4.1.2 Sampling

Convenience sampling methods and self-selection also bias and limit results and conclusions from this study. These sampling methodologies are simple and inexpensive, but do not obtain representative samples that may be generalized to a larger population of AES beneficiaries and agents in the Dry Corridor of Honduras. Inherent biases result from convenience sampling and non-response bias of self-selection that may lead to certain types of respondents being more likely to respond than others[153–155]. For example, it is unknown why nearly 75% of agents solicited chose not to participate in this study. This non-response bias might mean that certain agents were more likely to respond to the survey than others, but this precise bias cannot be ascertained. Furthermore, agents connecting the research group with beneficiaries likely held some bias in specific selection of these beneficiaries. The precise implications of these biases are unknown, but it is likely that the beneficiary group interviewed was not a representative sample of AES beneficiaries in the Dry Corridor of Honduras. As such, results from these data are not generalizable.

An improved sampling technique for future, similar studies should follow multi-stage, simple random sampling. Despite the fragmented status of AES in Honduras, ideally, a comprehensive list of AES agencies serving the Dry Corridor of Honduras USAID primary zone of influence would be collected. A random number generator would be used for simple random sampling to select AES agencies for inclusion in this study. Complete lists of employees and beneficiaries would then be obtained from each agency. All the beneficiary names would be compiled to a sample frame. Likewise, all agent names would be compiled to a sample frame. Alphabetizing each list would contribute further to random selection. Then, simple random sampling would be conducted for the beneficiary and agent lists, until a desired number was obtained for each group (as determined by power calculations necessary for statistical analysis)[156,155,154]. As such, generalizability of results to the larger population of AES agents and

beneficiaries in the Dry Corridor of Honduras USAID primary zone of influence would be improved through a more representative and robust sample.

5.4.2 Research Implementation

Differences in implementation (oral interviews for beneficiary surveys and self-led surveys for agents) also yielded inherent biases. Oral-implementation of surveys amongst beneficiaries likely resulted in social-desirability bias of responses. This occurs when a respondent offers a response deemed "socially appropriate" due to potential judgment of an alternative or actual response. This is especially relevant when power dynamics come into play, as they did in this study, with interviewers being well-educated outsiders brought into the community [126]. Furthermore, self-led written and online survey formats for the agents could also result in biases. Higher scores amongst agents could be attributed to "cheating" on the survey, with a less controlled environment (no direct supervision by researchers), ready access to the internet, and potential to communicate with others while taking the survey[157,158].

5.4.3 Research Context

The author is not aware of any prior KAP surveys conducted to compare beneficiary and extension agent nutrition knowledge, attitudes, and practices. One investigatory initiative in Ethiopia conducted an informal true/false assessment consisting of 10 items to determine nutrition knowledge of AES agents, finding that "they knew nothing about nutrition;" explicit results were not otherwise divulged[136]. The only KAP survey known to have been administered to agricultural extension agents was in Tanzania. This KAP survey focused on the impact of pesticides on health[159].

Most KAP surveys conducted in Honduras center on public health issues (i.e. HIV testing, emergency contraception, treatment of malaria, and smoking amongst children)[160–163]. The only nutrition-related KAP survey conducted in Honduras focused on folic acid knowledge, attitudes, and practices among post-partum women[125]. KAP survey format has been used for nutrition-related topics in Latin America (Andean grain usage in the feeding of young children in Peru and

salt consumption pertaining to health in Argentina, Costa Rica, and Ecuador); however, these studies did not directly follow the FAO KAP manual for the development or implementation of their surveys[164,165]. Therefore, this study's findings are limited by the lack of comparative examples within Honduras and Latin America; however, this also speaks to a gap in the literature that this research study fills.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Overall, nutrition-related knowledge was sub-optimal amongst beneficiaries and agents. Nutrition-related attitudes and practices were somewhat better, but quality of information ascertained from these dimensions is limited. Qualitative assessment reveals a deeper understanding of nutrition concepts among agents than beneficiaries. Nevertheless, critical knowledge of nutrition remains low among agents. This supports the need for capacity building of AES agents, yet highlights some pre-existing knowledge among agents that may facilitate nutrition integration into AES.

Addressing food and nutrition insecurity among beneficiaries (from the perspectives of access, utilization, and stability), through integrated nutrition-agricultural programming is recommended (especially in the domains of iron, vitamin A, and the Honduran dietary guidelines). Integration of these nutrition topics into AES has shown some promise for potential gain in nutritional status amongst mothers and young children[38–46].

Although predominant focus of global AES integration has been on the alleviation of undernutrition, the issue of overnutrition should not be overlooked. Considering that Honduras is undergoing a *nutrition transition*, those beneficiaries who are able to improve their incomes through AES involvement, are inherently at risk for falling into this tide. Therefore, AES nutrition concepts should also emphasize points from the Honduran dietary guidelines that encompass overweight and obesity topics (i.e. moderation of fats and sweets and regular physical activity). Furthermore, adding a dimension of overweight and obesity nutrition education should be considered from the perspective of corporate wellness for agency employees, taken as a mutually beneficial venture from the agency perspective.

Although nutrition integration of AES is advocated, agricultural extension agents serving the Dry Corridor of Honduras do not currently have adequate nutrition know-how to accomplish this. Therefore, nutrition education is urgently needed at the agent level. This study encourages AES institutions to provide solid nutrition education at the agency level through a *train-the-trainer* model to reach numerous beneficiaries through cost-effective, practical

means. In Honduras, the question becomes “Who should train these trainers?” Development of nutrition-sensitive programs by individual agencies is an option; however, this would only contribute to the fractured nature of AES in Honduras. Previous train-the-trainer programs in Zambia and Ethiopia have engaged strong stakeholders (i.e. government, universities) to support nutrition integration within AES to maximize impact and sustainability of interventions[136,147]. Advocacy for integrated programming, beginning with education of governmental authorities of the beneficial intersection of nutrition and agriculture was critical to making these connections[136].

In Honduras, an AES dairy project has been established through a partnership between Zamorano University and the government to improve economic status of beneficiaries[146]. This program shows great potential for integrated nutrition concepts to promote the consumption of dairy as well as to help direct increased incomes of beneficiaries toward nutritional benefit (as have been seen by other dairy-based nutrition-oriented AES interventions[43]). Considering that the government of Honduras has concurrent food security initiatives (i.e. school lunch program, improved access to micro-credit, and provision of latrines to rural households), an argument could be leveraged to engage integration of nutrition concepts into agriculture to align with these other efforts[33,35]. A widespread train-the-trainer program coordinated by the Honduran government would offer potential for uniform dissemination of evidence-based, strategic nutrition messages within AES (including dissemination of the dietary guidelines of Honduras, which was largely unknown amongst surveyed groups in this study).

Furthermore, train-the-trainer models of AES could engage KAP for baseline characteristics and outcome evaluation, as advocated by the FAO[92,93]. Use of KAP in this way can help drive targeted nutrition integration for AES program development. More importantly, outcome evaluation can contribute to the development of successful nutrition-relevant AES interventions, ensuring that resources are allocated to maximize impact. Use of current survey methods through development, implementation, and interpretation of KAP is recommended.

Finally, the impact of integration on job satisfaction is unknown. Future studies should investigate the impact of nutrition education integration on job satisfaction among extension agents, as this could impact long-term viability of integrated AES interventions.

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APPENDIX A. CODEBOOK

Question	*Code*	*Definition*
Nutrition Definition	At Risk Group - Children	Mentions kids, children
	At Risk Group - Elderly	Mentions elderly population
	Daily Life Activities	Ability to function in daily life activities, job activities, etc.
	Dietary Intake - Bad Foods	Specific food(s) to avoid or limit
	Dietary Intake - Balance	Mentions balance, specifically
	Dietary Intake - General	General, non-specific statement of eating
	Dietary Intake - Good Foods	Specific Food(s) to Emphasize/eat/consume
	Dietary Intake - Nutrients	Mentions nutrients, macronutrients, micronutrients. For example: protein, carbohydrates, fats, vitamins, minerals
	Dietary Intake - Quality	General, non-specific statement. For example: eating well, healthy eating, etc.
	Dietary Intake - Quantity	Specifically mentions quantity, or quantifies food intake- can be good, bad, neutral, etc.
	Dietary Intake - Variety	Specifically mentions variety; does not include lists of foods or nutrients.
	Food Insecurity - Death	Mentions death
	Food Insecurity - Life	Mentions life
	Food Insecurity - Malnutrition defined	Defined malnutrition, rather than nutrition
	Food Insecurity - Uncertainty/Lacking Food	Denotes a sense of uncertainty of access to food or a sense of lacking of food

	Important	Generally mentions importance of nutrition, important, essential, etc. We cannot make assumptions about what we think they think is important.
	Mental Wellbeing	Mentions some dimension pertaining to mental health, includes: general mental health, specific mental health condition, mood effects, etc.
	Physical Wellbeing/Health	Avoidance of disease, maintenance, body needs, growth/development, general physical health, general health
Overweight Definition	BMI Concept	Includes non-explicit BMI descriptions, such as: disproportional height and weight
	Causes - Imbalanced Eating	Including overeating, disordered eating, not eating the "right" things, poor nutritional intake
	Causes - Sedentary Lifestyle	Little or no physical activity or exercise
	Consequences - Decreased Mobility	Reduced capabilities, in terms of physical ability, mobility, ability to function in daily life activities, etc.
	Consequences - Health - General	General or generic mention of health, relation to health, benefit to health, but does not specify type, for example, it would not include: a specific health problem/risk/disease
	Consequences - Mental Health	Mentions some dimension pertaining to mental health, includes: general mental health, specific mental health condition, mood effects, etc.
	Consequences - Physical Health - Specific Health Problem	Specifies a health problem or risk: includes heart health, diabetes, cholesterol, respiratory issues, poor circulation, etc.

	State of Being Fat	Generally “fat,” excess accumulation of body fat; NOT in reference to proportions (BMI concept)
Iron Fortified Food	Fe Fortified Food	If food is plausibly/possibly fortified with Fe
	Excellent Source of Fe Food	At least 20% DV Fe, per USDA Nutrient Database
	Not a significant source of Fe Food	Less than 20% DV Fe, per USDA Nutrient Database
Vitamin A Fortified Food	Vit A Fortified Food	If food is plausibly/possibly fortified with Vit A
	Excellent Source of Vit A Food	At least 20% DV Vit A, per USDA Nutrient Database
	Not a significant source of Vit A Food	Less than 20% DV Vit A, per USDA Nutrient Database
Handwashing	<20 Seconds	Less than 20 seconds duration of handwashing
	≥20 Seconds	20 seconds or more handwashing, based upon CDC guidelines for safe handwashing requirements
	Did not specify time	No time stated, no specific time stated

	Uses Soap	Includes: enjabonarse, mention of soap, states soap use every time
Water Treatment	Treat Water	States that they treat the water
	Sometimes Treat Water	If explicitly states that they sometimes treat water and/or sometimes do not treat water
	Do Not Treat Water	Specifically mentioned that they do not treat the water, nada, etc.
	Water Treatment: Boil	If they mentioned boiling the water, boiled water, etc.
	Water Treatment: Chlorine	If they mentioned chlorinating, using chlorine
	Water Treatment: Filter, not specified	Filter, if did not specifically mention using a cloth
	Water Treatment: Filter, with a Cloth	Filter, if explicitly mentioned using a cloth
	Water Treatment: Solar treatment	Mentioned solar treatment, putting water in the sun to clean it, etc.
	Water already potable, Bottled water	Mentioned using bottled water
	Water already potable, not specified	Mentioned using water that is potable, but does not specify in what way it was processed

APPENDIX B. SURVEY INSTRUMENTS

B.1 BENEFICIARY DEMOGRAPHIC SURVEY

General Information Survey

INSTRUCTIONS FOR THE INTERVIEWER

Read the questions in a loud and clear voice. Mark an X next to the response given by the interviewee. Be sure to take time to answer every question that the participant is able to. **PLEASE ACT IN A CORDIAL MANNER TO THE PARTICIPANT UNTIL THE END OF THE INTERVIEW.**

INSTRUCTIONS FOR THE INTERVIEWEE: I am going to read you some questions and give you options for answers. Tell me which option is most appropriate or corresponds to you.

1. **I am going to read you a range of ages. Tell me in which range your age falls.** [*Don't ask for an specific age*] If they tell you the age, write it on the line.
   a. 18 – 29 _____
   b. 30 – 39 _____
   c. 40 – 49 _____
   d. 50 – 59 _____
   e. 60 – 69 _____
   f. More tan 70_____

2. **What is your marital status?**
   a. Free Union _____
   b. Married _____
   c. Single _____
   d. Divorced _____
   e. Other (specify)_____

3. **What is the highest level of education you have completed?** [*Highest completed*]
   a. None _____
   b. Primary school _____
   c. Secondary school _____
   d. College _____
   e. Other (specify)_____

4. **How many people live in your household?**
   a. 1-3 _____
   b. 4 a 6 _____
   c. 7 a 10 _____
   d. Other: Specific number_____

5. **How many children do you have?**

   Write the number _____

6. **How many children still live with you?**

   Write the number _____

7. **Note the sex of the person** [*Answer this question based on observation – NO NEED to ASK*]

   a. Male _____ b. Female _____

Cuestionario de Información General

INSTRUCCIONES PARA EL ENCUESTADOR

Lea las preguntas en voz alta y clara. Marque con una X la respuesta provista por el entrevistado. Asegúrese de tomarse el tiempo para contestar cualquier pregunta que el participante pueda tener. **POR FAVOR, AGRADEZCA DE MANERA CORDIAL AL PARTICIPANTE AL FINAL DE LA ENTREVISTA.**

INSTRUCCIONES AL ENTREVISTADO: Le voy a leer algunas preguntas y darle algunas opciones. Ud. me dice cual opción es la más adecuada o le corresponde a Ud.

8. Le voy a leer algunos rangos de edad en años. Ud. me dice en cual rango esta su edad. [*Don't ask for an specific age*] If they tell you the age, write it on the line.

a. De 18 – 29 _____
b. De 30 – 39 _____
c. De 40 – 49 _____
d. De 50 – 59 _____
e. De 60 – 69 _____
f. Más de 70 _____

9. ¿Cuál es su estado civil?

a. Unión libre _____
b. Casado/a _____
c. Soltero/a _____
d. Divorciado/a _____
e. Otro (especificar)_____

10. ¿Cuál es el nivel de educación máximo el cual Ud. obtuvo? [*Highest completed*]

a. Ninguno _____
b. Escuela primaria _____
c. Escuela Secundaria _____
d. Grado universitario _____
e. Otro (especificar)_____

11. ¿Cuál es el número de personas que actualmente viven en su hogar?

b. De 1-3 _____
c. De 4 a 6 _____
c. De 6 a 10 _____
d. Otro: Especifique el número_____

12. ¿Cuántos hijos tiene Ud.?

Escriba el numero _____

13. ¿Cuántos hijos aún viven con Ud.?

Escriba el numero _____

14. Anote el sexo de la persona [*Answer this question based on observation – NO NEED to ASK*]

a. Masculino _____ b. Femenino _____

B.2 COPING STRATEGIES INDEX

Coping Strategies Against Food Insecurity

Responses regarding strategies used to deal with food insecurity					
In the past month, if there have been times when you did not have enough food or money to buy food, how often has your household had to:	Relative Frequency				
	All the time? Every day	**Pretty Often 3-6* Times/Week**	**Once in a while? 1-2* Times/Week**	**Hardly at all? <1* Times/Week**	**Never 0*Times /Week**
a. Rely on less preferred and less expensive foods?					
b. Borrow food, or rely on help from a friend or relative?					
c. Purchase food on credit?					
d. Gather wild food, hunt, or harvest immature crops?					
e. Consume seed stock held for next season?					
f. Send household members to eat elsewhere?					
g. Send household members to beg?					
h. Limit portion size at meal times?					
i. Restrict consumption of adults in order for small children to eat?					
j. Feed working member of household at the expense of non-working members?					
k. Ration the money you had and buy prepared food?					
l. Reduce the number of meals eaten in a day?					
m. Eat only once per day?					
n. Skip entire days without eating?					

Índice de Estrategias de Afrontamiento en Contra de la Inseguridad Alimentaria

Respuestas sobre las estrategias para lidiar con inseguridad alimentaria					
En el último mes, si en su hogar no existieron los recursos necesarios para obtener alimentos, cuantas veces Ud. y su familia tuvieron que:	Frecuencia relativa				
	¿Todos los días?	**¿Varias veces? 3-6* Veces/Se**	**¿De vez en cuando? 1-2* Veces/Semana**	**¿Pocas veces? <1* Veces/Semana**	**Nunca 0* Veces/Semana**
a. ¿Comprar alimentos menos preferidos y mas baratos?					
b. ¿Pedirle alimentos, o la ayuda de un amigo, vecino o					
c. ¿Comprar comida con crédito?					
d. ¿Comer hierbas del patio, animales de monte, o comer cultivos no maduros como frutas y vegetales?					
e. ¿Consumir sus reservas de semilla que había guardado para la próxima siembra?					
f. ¿Mandar a los miembros de su hogar a comer a otro					
g. ¿Mandar a los miembros de su hogar a pedir comida en la calle					
h. ¿Reducir la cantidad de comida que le dio a cada miembro de su familia?					
i. ¿Reducir la comida de los adultos par que coman los niños?					
j. ¿Dar más comida solo a los miembros del hogar que trabajan					
k. ¿Racionar el dinero para comprar comida?					
l. ¿Reducir el número de comidas servidas por día?					
m. ¿Comer sólo una vez al día?					
n. ¿Dejar de comer por días enteros?					

B.3 HOUSING QUALITY SCORE

Rapid Visual Assesment – Housing Quality

This rapid visual assessment of the physical quality of different elements of the household has been previously used as an indirect indicator of socioeconomic status in developing countries. Please carefully read the following directions before starting.

INSTRUCTIONS

1. Please fill this questionnaire based on your own observations
2. Do so immediately after you complete your interview, but do it **after** you leave the household.
3. This is not a questionnaire, **do not ask** any questions regarding these indicators
4. Mark with an X or write down the required information. If you are not able to determine one of the characteristics based on your observation, leave blank.

Were you able to observe the housing premises? YES_____ (If yes, please complete the housing quality scale)	NO____
HOUSING QUALITY SCALE (Mark with an X the observable characteristic)	
WALL *(Predominant[1] material of external walls)*	
Masonry (brick, cement, block, cemented adobe, stone, gravel, etc.)	
Wood, un-cemented adobe	
Cane, palm, mud-straw, leaves, other non-durable plant material	
Metallic sheet (zinc, other), sticks, refuse, plastic sheets, cardboard	
FLOOR (Predominant material of floors)	
Ceramic, marble tiles, cement blocks, bricks, wood, carpeting, vinyl tile	
Dirt, non-durable plant material, plastic sheets, cardboard	
ROOF (Predominant material on roof)	
Baked clay roof tiles, asphalt, cement, gravel, other durable roof tile	
Wood, asbestos, fiber-cement	
Straw, cane, plantain/palm leaves	
Metallic sheet, canvas, cardboard, plastic sheets, other refuse	
ELECTRICITY (Electrical service to housing unit)	
Yes	
No	
SEWERAGE (Type of sewerage system)	
Piped system (public/private), piped septic tank	
Black water well, cesspool, latrine, outhouse	
No system, other (river, canal, other natural outlet), free-flowing sewage	
PIPE (Water supply system and indoor/outdoor access)	
Piped indoor from (public/private) aqueduct or other similar system	
Piped to outdoor location from (private/public) aqueduct or other similar system	
Well, spring (with or without pump) not piped	
Public fountain, river, canal, water truck, cistern	

[1] Predominant is defined as covering more than 50% of the surface

Evaluación rápida de calidad de recursos en el hogar

Esta evaluación visual rápida de la calidad física de los diferentes recursos disponibles a las familias ha sido utilizada anteriormente como un indicador indirecto de la situación socio-económica en países de bajos ingresos. Lea atentamente las siguientes instrucciones antes de comenzar.

INSTRUCCIONES

1. Rellene el siguiente cuestionario en base en sus propias observaciones.
2. Hacerlo inmediatamente después de completar su entrevista, pero después de salir del hogar.
3. Esto no es un cuestionario. No haga ninguna pregunta solo observe y tome información.
4. Marque con una X o anote la información requerida. Si Ud. no puede llenar alguna de las características en base a su observación, favor dejar en blanco.

Pudo Ud. observar el hogar y sus alrededores? Si_____ (En caso afirmativo, complete el cuestionario)	No_____
PAREDES *(Las más predominantes en el exterior del hogar[2])*	
Material durables (ladrillo, cemento, bloques, adobe, piedra, cascajo, etc.)	
Madera, sin cemento o adobe	
Cana, palma, paja, hojas secas, u otros materiales no durables	
Hojas metálicas (zinc, u otras), palos, desperdicios de otros, plástico, carton	
PISOS *(Los más predominantes)*	
Cerámica, mármol, azulejos, bloques de cemento, ladrillos, madera, alfombras, baldosas de vinilo	
Tierra, material vegetal no duraderos, láminas de plástico, cartón	
TECHOS *(Los más predominantes)*	
Tejas de arcilla cocida, asfalto, cemento, grava, otra teja duradera	
Madera, asbesto, fibra de cemento	
Paja, caña, hojas de plátano / hojas de palma	
Hojas o chapas metálicas, tela, cartón, láminas de plástico, u otros desechos	
ELECTRICIDAD *(Existe servicio eléctrico para la casa)*	
Si	
No	
ALCANTARILLADO Y DRENAJE *(Tipo de sistema de alcantarillado)*	
Sistema de tuberías (público / privado), tanque séptico	
Agua de pozo negro, cloaca , letrina , excusado	
Ningún sistema, otros (río, canal, otra salida natural), aguas residuales que fluyen libremente	
AGUA POTABLE *(Sistema de abastecimiento de agua y el acceso interior/exterior)*	
Agua potable Si	
No	
Tubería interior (público / privado) u otro sistema similar	
Tuberías al aire libre desde un acueducto (público / privado) u otro sistema similar	
Agua de pozo, de un afluente (con o sin bomba) no entubada	
Fuente pública, río, canal, camión cisterna, cisterna	

[P]redominant is defined as covering more than 50% of the surface

B.4 MINNESOTA SATISFACTION QUESTIONNAIRE

Ag. Extension Agents Occupational Survey

1. What is your sex?
   a. Male
   b. Female

2. What is your age?
   a. 18-29 years old
   b. 30-49 years old
   c. 50-64 years old
   d. 65 years old or older

3. What is your highest level of education?
   a. Some high school
   b. High school degree
   c. Some college
   d. Technical/vocational training
   e. College degree
   f. Graduate degree

4. How many years of experience do you have in your current field?
   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. 5 or more years

5. Are you employed full-time or part-time?
   a. Full time
   b. Part-time

6. How long have you been employed in your current job?
   a. 0-3 months
   b. 3-6 months
   c. 6-9 months
   d. 9-12 months
   e. Over 1 year

7. ¿How many hours do you dedicate to your current job?
   a. At least 8 hours per day
   b. More than 8 hours per day

8. What is your monthly income?
   a. Less than minimal salary
   b. Lps. 5,000 to Lps. 8,000
   c. Lps. 8,000 to Lps. 10,000
   d. Lps. 10,000 to Lps. 15,000
   e. Lps. 15,000 to Lps. 20,000
   f. Lps. 20,000 to Lps. 30,000
   g. Lps. 30,000 or more

On the next page you will be asked questions about your level of satisfaction with various aspects of your job.

Ask yourself : How satisfied am I with this aspect of my work?

Based on your current job, please answer if you are:

1 = Very dissatisfied with this aspect of the job
2 = Dissatisfied with this aspect of the job
3 = Neutral is not sure whether you are satisfied or not with this aspect of the job
4= Satisfied with this aspect of the job
5 = Very satisfied with this aspect of the job

At my current job, this is how I feel about …	1 = Very dissatisfied	2 = Dissatisfied	3 = Neutral	4 = Satisfied	5 = Very satisfied
1.Being able to keep busy all the time					
2.The chance to work alone on the job					
3.The chance to do things differently from time to time					
4.The chance to be “somebody” in the community					
5.The way my boss handles his/her workers					
6.The competence of my boss in making decisions					
7.Being able to do things that go against my conscience					
8.The way my job provides steady employment					
9.The chance to do things for other people					
10.The chance to tell people what to do					
11. The chance to do something that makes use of my abilities					
12. The way company policies are put into practice					
13. My pay and the amount of work I do					
14. The chances for advancement in this job					
15. The freedom to use my own judgement					
16. The chance to try my own methods to do this job					
17. The working conditions					
18. The way my co-workers get along with each other					
19. The praise I get for doing a good job					
20. The feeling of accomplishment I get from the job					

Encuesta Ocupacional Agentes de Extensión Agrícola

1. ¿Cuál es su sexo?
    a. Masculino
    b. Femenino

2. ¿Cuál es su edad?
    a. 18-29 años de edad
    b. 30-49 años de edad
    c. 50-64 años de edad
    d. 65 años de edad o más

3. ¿Cuál es su nivel de educación?
    a. Algunos cursos de secundaria, colegio o bachillerato
    b. Diploma de secundaria, colegio o bachillerato
    c. Algunos cursos de educación superior
    d. Diplomado en Educación Media – Profesional o técnico
    e. Nivel superior, Título universitario - licenciatura o técnico
    f. Nivel superior, Título de Ingeniería
    g. Nivel superior, Maestría

4. ¿Cuántos años de experiencia tiene en su campo actual?
    a. Menos de 1 año
    b. De 1 a 3 años
    c. De 3 a 5 años
    d. Más de 5 años

5. ¿Está Ud. empleado a tiempo completo o a tiempo parcial?
    a. Tiempo completo
    b. Medio tiempo o tiempo parcial

6. ¿Cuánto tiempo ha sido empleado en su trabajo actual?
    a. Menos de 3 meses
    b. De 3 a 6 meses
    c. De 6 a 12 meses
    d. De 1 a 3 años
    e. De 3 a 6 años
    f. Más de 6 años

7. ¿Qué cantidad de horas le dedica a su trabajo actual?
    a. Al menos 8 horas al día
    b. Más de 8 horas al día

8. ¿Cuál es su ingreso mensual?
    a. Menos que el salario mínimo
    b. Lps. 5,000 a Lps. 8,000
    c. Lps. 8,000 a Lps. 10,000
    d. Lps. 10,000 a Lps. 15,000
    e. Lps. 15,000 a Lps. 20,000
    f. Lps. 20,000 a Lps. 30,000
    g. Más de LPS. 30.000

En la siguiente página se le harán preguntas acerca de su nivel de satisfacción con varios aspectos relacionados con su empleo.

Pregúntese a sí mismo: ¿Cuán satisfecho estoy con este aspecto de mi trabajo?

Muy satisfecho = 5, significa que estoy muy satisfecho con este aspecto de mi trabajo
Satisfecho = 4, significa que estoy satisfecho con este aspecto de mi trabajo.
Indiferente = 3, significa que no puedo decidir si estoy satisfecho o no con este aspecto de mi trabajo.
Insatisfecho =2, significa que estoy insatisfecho con este aspecto de mi trabajo.
Muy insatisfecho = 3, significa que estoy muy insatisfecho con este aspecto de mi trabajo.

En mi empleo actual, yo me siento [1,2,3,4, ó 5] con:	1 = Muy insatisfecho	2 = Insatisfecho	3 = Indiferente	4 = Satisfecho	5 = Muy satisfecho
1. La capacidad de mantenerme ocupado todo el tiempo					
2. La oportunidad para desempeñarme sólo en el trabajo					
3. La oportunidad de hacer cosas diferentes de vez en cuando					
4. La oportunidad de ser "alguien de valor" en la sociedad					
5. La forma en la que mi jefe coordina las actividades de los trabajadores					
6. La capacidad de mi jefe de tomar decisiones					
7. Ser capaz de hacer cosas que no van en contra de mi conciencia					
8. La estabilidad laboral que ofrece mi trabajo					
9. La oportunidad de ayudar a otras personas.					
10. La oportunidad para decirles a las personas que hacer					
11. La oportunidad de hacer uso de mis habilidades y destrezas					
12. La forma en que las políticas de la organización son puestas en práctica					
13. Mi salario y la cantidad de trabajo que yo hago					
14. La oportunidades de crecimiento y promoción que ofrece mi compañía					
15. La libertad de usar mi propio juicio					
16. La oportunidad de usar probar métodos diferentes en mi trabajo					
17. Las condiciones laborales					
18. La relación que llevan mis colegas y compañeros					
19. El reconocimiento que obtengo por hacer un buen trabajo					
20. El sentimiento de logro que obtengo de mi trabajo					

B.5 NUTRITION-RELATED KNOWLEDGE, ATTITUDES, AND PRACTICES SURVEY

Knowledge, Attitudes, and Practices towards Nutrition

A. Dietary Guidelines

I. Knowledge of the Dietary Guidelines

1. What does nutrition means to you?

2. Are you familiar with the following figure?
    a. If yes, please go to question 3
    b. If no, please go to section B
    c. Not sure, please go to section B

3. What is the name for the above image?
    a. Dietary guidelines for Honduras
    b. My plate for Honduras
    c. Not sure
4. What is the above image good for?
    a. To help people remain healthy
    b. To choose only grains and dairy foods
    c. Not sure
5. How many food groups are included in the above image?
    a. 4
    b. 5
    c. Not sure
6. Which food groups should you eat every day?
    a. Meats and Dairy
    b. Fruits and Staples
    c. Not sure
7. Which food groups should you eat two times per week?
    a. Meats
    b. Dairy
    c. Not sure
8. Which food groups should you eat three times per week?
    a. Meats
    b. Dairy

c. Not sure

9. Which food group should you limit your intake of?
    a. Meats
    b. Fats
    c. Not sure

10. What is the adequate serving size for beans?
    a. A ladle
    b. A plate
    c. Not sure

11. What is the adequate serving size for tortillas?
    a. One
    b. More than one
    c. Not sure

12. What is adequate serving size for bananas?
    a. One
    b. More than one
    c. Not sure

13. What is the adequate serving size for milk?
    a. Half a glass
    b. A glass
    c. Not sure

14. Which recommendation is found within the guidelines?
    a. Drink at least 8 glasses of water every day for body maintenance
    b. Walk at least 2 hours per day to maintain health
    c. Not sure

II. Attitudes toward Dietary Guidelines

1. How important is it to follow the dietary guidelines?
    a. Not important
    b. Not sure the importance
    c. Important

B. Iron-deficiency anemia

I. Knowledge of Iron-deficiency anemia

1. Have you heard about iron-deficiency anemia?
    a. If yes, please go to question 2
    b. If no, please go to section C
    c. Not sure, please go to section C

2. How would you know if someone had iron-deficiency anemia? (check all appropriate answers)
    a. Less energy/weakness

b. Paleness/pallor
c. Gets sick more often
d. Not sure

3. What causes iron-deficiency anemia? (check all appropriate answers)
    a. Lack of iron in the diet/ eat too little
    b. Sickness/infection
    c. Heavy bleeding during menstruation
    d. Not sure

4. How can iron-deficiency anemia be prevented? (check all appropriate answers)
    a. Eat a diet rich in iron foods
    b. Eat Vitamin-C rich foods
    c. Take iron supplements
    d. Not sure

5. Which foods are high in iron? (check all appropriate answers)
    a. Beef
    b. Corn
    c. Tortilla
    d. Not sure
    e.
6. Which foods will help with the absorption of iron? (check all appropriate answers)
    a. Lime
    b. Coffee
    c. Beef
    d. Not sure

7. Which foods will reduce the absorption of iron? (check all appropriate answers)
    a. Orange juice
    b. Coffee
    c. Coke
    d. Not sure

II. Attitudes toward iron-deficiency anemia

1. How likely do you think you will be iron-deficient/anemic?
    a. Not likely
    b. Maybe
    c. Likely

2. How serious do you think iron-deficiency anemia is?
    a. Not serious
    b. Maybe serious
    c. Serious
3. How good do you think it is to prepare meals with iron-rich foods such as beef, chicken, or liver?
    a. Not good
    b. Maybe good

c. Good

III. Practices towards consuming iron-rich foods

1. Do you eat fresh citrus fruits such as oranges, mangoes, pineapple, or drink juice made from them on a daily basis?
   a. Yes
   b. No
   c. Not sure

2. Do you drink tea or coffee?
   a. Yes, every day
   b. Yes, but not every day
   c. No
   d. Not sure

3. Do you know what iron fortification is?
   a. Yes (continue with question 4)
   b. No (continue with section C)

4. What foods do you consume that are fortified with iron? (write response)

C. Vitamin A deficiency

I. Knowledge of Vitamin A deficiency

1. Have you heard about Vitamin A deficiency?
    a. Yes (continue with question 2)
    b. No (continue with section D)
    c. Not sure (continue with section D)

2. How would you know if someone had iron-deficiency anemia? (check all appropriate answers)
    a. Less energy/weakness
    b. Gets sick more often
    c. Eye problems
    d. Not sure

3. How can Vitamin A deficiency be prevented? (check all appropriate answers)
    a. Eat/have a diet rich in Vitamin A foods
    b. Eat foods fortified with Vitamin A
    c. Take Vitamin A supplements, per medical recommendation
    d. Not sure

4. Which foods are high in Vitamin A? (check all appropriate answers)
    a. Carrot
    b. Fish
    c. Milk
    d. White corn tortilla
    e. Not sure

II. Attitudes toward Vitamin A deficiency

1. How likely do you think you will be Vitamin A deficient?
    a. Not likely
    b. Maybe
    c. Likely

2. How serious do you think Vitamin A deficiency is?
    a. Not serious
    b. Maybe serious
    c. Serious

3. How good do you think it is to prepare meals with Vitamin A-rich foods such as liver, carrots, bell peppers, mango?
    a. Not good
    b. Maybe good
    c. Good

III. Practices towards consuming Vitamin A-rich foods

1. Please check the foods you consumed yesterday, during the day and night:
    a. Liver
    b. Eggs

c. Milk
d. Cheese
e. Yogurt
f. Carrot
g. Ripe mango
h. Ripe melon
i. Papaya
j. Watermelon
k. Spinach
l. None of the above

2. Do you know what vitamin A fortification is?
    b. Yes (continue with question 3)
    c. No (continue with section D)

3. What foods do you consume that are fortified with iron? (write response)

D. Knowledge about Overweight and Obesity

I. Knowledge about Overweight and Obesity

1. Have you heard of overweight and obesity?
    a. Yes (continue with question 2)
    b. No (continue with section E)
    c. Not sure (continue with section E)

2. What is overweight and obesity, to you? (write response)

3. What are the health problems that can occur when a person is overweight or obese? (check all that apply)
    a. Increased risk of chronic conditions
    b. Heart/cardiovascular disease, high blood pressure, diabetes, certain types of cancer
    c. Reduced quality of life
    d. Premature death
    e. Not sure

II. Attitudes toward Overweight/Obesity

1. How likely is it that you are overweight or obese?
    a. Not likely
    b. Maybe likely
    c. Likely

2. How serious do you think overweight or obesity is for your health?
    a. Not serious
    b. Maybe serious
    c. Serious

3. How good do you think it is to do some physical activity, such as walking for 30 minutes a day, running or doing a sport?
    a. Not good
    b. Maybe good
    c. Good

III. Practices toward reducing Overweight/Obesity

1. How often do you consume the following foods?

	Every day	2 or 3 times per week	Never

Sodas (Coca-Cola, Pepsi-Cola)			
Churros			
Pan o semitas			
Dulces, azucar			
Aceite/manteca			
Comida frita			

2. Below there are some activities and sports. Pleas provide information of the type and frequency of the activities that you perform every day.

		If Yes, How many minutes per day?
a. walking	☐ Yes ☐ No	
b. running	☐ Yes ☐ No	
c. Gardening	☐ Yes ☐ No	
d. Agriculrure activities	☐ Yes ☐ No	
e. Sports: soccer	☐ Yes ☐ No	
f. sports: basketball	☐ Yes ☐ No	
g. sports: swimming	☐ Yes ☐ No	
h. sports: martial arts	☐ Yes ☐ No	
i. sports: beisball	☐ Yes ☐ No	
Otra actividad_____		

E. Hand Hygiene and Water Sanitation

I. Knowledge of Hand Hygiene and Water Sanitation

1. There are key moments when you need to wash your hands to prevent germs from reaching food. What are these key moments? (check all that apply)
    a. After going to the toilet/latrine
    b. Before preparing/handling food
    c. Before eating
    d. Not sure

2. If you know that the water you are going to use for cooking or drinking is not safe or does not come from a safe source, what should you do? (check all that apply)
    a. Boil water
    b. Add bleach/chlorine
    c. Strain the water through a cloth
    d. Discard the water and get water from a safe source
    e. Not sure

3. What diseases are transmitted through contaminated water or non-potable sources?
    a. Anemia
    b. Parasites
    c. Diarrhea
    d. Not sure

II. Attitudes toward Hand Hygiene and Water Sanitation

1. How likely do you think you are to become sick, such as having stomach ache or diarrhoea, from not washing your hands?
    a. Not likely
    b. Maybe
    c. Likely

2. How serious do you think diarrhoea is for your health?
    a. Not serious
    b. Maybe serious
    c. Serious

3. How important do you think it is to wash your hands before preparing food?
    a. Not important
    b. Maybe important
    c. Very important

4. How likely do you think you are to get diarrhea from using unsafe water?
    a. Not likely
    b. Maybe likely
    c. Likely

5. How important do you think it is to boil water before drinking or using it?
    d. Not important
    e. Maybe important
    f. Very important

III. Practices toward Hand Hygiene and Water Sanitation

1. In the space below, type in the steps you take to wash your hands

2. Check the box that describes the main source of water used by your household for drinking, cooking and handwashing?
    a. Piped water with central distribution
    b. Tube well/borehole
    c. Cistern
    d. Purified water or bottled water
    e. Water from a spring
    f. Rainwater collection
    g. Surface water (river, stream, dam, lake, pond, canal, irrigation channel)
    h. Not sure

    (If an answer in bold is selected, continue with Question 4)
    (If the answer is NOT, Continue with Question 3)

3. How do you collect your water?

4. How do you treat your water before consuming it?

5. How do you store your water in your house?

6. Which of the following do you have at your home for waste?
    a. Piped system, septic tank
    b. Letrine
    c. No system

Conocimientos, Actititudes, y Practicas

A. Conocimiento de las Guías Alimentarias

1. Que significa la nutrición para Ud. *(write the three words or phrase)*

2. ¿Conoce Ud. esta imagen? (*show the large image)*

○ Sí, (*If so, continue with Question 3*)
○ No, (*If so, continue with SECTION B*)
○ No estoy seguro

3. ¿Cuál es el nombre de esta imagen? (show the image)

○ El Comal de Alimentos de Honduras
○ La Olla de Alimentos de Honduras
○ No estoy seguro

4. ¿Para qué sirven las Guías Alimentarias?

○ Para mantenerse saludable
○ Para seleccionar sólo los cereales y lácteos
○ No estoy seguro

5. ¿Cuántos grupos de alimentos están representados en la Guía Alimentaria de Honduras?

○ Cuatro
○ Cinco
○ No estoy seguro

6. ¿Cuáles grupos de alimentos se deben comer todos los días?

○ Las carnes y los lácteos
○ Las frutas y los cereales

No estoy seguro

Actitudes hacia las Guías Alimentarias

¿Qué tan importante es seguir las Guías Alimentarias

○ Es importante
○ No es importante
○ No estoy seguro de la importancia

7. ¿Cuáles grupos de alimentos se deben comer dos veces por semana?

○ Las carnes
○ Los lácteos
○ No estoy seguro

8. ¿Cuáles grupos de alimentos se deben comer tres veces por semana?

○ Las carnes
○ Los lácteos
○ No estoy seguro

9. ¿Cuáles grupos de alimentos se deben consumir con moderación?

○ Las carnes
○ Las grasas y aceites
○ No estoy seguro

10. ¿Cuál es la porción adecuada de frijoles?

○ Un cucharón
○ Un plato
○ No estoy seguro

11. ¿Cuál es la porción adecuada de tortillas?

○ Una
○ Más de una
○ No estoy seguro

12. ¿Cuál es la porción adecuada de los mínimos o bananas?

○ Una
○ Más de una
○ No estoy seguro

13. ¿Cuál es la porción adecuada de leche?

○ Medio vaso
○ Un vaso

No estoy seguro

14. ¿Cuál de las siguientes recomendaciones está incluida en las guías?

○ Tomar al menos 8 vasos de agua al día para el buen funcionamiento de su cuerpo
○ Caminar al menos dos horas diarias para mantenerse saludable y sin estrés.
○ No estoy seguro

B. Conocimiento de la anemia por deficiencia de hierro

1. ¿Ud. sabe o ha escuchado de la anemia por deficiencia o falta de hierro?
○ Sí *(If so, continue with Question 2)*
○ No *(If so, continue with SECTION C)*
○ No estoy seguro

2. ¿Cómo sabe Ud. si alguien tiene anemia por deficiencia de hierro? (Elija todas las repuestas que le parecen apropiadas)
○ Por la falta de energía/ la debilidad
○ Por la palidez de las manos y la cara
○ Porque se enferman más a menudo
○ No estoy seguro

3. ¿Qué causa la anemia por deficiencia de hierro? (Elija todas las repuestas que le parecen apropiadas)
○ Falta de hierro en la dieta
○ Las enfermedades e infecciones
○ El sangrado menstrual profuso (si es mujer)
○ No estoy seguro

4. ¿Cómo se puede prevenir la anemia por deficiencia de hierro? (Elija todas las respuestas que le parezcan apropiadas)
○ Comer una dieta de alimentos ricos en hierro
○ Comer alimentos ricos en vitamina C
○ Tomar suplementos con hierro
○ No estoy seguro

5. ¿Cuáles alimentos son ricos en hierro? (Elija todas las repuestas que le parecen apropiadas)
○ Carne de res
○ Maíz
○ Tortillas
○ No estoy seguro

6. Escoja el o los alimento(s) que le ayudarán en la asimilación de hierro. (Elija todas las repuestas que le parecen apropiadas)
○ Limón
○ Café
○ Carnes
No estoy seguro

***(Continue Practices here*)** 3. ¿Sabe Ud. que es la fortificación con hierro? ○ Sí ○ No
(If No, continue with SECTION C) (If Yes:) ¿Qué alimentos consume Ud. que vienen fortificados con hierro? *(write)*

7. Escoja el o los alimento(s) que NO le ayudarán en la asimilación de hierro. (Elija todas las repuestas que le parecen apropiadas)
○ Jugo de naranja
○ Café
○ Coca-Cola o soda
○ No estoy seguro

Actitudes hacia la anemia por deficiencia de hierro

1. ¿Qué tan probable sería que Ud. tuviera anemia o deficiencia de hierro?
○ No es probable
○ Tal vez es probable
○ Es probable

2. ¿Qué tan grave es la anemia por deficiencia de hierro?
○ No es grave
○ Tal vez es grave
○ Es grave

3. ¿Cree que es bueno preparar la comida con alimentos rico en hierro como la carne de res, pollo, o hígado?
○ No es bueno
○ Tal vez es bueno
○ Es bueno

Prácticas asociadas al consumo de alimentos ricos en hierro.

1. ¿Come Ud. frutas o jugos de frutas como por ejemplo de naranja, mango, piña u otros, todos los días?
○ Sí
○ No
○ No estoy seguro

2. ¿Bebe Ud. café o té?
○ Sí, todos los días
○ Sí, pero no todos los días
○ No
○ No estoy seguro

C. Conocimiento de la deficiencia de vitamina A

1. ¿Ud. sabe o ha escuchado de la deficiencia de Vitamina A?
- ○ Sí (*If so, continue with Question 2*)
- ○ No (*If so, continue with SECTION D)*
- ○ No estoy seguro (*If so, continue with SECTION D)*

2. ¿Cómo sabe Ud. si alguien tiene deficiencia de Vitamina A? (Elija todas las repuestas que le parecen apropiadas)
- ○ Porque le falta energía o presenta debilidad
- ○ Porque sufre de enfermedades más a menudo
- ○ Porque tienen problemas de la vista
- ○ No estoy seguro

3. ¿Cómo se puede prevenir la deficiencia de Vitamina A? (Elija todas las repuestas que le parecen apropiadas)
- ○ Consumir alimentos ricos en Vitamina A
- ○ Consumir alimentos fortificados con Vitamina A
- ○ Tomar suplementos con Vitamina A, por recomendación médica
- ○ No estoy seguro

4. ¿Cuáles alimentos son ricos en Vitamina A? (Elija todas las repuestas que le parecen apropiadas)
- ○ Zanahoria
- ○ Pescado
- ○ Leche
- ○ Tortilla de maíz blanco
- ○ No estoy seguro

Actitudes hacia la deficiencia de Vitamina A

1. ¿Qué tan probable es que Ud. tenga deficiencia de Vitamina A?
- ○ No es probable
- ○ Tal vez es probable
- ○ Es probable

2. ¿Qué tan grave es la deficiencia de Vitamina A?
- ○ No es grave
- ○ Tal vez es grave
- ○ Es muy grave

3. ¿Cree Ud. que es bueno preparar la comida con alimentos ricos en Vitamina A como el hígado de res/vaca, zanahorias, los chiles dulces, los mangos o papayas?
- ○ No es bueno
- ○ Tal vez es bueno
- ○ Es muy bueno

Prácticas hacia el consumo de alimentos ricos en Vitamina A

1. ¿Consume Ud. los siguientes alimentos todas las semanas?
- ○ Hígado
- ○ Huevos
- ○ Leche
- ○ Queso
- ○ Zanahoria
- ○ Mango maduro
- ○ Melon o melocotón maduro
- ○ Papaya
- ○ Sandia
- ○ Espinaca
- ○ Ninguno de los anteriores

2. ¿Sabe Ud. que es la fortificación con vitamina A?
- ○ Sí (*if Yes, continue with Question 3*)
- ○ No *(If No, continue with SECTION D)*

3. ¿Qué alimentos consume Ud. que vienen fortificados con vitamina A? *(write below)*

D. Conocimiento del sobrepeso y la obesidad

1. ¿Ha escuchado acerca del sobrepeso y la obesidad?

○ Sí
○ No
○ No estoy seguro

(If No, continue with practices)
(If Yes, ask)
¿Qué es para Ud. el sobrepeso y la obesidad?

2. ¿Qué problemas de salud le pueden pasar a alguien que tiene sobrepeso u obesidad? (Elija todas las respuestas que le parecen apropiadas)

○ Tienen más riesgo de tener enfermedades crónicas
○ Las enfermedades cardiacas/ cardiovasculares, presión alta, diabetes, ciertos tipos de cáncer
○ Las personas tienen una calidad de vida reducida
○ Las personas se pueden morir prematuramente
○ No estoy seguro

Actitudes hacia el sobrepeso/ la obesidad

1. ¿Qué tan probable es que Ud. tenga sobrepeso u obesidad?

○ No es probable
○ Tal vez es probable
○ Es probable

2. ¿Qué tan grave son el sobrepeso y la obesidad para la salud?

○ No es grave
○ Tal vez es grave
○ Grave

3. ¿Qué tan bueno es hacer actividad física, por ejemplo caminar por 30 minutos diarios, hacer deportes, o correr?

○ No es bueno
○ Tal vez es bueno
○ Es bueno

Prácticas hacia la reducción del sobrepeso y la obesidad

1. ¿Qué tan frecuente consume Ud. los siguientes alimentos?

	Todos los días	2 ó 3 veces por semana	Nunca
Sodas (Coca-Cola, Pepsi-Cola)			
Churros			
Pan o semitas			
Dulces, azucar			
Aceite/manteca			
Comida frita			

2. Abajo se describen algunas actividades físicas y deportes. Provea información del tipo y frecuencia de las actividades que Ud. realiza todos los días.

Actividad	Respuesta	En caso de decir Sí, ¿Cuántos minutos/horas al día?
Caminar	☐ Sí ☐ No	
Correr	☐ Sí ☐ No	
Bailar	☐ Sí ☐ No	
Atender el jardín	☐ Sí ☐ No	
Actividades agrícolas	☐ Sí ☐ No	
Deportes: fútbol	☐ Sí ☐ No	
Deportes: baloncesto	☐ Sí ☐ No	
Deportes: natación	☐ Sí ☐ No	
Deportes: artes marciales	☐ Sí ☐ No	
Deportes: béisbol	☐ Sí ☐ No	
Otra actividad:		

E. Conocimientos acerca del agua de consumo y el control sanitario

1. Hay momentos muy importantes cuando Ud. se tiene que lavar las manos para evitar enfermedades y gérmenes. ¿Cuáles son estos momentos importantes? (Elija todas las respuestas que le parecen apropiadas)
- ○ Después de ir al baño
- ○ Antes de preparar los alimentos
- ○ Antes de comer
- ○ No estoy seguro

2. Si Ud. sabe que el agua que va a usar para cocinar o tomar no es segura o no viene de una fuente segura ¿Qué debe hacer Ud.? (Elija todas las respuestas que le parecen apropiadas)
- ○ Hervir el agua
- ○ Echarle cloro o desinfectarla
- ○ Filtrar o colar el agua con un trapo
- ○ Desechar el agua y buscar el agua de una fuente segura
- ○ No estoy seguro

3. ¿Qué enfermedades se transmiten por el agua contaminada o que viene de fuentes que no son seguras? (Elija todas las respuestas que le parecen apropiadas)
- ○ Anemia
- ○ Parásitos
- ○ Diarrea
- ○ No estoy seguro

Actitudes acerca del agua de consumo, higiene de manos, y el control sanitario

1. ¿Qué tan probable es que Ud. se enferme, por ejemplo con dolor de estómago o diarrea, porque no se lava las manos?
- ○ No es probable
- ○ Tal vez
- ○ Es probable

2. ¿Qué tan grave cree Ud. es la diarrea para su salud?
- ○ No tan grave
- ○ Tal vez es grave
- ○ Es muy grave

3. ¿Qué tan importante es lavarse las manos antes de preparar la comida?
- ○ No es tan importante
- ○ Tal vez es importante
- ○ Es muy importante

4. ¿Qué tan probable es que a Ud. le dé diarrea por consumir agua no potable o contaminada?
- ○ No es probable
- ○ Tal vez es probable
- ○ Es muy probable

5. ¿Qué tan importante es hervir el agua antes de tomarla/ usarla?
- ○ No es importante
- ○ Es un poco importante
- ○ Es muy importante

Prácticas hacia el agua de consumo, higiene de manos, control sanitario

1. ¿Cómo se lava las manos? *(Be certain to gather where, with what, and for how long)*

2. ¿De dónde obtiene el agua que Ud. usa para consumo y otras actividades?
- ○ **Sistema de distribución de agua (por tubería)**
- ○ **Pozo con distribución por tubos y bomba**
- ○ **Camión cisterna**
- ○ **Agua purificada o en botella**
- ○ Pozo con balde
- ○ Agua lluvia que recojo en balde o paila
- ○ Agua del río o quebrada
- ○ No estoy seguro

(If an answer in bold is selected, continue with Question 4)
(If the answer is NOT, Continue with Question 3)

3. ¿Cómo hace Ud. para recoger el agua?

4. ¿Cómo hace Ud. para tratar el agua antes de consumirla?

5. ¿Cómo almacena Ud. el agua en la casa?

6. ¿Cuáles de los siguientes Ud. posee en su hogar para los desechos?

- ○ Sistema de tuberías (público / privado), tanque séptico
- ○ Sistema de aguas negras, cloaca, letrina, excusado
- ○ Ningún sistema, otros (río, canal, otra salida natural), aguas residuales que fluyen libremente

B.6 HOUSEHOLD DIETARY DIVERSITY SCORE

Household Dietary Diversity Score (HDDS)

I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night.

INSTRUCTIONS FOR THE INTERVIEWER

*Read the list of foods. Write down a **one** in the box if anyone in the household ate the food in question; write down a **zero** in the box if no one in the household ate the food.*

HDDS	FOOD GROUP	EXAMPLES	CODING YES=1 NO=0
A	Cereals	¿Corn tortilla, flour tortilla, tamales, tamalitos, corn atole, white porridge, noodles, bread, sweet bread, cookies, white rice or other food made from corn, sorghum, or wheat?	A.....[ ]
B	Roots and white tubers	¿Potatoes, cassava, taro or other root crops or white tubers?	B.....[ ]
C	Vitamin A rich vegetables and tubers	¿Carrots, sweet potato, red pepper or any other vegetable that is orange?	C.....[ ]
	Leafy vegetables	¿Lettuce, spinach, chard, chipilin, yerbamora or any other leafy vegetable?	C.....[ ]
	Other vegetables	¿Tomatoe, onion, peas, cauliflower, cucumber, cabbage, green beans, broccoli or any other vegetable?	C.....[ ]
D	Vitamin A rich fruits	Ripe mango, cantaloupe, peach, papaya, guava, grapefruit or juices from any of these fruits?	D.....[ ]
	Other fruits	Orange, blackberry, pear, pineapple, banana, strawberry, watermelon, apple, tangerine, grape, other fruits?	D.....[ ]
E	Meet (organs)	¿Liver, kidney, heart, tripe, sausage, intestines, stomach, blood, ear, tail, feet, testicles, leather, other organ?	E.....[ ]
	Meet (muscle)	Beef: tenderloin, jab, etc. pork, chicken, rooster, duck, turkey, sheep, goat, rabbit, wild animals, other?	E.....[ ]
F	Eggs	Eggs from: chicken, duck, turtle, etc. Any other type of egg?	F.....[ ]
G	Fish, fresh or dry seafood	¿Any type of fish or shellfish, fresh or dried? E.g. shrimp, lobster, conch, etc.	G.....[ ]
H	Legumes, seeds and nuts	¿Beans (cooked or fried), bean soup, bean tamales, lentils, peanuts, habas, macadamias, cashews, or any other type of seeds, legumes or nuts?	H.....[ ]
I	Milk and Dairy foods	¿Milk, cheese, curd, fresh cheese, sour cream, yogurt or other dairy products?	I.....[ ]
J	Oils and fats	¿Oils, margarine, butter, lard or any other product for cooking or frying?	J.....[ ]
K	Sweeteners	¿White sugar, brown sugar, panela, sugar cane	K.....[ ]

		syrup, honey or other sweetener?	
	Candy and Sugary drinks	¿Sweetened beverages such as juices, soda, coffee, tea, porridge, Incaparina, smoothies, or any beverage that contains a sweetener. Alcoholic beverages: beer, liquor, cusha, chicha, etc. Candy, chocolates, cookies, cakes, etc.?	K……[ ]
L	Spices and condiments	¿Salt, pepper, cinnamon, cardamom, or any type of spice used for cooking. Sauces like hot sauce, ketchup, mayonnaise, mustard, etc.?	L……[ ]
Did you or any member of your family eat in a restaurant or from street vendors yesterday? Did you buy anything from the store as a soda, cookies, bread, etc..? (*Describe*)			

Indice de Diversidad Dietética en el Hogar (HDDS)

Quisiera preguntarle sobre la comida que usted o cualquiera de los miembros de su familia comieron durante todo el día de ayer y por la noche.

INSTRUCCIONES PARA EL ENTREVISTADOR

*Lea la lista de alimentos en cada grupo alimenticio. Escriba **uno** en la casilla si algún miembro del hogar consumió el alimento nombrado; escriba **cero** en la casilla si ningún miembro de del hogar consumió el alimento mencionado.*

HDDS	GRUPO ALIMENTICIO	EJEMPLOS	CODIFICACION SI=1 NO=0
A	Cereales	¿Tortilla de maíz, tortilla de harina, tamales, tamalitos, atol de elote, atol blanco, fideos, pan, pan dulce, , galletas, arroz blanco o cualquier otro alimento hecho de maíz, sorgo, o trigo?	A……..[ ]
B	Raíces y Tubérculos blancos	¿Papas, yuca, malanga o cualquier otro tipo de raíces o tubérculos blancos?	B……..[ ]
C	Vegetales y tubérculos ricos en Vitamina A	¿Zanahorias, camote, chile dulce rojo o cualquier otro vegetal que sea anaranjado?	C……..[ ]
	Vegetales de hoja	¿Lechuga, espinaca, acelga, chipilín, yerbamora, o cualquier otro vegetal de hoja?	C……..[ ]
	Otros vegetales	¿Tomate, cebolla, arvejas, coliflor, pepino, repollo, ejotes, brócoli o cualquier otro vegetal?	C……..[ ]
D	Frutas ricas en Vitamina A	Mango maduro, melón anaranjado, durazno, papaya, melocotón, guayabas, toronjas o jugos de estas frutas?	D……..[ ]
	Otras frutas	Naranjas, moras, pera, piña, banano, fresa, sandias, manzana, mandarinas, uvas o cualquier otra fruta?	D……..[ ]
E	Carne (órganos)	¿Hígado, riñón, corazón, tripa, morcilla, intestinos, panza, sangre, oreja, cola, patas, criadillas, cuero, otro organo?	E……..[ ]
	Carne (músculo)	Pura carne de vaca: lomito, puyazo, etc. Carne de coche, de pollo, de gallina, de pato, chompipes, de oveja, de cabra, de conejo, de animal de monte? Otro tipo?	E……..[ ]
F	Huevos	Huevo de gallina, pato, tortuga o cualquier otro tipo de huevo?	F……..[ ]
G	Pescado y mariscos frescos o secos?	Cualquier tipo de pescado o mariscos frescos o secos? Ej. Camarón, langosta, caracol, concha, etc.	G……..[ ]
H	Legumbres, semillas y nueces	¿Frijol (cocido o frito), sopa de frijol, tamales de frijol, lentejas, habas, manías, macadamias, marañón, o cualquier otro tipo de semillas?	H……..[ ]

I	Leche y productos lácteos	Leche, queso, cuajada, queso fresco, crema, yogurt, u otros productos lácteos?	I……..[ ]
J	Aceites y grasas	Aceites, margarinas, mantequilla, manteca o cualquier otro producto para cocinar o freír?	J……..[ ]
K	Edulcorantes	Azúcar blanca, azúcar morena, panela, miel de cania, miel de abeja o cualquier otro endulzante.	K……..[ ]
	Confites y bebidas	Bebidas endulzadas como jugos, gaseosas, café, te, atoles, Incaparina, licuados, o cualquier bebida que contenga algún endulzante. Bebidas alcohólicas: cerveza, guaro, cusha, chicha, etc. Dulces, dulces típicos, chocolates, galletas dulces, pasteles, etc.?	K……..[ ]
L	Especias y Condimentos	Sal, pimienta, canela, cardamomo, o cualquier tipo de especia usada para cocinar. Salsas como chile picante en bote, salsa de tomate, mayonesa, mostaza, etc.?	L……..[ ]
Comió UD. O algún miembro de su familia en un restaurante o en la calle el día de ayer? Compro algo en la tienda como una agua gaseosa, galletas, pan, etc.? *(Describir)*			