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Evaluating the Knowledge, Attitude and Practice of Rural Guatemalan Healthcare Providers Regarding Chronic Malnutrition in Children

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An abstract of
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2014

Abstract

Evaluating the Knowledge, Attitude and Practice of Rural Guatemalan Healthcare Providers Regarding Chronic Malnutrition in Children

By Yuna Tiffany Hammond

Background: At 49%, Guatemala has the 6th highest prevalence of chronic malnutrition in children under five worldwide. Poor nutrition and recurrent infections during the 1000 days between conception and two years of age impair brain development and cause stunting. Although stunting has a lower risk of mortality than acute malnutrition, it cannot be treated once established in early childhood. Despite extensive research on the nature of stunting, few studies evaluate how providers transmit knowledge about nutrition to mothers during consultations.

Objectives: The study 1) evaluated rural Guatemalan healthcare providers' ability to compare chronic and acute malnutrition during the 1000 day window and beyond, 2) determined if provider knowledge differed by state, profession, type of health facility or years of experience and 3) assessed in what context and how accurately providers discussed nutrition during their contact with mothers in the 1000 days window.

Methods: This mixed-methods baseline evaluation was based on convenience sampling. The study involved 122 auxiliary nurses, educators and professional nurses at the primary level of care in a cross-sectional survey and structured observations. Providers received a composite score for a 29 question survey that evaluated their knowledge about the causes, characteristics and consequences of stunting. They were also observed during nutrition consultations using a checklist of essential growth monitoring and counseling activities.

Results: The survey and observations suggest that providers lack a basic understanding of stunting within the 1000 days window. Most providers were unable to differentiate between chronic and acute malnutrition and more than half failed to identify non-exclusive breastfeeding and late complementary feeding as fundamental causes of stunting. Survey scores ranged from 5 to 26 points with an average of 15 points (52%).

Discussion and Recommendations: Irrespective of a serious, collective lack of knowledge about the 1000 days window, some providers gave excellent nutrition consultations. This suggests that providers can give mothers useful advice about feeding techniques without understanding *all* aspects of stunting. Recommendations to state-level Ministry of Health officials emphasize carefully prioritizing only essential causes and characteristics of stunting in order to improve the quality of advice given during consultations.

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Table of Contents

Index of Tables

Index of Figures

Index of Terms

AM-Acute Malnutrition

CF-Complementary feeding

CM-chronic malnutrition (interchangeable with stunting)

ENSMI-Encuesta Nacional de Salud Materno-Infantil (National Survey of Maternal and Child Health)

HAZ-height for age z-score

KAP-Knowledge, attitude and practice

IYCF-Infant and young child feeding

GMC-Growth monitoring and counseling

GMOH-Guatemalan Ministry of Health

LMIC-Low and middle income countries

MCNS-Maternal and Child Nutrition Series

MOH-Ministry of Health

MSPAS-Ministry of Public Health and Social Assistance (by its Spanish acronym, referencing the GMOH)

NGO-non-government organization

URC-The University Research Co., LLC

USAID-United States Agency for International Development

WHO-World Health Organization

ZHP-The Zero Hunger Plan

1. Introduction

1.0 Overview of Malnutrition

The World Health Organization (WHO) estimates that almost half of all deaths in children under the age of five in low and middle income countries (LMIC) are linked to malnutrition (World Health Organization, 2013). The global burden of disease for nutrition-related deaths is high, in part, because of food insecurity, sanitation conditions and a lack of knowledge and experience in implementing appropriate infant and young child feeding practices (IYCF) (Black et al., 2008). Recurrent infections also amplify the negative consequences of malnutrition and cause further deficits by preventing optimal absorption of nutrients (Guerrant, Oriá, Moore, Oriá, & Lima, 2008). Malnutrition has three categories, acute, chronic and over-nutrition (i.e. overweight or obesity). According to The Lancet Maternal and Child Nutrition Series (MCNS), three times as many children suffer from chronic malnutrition as acute malnutrition in LMICs (Black et al., 2008; Black et al., 2013).

Acute malnutrition (AM) is caused by a variety of factors like food insecurity, an unsanitary environment and inadequate dietary intake (Müller & Krawinkel, 2005). The inappropriate height to weight relationship in AM can lead to death if untreated. Chronic malnutrition (CM) is generally a deficiency of energy, good quality protein and micronutrients (iron, vitamin A, zinc, etc.) that is exacerbated by recurrent infection and poor maternal nutrition before and throughout pregnancy. Stunting is the most prominent physical manifestation of chronic malnutrition (Hoddinott, Maluccio, Behrman, Flores, & Martorell, 2008; Victora et al., 2008). This research project focuses specifically on the role that healthcare providers' knowledge, attitude and practice (KAP) plays in the quality of growth monitoring and counseling (GMC) consultations for children under two years of age in Guatemala.

Figure 1. Illustrations of the physical differences between acute and chronic malnutrition in children

Acute Malnutrition (Wasting)

A two year old child suffering from wasting (left) and at a normal weight (right). Retrieved from the WHO, 2014

Chronic Malnutrition (Stunting)

Both of these Guatemalan-born girls are five years old. The girl on the left was raised in the U.S. The girl on the right was raised in Guatemala and is stunted. Retrieved from Miracles in Action, 2014

According to the United Nations Children's Fund (UNICEF), the prevalence of stunting in children under five in Guatemala rivals that of countries like Afghanistan, Bangladesh, Niger and India. At nearly 50%, this Central American country has a higher prevalence of stunting than the average prevalence in either Africa or Asia (UNICEF, 2013b). Despite a need for quality GMC in Guatemala, the country has a long history of focusing its political energy on the 1.1% of children that are acutely malnourished (Martorell, 2012; Palmieri, Méndez Cabrera, Delgado Valenzuela, Flores Ayala, & Palma de Fulladolsa, 2009). Why would Guatemala spend precious time and exhaustible resources preventing a relatively small number of deaths due to acute malnutrition when both the global and local burden of CM is much greater (Bhutta et al., 2013)?

1.0.1 Barriers to addressing chronic malnutrition

The Bill and Melinda Gates Foundation website explains: "Most people affected by undernutrition do not show symptoms of extreme hunger or starvation. This crisis of 'hidden hunger' is invisible to most policy makers, which means the national nutrition programs [for chronic malnutrition] are often underfunded" (accessed October 13, 2013). As mentioned in the quote, stunting in Guatemala is *not* usually associated with an insufficient quantity of food but is rather the result of a poorly diversified, low quality diet and recurrent infections. After decades of emphasis on acute malnutrition, Guatemala finally has a new trajectory for its national nutrition program that addresses stunting as a national priority.

1.1 Guatemala's Current National Nutrition Plan

The 2012 election of Otto Pérez Molina as Guatemala's president brought political commitment and a substantial allocation of funds and resources to chronic malnutrition for the first time. The Zero Hunger Plan (ZHP), the government's official strategy for reducing chronic malnutrition by 10% in four years, focuses heavily on the 1000 days window. This window constitutes the period of time between conception and two years of age in which many of a child's crucial physical and cognitive structures are developed (Victora et al., 2008; Victora, de Onis, Hallal, Blössner, & Shrimpton, 2010). The government incorporated the 1000 days window as a specific campaign within the ZHP to create a target group of pregnant women, nursing mothers and children under two to receive micronutrient supplements, nutrition education, fortified cereal, etc.

Shifting the focus from acute malnutrition to stunting will continue to be an uphill battle for both the state-level health officials and healthcare providers. Capitalizing on Guatemala's political will and recognizing the need to strengthen the healthcare workforce, the University Research Co, LLC (URC)—an international development

agency—began to provide technical support to the GMOH in 2012. Their programs strengthen the capacity of the rural healthcare providers that implement the ZHP. Accurately identifying existing knowledge gaps and harmful mentalities about chronic malnutrition is a crucial step in addressing misconceptions and finding a feasible strategy for training the providers that staff healthcare facilities nationwide. To maximize the technical assistance they offer to the state-level GMOH officials, the URC's Nutri-Salud program requested and supported this mixed-methods investigation. The research seeks to present a cross-sectional view of the current knowledge, attitude and practice of a sample of providers in two largely indigenous western states. The evidence gathered can substantiate the GMOH and non-governmental organizations' (NGO) general understanding of provider strengths and weaknesses with empirical data.

1.2 Problem Statement

There are numerous studies investigating the causal relationships, underlying determinants, characteristics and health outcomes associated with stunting (Black et al., 2008; Müller & Krawinkel, 2005). Best-practices research has given public health professionals a large body of evidence-based interventions and randomized controlled trials (Alderman, 2010; Bhutta et al., 2008; Ruel & Alderman, 2013). Studies in various countries have explored modifiers to mothers' uptake of interventions, such as increased use of health services due to conditional cash transfers (Lagarde, Haines, & Palmer, 2007; Tan & Yamey, 2012). Peer-reviewed articles, official government documents and grey literature confirm that chronic malnutrition leads to stunted physical growth, impaired mental capacity and diminished lifetime earning potential (Alderman, 2010; Hoddinott et al., 2008).

Despite all that is known about chronic malnutrition from the literature, very few investigators have attempted to evaluate if or how frontline healthcare providers translate their knowledge into quality nutrition consultations with

mothers. According to surveillance data, between 1966 and 2009 stunting decreased in Guatemala by only 15% despite millions of dollars invested and numerous nutrition intervention programs (MSPAS, 2009). Undoubtedly, a variety of factors like ongoing food insecurity, inadequate finances within households to purchase food and natural disasters have contributed to this sluggish decrease (Delgado, 2010). Failing to include provider knowledge and practice as a cornerstone of successful prevention efforts could also be a significant contributor to this relatively slow improvement.

1.3 Purpose Statement

The purpose of this research was to a) evaluate providers' technical knowledge about chronic malnutrition and b) better understand how they manage the topic of nutrition in consultations with mothers of children under two years of age. The URC's goal in conducting this study was to determine how providers apply the information they learn from technical trainings during sick child, prenatal and GMC consultations. This research will inform state-level GMOH officials and the URC of the success or gaps in the current training strategy and guide the five-year strategic plan for preparing and delivering technical support to healthcare providers.

1.4 Principal Research Questions

This study sought to answer the following questions:

1) Do health care providers at the primary level of care understand the causes, characteristics and consequences of chronic malnutrition in children under two years of age?
2) Can providers differentiate between chronic and acute malnutrition?
3) Does provider knowledge differ by state, profession, type of health facility or years of experience?

4) In what context and how accurately do providers at the primary level of care address nutrition in their daily consultations with pregnant women and mothers of children under two years of age?

1.5 Significance

The key stakeholders that could integrate detailed information about provider KAP into their strategy and training curriculum are: the Guatemalan Ministry of Health, the University Research Co., LLC, Guatemalan NGOs (local NGOs supply more than half of the healthcare workforce at the primary level of care), international NGOs, researchers and ultimately the providers themselves. The most important stakeholder is the GMOH because they make all major decisions about the implementation of the ZHP. In their role as coordinators, state-level officials are often far removed from the reality of providers' knowledge or practice in the field. In many cases, they have limited or second-hand knowledge of the kind of advice providers are giving mothers during consultations. Thus, those who plan nutrition trainings for providers have *working* knowledge but little *evidence* detailing gaps in providers' understanding of the causes, characteristics and consequences of stunting.

Unfortunately, the literature does not often address providers' knowledge base or the quality of advice they give during consultations. Thus, this research attempts determine if and how providers are absorbing information from the trainings the government and aid agencies plan and if that knowledge is being translated into accurate and useful counsel to mothers during the 1000 days window. The remainder of this document will describe the methodology used to collect and analyze the data, the results and the recommendations and suggested application of the study's findings. The literature review will address the causes, characteristics and consequences of chronic malnutrition and highlight the role of healthcare providers in nutrition interventions and best practices.

2. Literature Review

2.0 Overview

The 2008 and 2013 Maternal and Child Nutrition Series from The Lancet are arguably the most prominent pieces of literature to date in the field of maternal and child nutrition. They analyze the existing literature to summarize the global burden and impact of malnutrition and the importance of targeting the 1000 days window (Black et al., 2008; Black et al., 2013). The 2013 articles address the projected effect of specific interventions like supplementation on child mortality (Bhutta et al., 2013), the impact of nutrition-sensitive interventions on the determinants of undernutrition (Ruel & Alderman, 2013), and the political momentum necessary to decrease the prevalence of stunting (Gillespie, Haddad, Mannar, Menon, & Nisbett, 2013). This literature review utilizes studies from the Lancet, peer-reviewed journal articles (including meta-analyses or Cochrane reviews), monographs, information from websites (e.g. the WHO) and grey literature. The review briefly discusses the nature of acute and chronic malnutrition, the global burden of malnutrition and the burden in Guatemala, the impact of nutrition interventions and the role of the healthcare workforce in community-based interventions and nutrition education.

2.1 Rational for a KAP Study of Rural Guatemalan Healthcare Providers

In lieu of replacing old ideas with new ideas, people often integrate novel information into their *existing* paradigm (Rowe, de Savigny, Lanata, & Victora, 2005). Thus, to help the healthcare workforce (e.g., healthcare providers, community health workers and midwives) accurately integrate the recommendations and best-practices generated by researchers into their daily work, Ministries of Health in LMICs need to understand providers' existing paradigm for conceptualizing chronic malnutrition. Few if any sources, however, explore whether providers can differentiate between chronic and acute malnutrition and what misconceptions manifest themselves during nutrition

consultations with mothers. To address the lack of evidence about providers' existing knowledge base, this thesis assesses the knowledge, attitude and practice of rural Guatemalan healthcare providers through a baseline evaluation.

2.2 International Growth Standards and the 1000 Days Window

The WHO Growth Reference Study suggests that up to the age of five, regardless of genetics or cultural differences, children's mean linear growth is similar if optimal environmental conditions and recommended IYCF practices are followed (WHO, 2006). The establishment of growth standards allows assessment of the global burden of child malnutrition and the identification of critical periods of growth. Much of the cognitive and physical development that affects a child's lifetime health and productivity occurs during the 1000 day window between conception and two years of age. A study evaluating growth faltering in 54 countries suggests that the process of stunting via retarded linear growth begins at birth and continues through the 1000 days window (Victora et al., 2010). Recent evidence also suggests that some "catch-up" in height can occur in later childhood (Sokolovic et al., 2013) or adolescence (Prentice et al., 2013). Despite evidence of additional windows of opportunity in which stunted individuals can regain some lost ground, damage to other organ systems, such as the brain, may remain.

2.3 Global Burden of Acute and Chronic Malnutrition

In 2011, 165 million children under five—one in three children worldwide—were stunted (chronic malnutrition) and 52 million children were wasted (acute malnutrition). Intrauterine growth restriction, stunting, severe wasting and micronutrient deficiencies in zinc and vitamin A accounted for 3.1 million deaths and over 91 million DALYs (21% of total DALYS) in children under five (Black et al., 2013). According to data from the WHO Global Database on Child Growth and Malnutrition, the prevalence of stunting in Africa has not improved in over a

decade—about 60 million pre-school aged children (40%) are currently stunted. Although the number of stunted children in Asian has decreased significantly since 1990 from 190 million to 100 million, Africa and Asia still shoulder the majority of the world's child malnutrition burden (De Onis, Blössner, & Borghi, 2012). Although Latin America has the lowest prevalence of the three at 14%, data from The Lancet indicate that Guatemala is the only country in the region contributing to the global burden (shown in Figure 2).

2.4 Outcomes Due to Stunting

The consequences of having a stunted population are not merely health-related; they are also ethical and economic. The 2008 Lancet MCNS asserts that children's height for their age at the end of the 1000 days window is a powerful predictor of human capital (Victora et al., 2008). This bold statement about the consequences of stunting makes the appeal to prioritize malnutrition more robust by adding both an ethical and economic argument for its rapid eradiation.

Figure 2. Visualization of the global burden of malnutrition (Black et al., 2013)

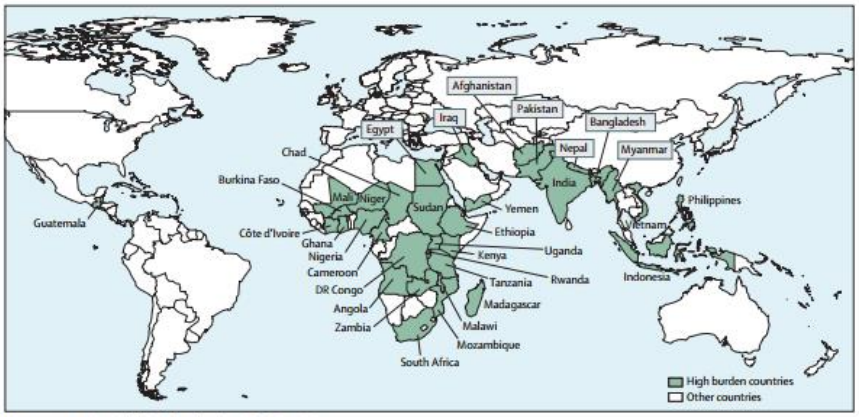
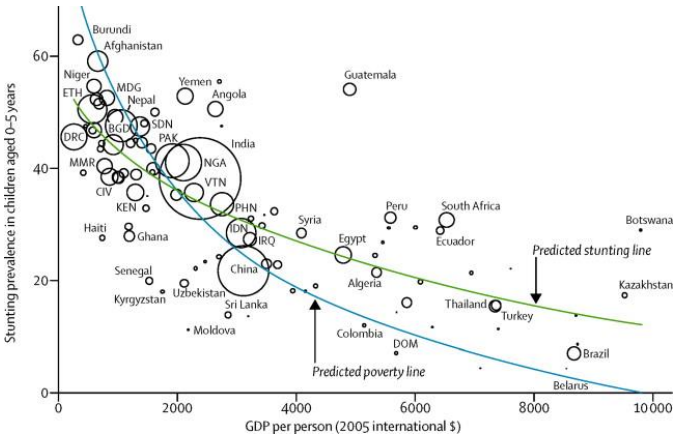


Figure 3: **Countries with the highest burden of malnutrition**
These 34 countries account for 90% of the global burden of malnutrition.

Grantham-McGregor et al. suggest that among the negative consequences of stunting are delayed walking age, reduced number of years in school, grade failure, a smaller vocabulary and diminished general knowledge in adolescents. The 2007 study, calculated the impact of stunting on earning potential: "We estimate that the loss in

adult income from being stunted but not in poverty is 22·2%, the loss from living in poverty but not being stunted is 5·9% and from being both stunted and in poverty is 30·1%" (Grantham-McGregor et al., 2007). General growth failure (stunting and wasting) not only strips individuals of human capital, it leaves them vulnerable to diseases like measles, pneumonia and diarrhea (Caulfield, de Onis, Blössner, & Black, 2004). Data from the Journal of the American Medical Association show that not being stunted has an intergenerational protective effect: an increase in maternal stature decreased the risk of stunting, wasting and mortality in their offspring (Özaltin, Hill, & Subramanian, 2010).

Figure 3. Guatemala's stunting prevalence in children 0-5 years relative to its GDP (Ruel & Alderman, 2013)

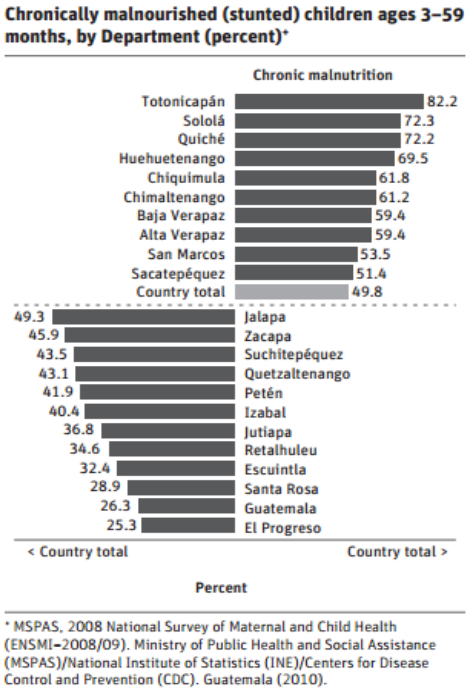


2.5 General Trends in Stunting in Guatemala

In Guatemala, stunted individuals spend fewer years in school, have offspring with lower birth weight and marry partners with lower earning potential and fewer years of education (Hoddinott et al., 2008). Low maternal education, ethnicity and low income increase the risk of being stunted (Black et al., 2008; MSPAS, 2009). According to the 2008/9 National Maternal and Child Health Survey, the prevalence of stunting among mothers with no education was 62.9% compared to 15.8% of children whose mothers had secondary or higher education, and being indigenous doubled the risk of being stunted (MSPAS, 2009). A 2006 study in Guatemala suggests that growth failure during the 1000 days window causes mental and physical impairment (Kuklina, Ramakrishnan, Stein, Barnhart, & Martorell, 2006). Thus, of the nearly 50% of Guatemalan children that are stunted, a disproportionate percentage of the indigenous population suffers from these negative outcomes.

According to a technical report by the United States Agency for International Development and the URC, nearly a third of the 333 municipalities in Guatemala have at least a 50% prevalence of stunting. This number is 20 times the 2.3% expected prevalence based on the WHO growth standards (Delgado, 2010). Decades of nutrition interventions by the GMOH reduced stunting by .25 to 1 percentage point per year since 1985 (Palmieri et al., 2009). At the current pace, it will take more than a half century to eradicate stunting in Guatemala. Delgado's report goes on to address the discordance between having knowledge and appropriately applying it to nutrition strategies:

Figure 4. The prevalence of stunting by state in Guatemala (Martorell, 2012)



"The situation of continuous nutritional deprivation contrasts with the wealth of information, scientific knowledge, and evidence generated globally and in Guatemala regarding nutrition problems and the efficacy and effectiveness of solutions. If this knowledge were duly applied within the context of national programs, it could contribute to a sustainable solution to the problems."

Knowledge and resources are not enough. Ministries of Health have to effectively translate and distribute that knowledge to the population.

2.6 Platforms for Intervention Delivery

There are a wide range of platforms from which to deliver evidence-based nutrition interventions like salt iodization, nutrition education and flour fortification. But all platforms are not equal; each must be adapted to a country's specific habits and traditions. For example, although flour fortification has successfully improved health outcomes in other countries, the likelihood of this platform improving the health outcomes of extremely poor

Guatemalans is small because they consume very little fortified wheat flour (Imhoff-Kunsch, Flores, Dary, & Martorell, 2007). Based on the distribution of stunting in Guatemala and the existing healthcare system, community-based interventions could be a very successful platform for delivering nutrition services. The Guatemalan public health sector delivers preventive and basic care to 4.1 million inhabitants in 8,596 communities in 198 municipalities in rural areas (UNICEF, 2013a). In 2013, Lancet authors Bhutta et al. used systematic and Cochrane reviews to conclude that community-based platforms for nutrition education have "substantial potential to improve the uptake of child health and nutrition outcomes" (Bhutta et al., 2013). This statement corroborates Bhutta et al.'s 2008 finding that ranked breastfeeding, complementary feeding, supplementation and improving nutrition intake among the highest impact interventions for reducing mortality and chronic malnutrition (Bhutta et al., 2008). Thus, community-based interventions, which rely heavily on the healthcare workforce, are platforms that could be very successful in rural Guatemala.

2.6.1 Maternal and child micronutrient supplementation

Supplementing mothers with folic acid during the periconceptional period produced a 72% reduction in the risk of developing a neural tube defect (De-Regil, Fernández-Gaxiola, Dowswell, & Peña-Rosas, 2010). A 2009 study showed that Guatemalan women who received high-quality food supplements as young girls had offspring with greater HAZ scores. This suggests that stunting prevention through food supplementation not only reduces the impact of malnutrition in a woman's life, but substantially improves birth weight, HAZ score and other health outcomes for her children as well (Behrman et al., 2009). Maternal periconceptional or prenatal supplementation with iron, folic acid, calcium or other micronutrients all require *someone*, generally a healthcare provider, to deliver the tablets, syrup, injection, etc. The results evidenced by these studies and others cannot be replicated or scaled-up in rural areas without a strong rural healthcare workforce. Although an inadequate supply of micronutrient

supplements remains a formative challenge (Victora et al., 2012), micronutrient and food supplementation programs with an educational component have the potential to educate mothers about stunting and prevent it simultaneously if providers are appropriately equipped.

2.6.2 Breastfeeding

Women living in rural areas are likely to be attended by rural healthcare providers, community health workers or midwives. Thus, training the healthcare workforce effectively is crucial because they are the primary conduits of nutrition information to this population. A systematic review of breastfeeding interventions established that breastfeeding within one hour of birth is associated with a reduction in neonatal death due to infection (Debes, Kohli, Walker, Edmond, & Mullany, 2013). Research by Lassi et al. suggests that the presence of a health worker doubles the incidence of breastfeeding within the first hour (Lassi, Das, Zahid, Imdad, & Bhutta, 2013). Evidence suggests that nutrition counseling and education interventions, especially group counseling, increase optimal breastfeeding habits, suggesting that an educated healthcare workforce can make a substantial difference in health outcomes (Imdad, Yakoob, & Bhutta, 2011).

2.6.3 Complementary feeding (CF)

A systematic review of the effectiveness of complementary feeding interventions describes a wide range of improvements in HAZ scores, from an 11% decrease in stunting in Peru to a negligible impact in Bangladesh. Most importantly, the analysis concluded that the most effective interventions had an educational c1omponent (Dewey & Adu-Afarwuah, 2008). In a later systematic review, Lassi and colleagues conclude that nutrition education alone, CF with nutrition education and CF without nutrition education all had a significant positive impact on height for age. The review notes that the two highest-impact educational interventions used clear messaging to promote

simple, straightforward ways to enrich the diet (Lassi et al., 2013). More specifically, Arimond and Ruel use Developmental Health Survey data from 11 countries to show an association between dietary diversification and stunting (Arimond & Ruel, 2004). Scaling up CF interventions will likely involve training healthcare providers or community health workers on how to effectively and concisely teach IYCF techniques like dietary diversification.

2.7 Conclusion

Many of the aforementioned community-based interventions are driven by an educated and active healthcare workforce. In his monograph, Martorell highlights the importance of combining an *educational* component with the distribution of fortified foods, staple foods baskets and conditional cash transfers (Martorell, 2012). Although studies on conditional cash transfers show an increase in prenatal health center visits, if healthcare providers are ill-equipped to properly advise mothers on optimal feeding habits or cannot explain the basic concepts of the 1000 days window, the rural population will be unable to incorporate knowledge from research into their existing paradigm of IYCF practices. If poor families do not incorporate dietary diversification, CF and other appropriate IYCF practices, catch-up growth outside of the 1000 days window is unlikely (Martorell, Khan, & Schroeder, 1994).

For the nearly 9,000 communities in rural Guatemala that receive healthcare from rural health facilities, the knowledge, attitude and practice of providers is fundamental to a timely decrease in stunting. Regardless of political support and/or well-designed, evidence-based interventions, if nutrition knowledge bottlenecks at providers, interventions in rural areas become cost-inefficient and lead to an unsatisfactory improvement in health outcomes. More research on provider KAP is required in order to identify gaps in provider knowledge and training. Performance evaluations and empirical data on providers' current understanding of chronic malnutrition can help

the MOH and international NGOs design effective trainings that will resonate with the healthcare workforce and lead to more effective and successful implementation of nutrition interventions.

3. Methods

3.0 Overview

Nutri-Salud requested this study as a baseline evaluation of provider knowledge, attitude and practice regarding stunting in children under two years of age. Rather than test a hypothesis, this study used the grounded theory method to generate theories about provider knowledge and behavior based on themes that emerged from the data itself. This chapter defines the research context and study population, describes the design of two original data collection tools as well as the data collection and analysis procedures.

3.1 Study Design and Principal Outcomes

This cross-sectional study used a mixed-methods, grounded theory design that employed convenience sampling to gather data through a survey questionnaire and observations. The principal quantitative outcomes were a) a composite survey score based on individual performance and b) descriptive statistics from a structured observations checklist that tallied providers' completion of essential GMC tasks. The qualitative outcomes were a) two provider profiles representing high and low quality nutrition counseling given to mothers during GMC visits and b) general themes about provider behavior during consultations. The goal of the structured observations was to assess each activity on the checklist for completion rather than calculate a composite score for the consultation.

3.2 Population and Sample

3.2.1 Geographical location and site determination

In its role as technical advisor to the Guatemalan Ministry of Health, the URC works closely with providers at the primary level of care in the western highlands, which houses the highest percentage of malnourished children in

Guatemala (MSPAS, 2009). It is therefore a priority region for the GMOH, international NGOs and bilateral and multilateral aid programs. The URC nutrition team selected Quetzaltenango and Totonicapán, the two states closest to their regional office in Quetzaltenango, as study sites. The Nutri-Salud program operates in the county of San Juan Ostuncalco in the state of Quetzaltenango. In Totonicapán, they work in Momostenango (Momos). The lack of data about provider knowledge and practice in this highly affected region made it an ideal population for doing a baseline evaluation.

3.2.2 Brief overview of healthcare facilities and units

The primary level of care consists of mid-sized health posts and small health centers in remote areas whose inhabitants often lack access to regional health facilities or hospitals. Most health *centers* are equipped with only the most basic medical provisions and are often staffed by a single auxiliary nurse and a local community health promoter if they are staffed full-time (everyday) at all. A mobile unit of health professionals provides a more comprehensive package of health services by rotating through rural health centers weekly or monthly. Local NGOs staff these mobile health units. The unit usually consists of a professional nurse, an immunization specialist and at least two educators and two auxiliary nurses, but can have up to 18 members depending on coverage area size.

In contrast, providers at health care *posts* are employed and trained by the government and placed at one health post "permanently". Health posts and centers comprise the primary level of care and are the most accessible route to healthcare for rural Guatemalans. The providers that work in these facilities, whether permanent or rotating, are responsible for providing all routine nutrition services and counseling.

3.2.3 Target population and recruitment

Auxiliary nurses and health educators were the primary target population. This is largely because educators provide the bulk of nutrition counseling with auxiliary and professional nurses supporting as necessary. Only a small number of professional nurses, rural health technicians and doctors were surveyed. Professional nurses, and occasionally doctors, provide basic nutrition counseling via prenatal and sick child visits. In total, surveys were collected from a subset of 81 providers in Momos and 41 in San Juan Ostuncalco.

3.2.4 Sample size and sampling method

Because grounded theory research creates theories as they emerge from the data, there was no practical way to establish a reasonable sample size from the outset of the study. The aim of the requested research was to survey and observe as many providers from the sites as possible. Surveys were distributed during district-wide meetings for health personnel in these two regions. About 10% of surveyed providers completed surveys during a site visit in the weeks following the mass survey distribution. The providers that were observed during the structured observations were selected because they were responsible for doing nutrition consultations on the day of the visit. Mothers rotated through a series of stations with their children during GMC visits to get weighed, measured, vaccinated etc. Data from provider-mother interactions were only used if the mother could be observed through the full rotation.

3.3 IRB and Ethical Considerations

Because the research conducted was a needs assessment requested by Nutri-Salud, it was not considered human subject research and IRB approval was not required.

3.4 Quantitative Instrument Design

The survey of provider knowledge (the quantitative tool) and the structured observation checklist (the qualitative tool) were designed to assess the most basic elements of provider knowledge and practice and solicited demographic information such as profession, state, etc. The three-page questionnaire collected a total of 29 pieces of information (not including demographic information) and had three components:

I. Identification of physical characteristics of stunting
II. Prioritization of possible causes of stunting
III. Differentiation between causes, characteristics and consequences of chronic and acute malnutrition

The Nutri-Salud technical advisors and nutritionist translated all data collection tools into Spanish.

To address the first principal research question, *how much do providers at the primary level of care know about chronic malnutrition,* each survey question was evaluated individually, by section and for an overall composite score. In parts one and two, one question was worth one point. For section two, the open-ended question, "*List three to five causes of chronic malnutrition in children under two"* was used during the pilot phase to elicit providers' typical responses and/or myths relating to the causes of chronic malnutrition. The most common responses from providers were compiled (maintaining their original word-choice) with proven causes of chronic malnutrition as well as myths associated with short stature and poor nutrition to construct the table shown in Table 1.

Section three contained five pairs of mutually exclusive statements that described various characteristics of malnutrition. These mutually exclusive pairs assessed providers' understanding of the difference between chronic and acute malnutrition. Providers had to correctly categorize *both* characteristics in the pair to receive a point. A

higher sectional or overall score indicated more correctly answered questions and a fuller knowledge of the causes, characteristics and consequences of malnutrition. The highest score possible was 29 points.

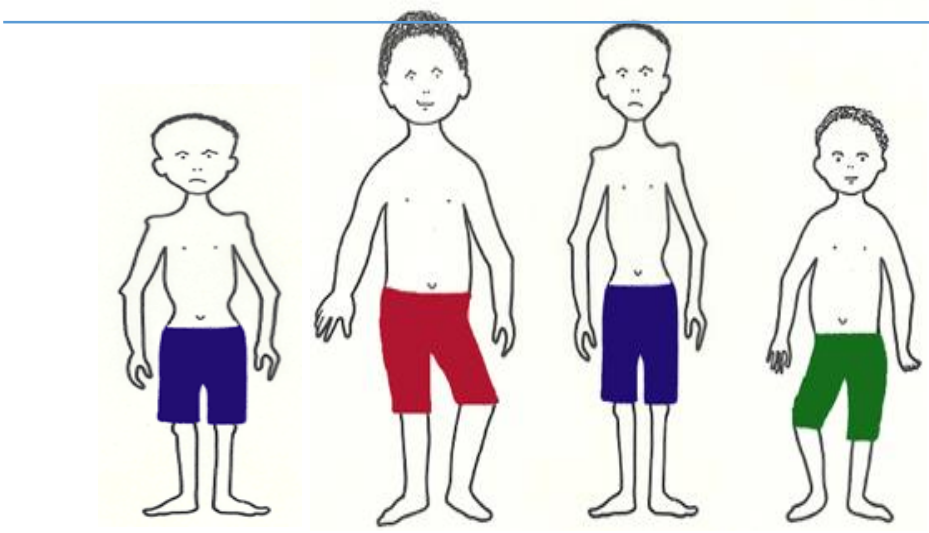
Figure 5. Picture of providers completing the pile sort in section three of the survey. Totonicapán, Guatemala, 2013

The pile sort was an intentionally hands-on to force providers to categorize *each phrase*. Twenty phrases describing chronic malnutrition, acute malnutrition or both forms of malnutrition were written on slips of colored paper, which providers categorized and taped to their survey.

Figure 6. Survey section I: Identifying the physical characteristics of malnutrition: stunting vs. wasting

Identification of physical characteristics

Original Survey Instructions: Below are four figures of five year old boys. Beneath each figure, write if this child has chronic malnutrition, acute malnutrition, both or if the child has a normal nutritional status.



Both	Normal	Acute	Chronic
Short stature, underweight	Normal stature, normal weight	Normal stature, underweight	Short stature, normal weight

Table 1. Survey section II: ranking descriptive phrases of the possible causes of malnutrition

Prioritization of possible causes of stunting

Original Survey Instructions: Carefully read the possible causes of chronic malnutrition and decide how much they influence the development of CM in children under two (use a √ or an X). (The most correct response for each question is marked with an X.)

POSSIBLE CAUSES	Very Little	Regular	A Lot
Poor water and sanitation conditions that increase the presence of infections		X	X
The father was malnourished during his childhood	X		
The child didn't receive exclusive breast feeding during the first six months of life (s/he was given other food or liquids)			X
The family has little access to nutritious foods		X	X
A lack of vitamins and minerals (micronutrients) in the mother's diet			X
The child begins to at complementary foods late (later than at 6 months)			X

The mother did not eat nutritiously during her pregnancy			X
Lack of vitamins or minerals (micronutrients) in the child's diet		X	X
Big families (a lot of children)		X	X
Heritage or genetics	X		

Table 2. Survey section III: categorization of statements describing acute and/or chronic malnutrition

Categorization of causes, consequences and characteristics

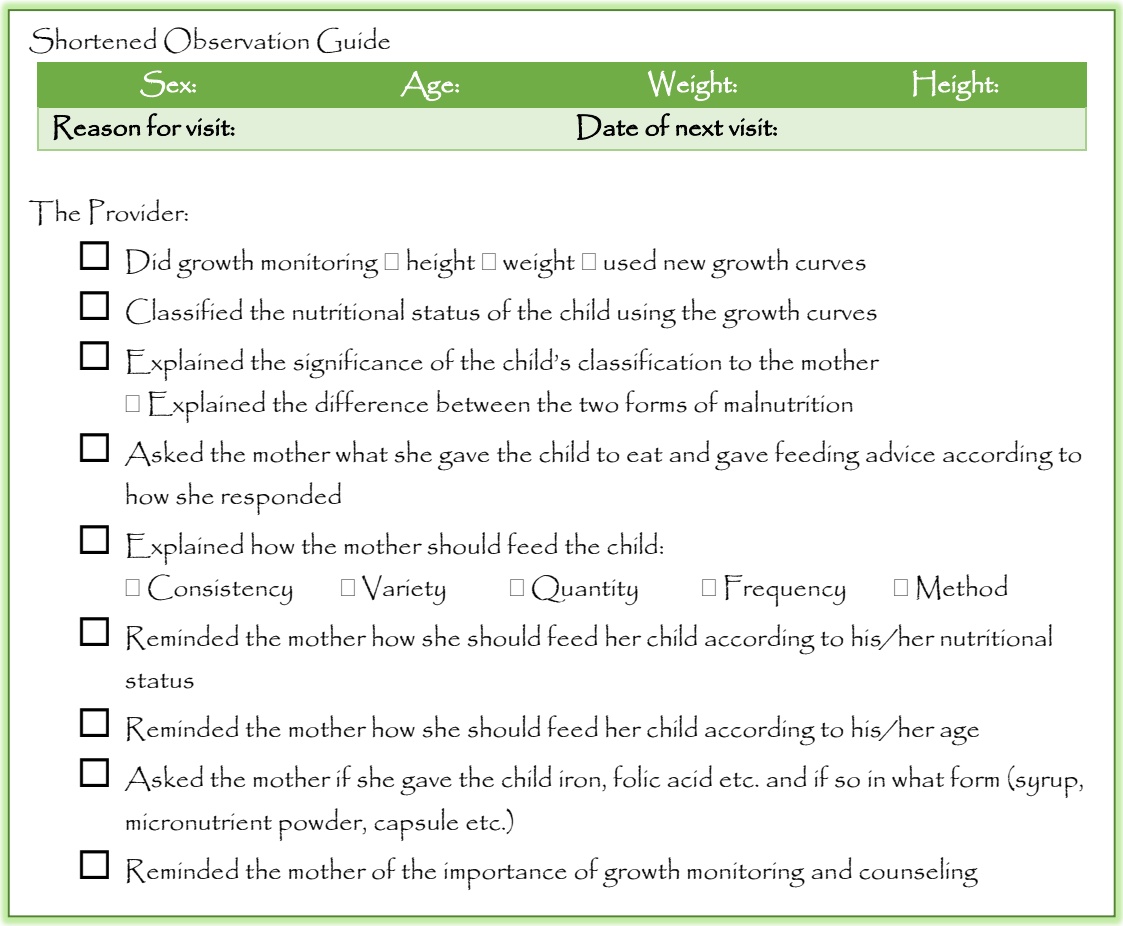
Original Survey Instructions: Each card has a cause, characteristic or consequence of malnutrition written on it. Based on your knowledge of chronic and acute malnutrition, place each card in the column in which you think it belongs. Each column can have a different number of cards. (The statements below have been correctly categorized.)

Chronic Malnutrition	Acute Malnutrition	Both Kinds of Malnutrition
Most strongly associated with being too short for their age **(0.5 points)**	Most strongly associated with being too thing for their height or not being able to gain weight **(0.5 points)**	← **Worth 1 point per pair**
Is irreversible: long term effects can be seen over person's lifetime	Is generally short term: effects disappear as food becomes available	
Generally not "urgent" or life-threatening	Poses more urgent, high priority, health risks that can be fatal	
Cannot be treated, only prevented	Can be treated	
Low mortality rate	Higher mortality rate	
Worth 1 point each		
Due to lack of micronutrients in the diet like iron, vitamin-A and iodine **(1 point)**	Often due to crisis or loss of ability to buy food due to natural disasters etc.	Due to a lack of funds to buy enough food for the family
Results in decreased cognitive ability and impaired brain development	Associated with swelling due to fluid in the legs or feet (children look swollen)	Due to a nutrient poor diet (too many carbs, little protein, fruits, vegetables, etc.)
Negatively influences learning potential	Decreased appetite	Low weight and small height for age
Decreases productivity and lowers lifetime earnings as an adult		

3.5 Qualitative Instrument Design

At the time of the study, the GMOH did not have an official list of standardized activities that providers had to fulfill during nutrition consultations with mothers of children under two. Thus, a checklist of 16 essential activities that should occur during an ideal consultation was composed (see appendix for the complete list in Spanish).

Figure 7. A translated, shortened version of the observation guide



Shortened Observation Guide

Sex:	Age:	Weight:	Height:
Reason for visit:		Date of next visit:	

The Provider:

- ☐ Did growth monitoring ☐ height ☐ weight ☐ used new growth curves
- ☐ Classified the nutritional status of the child using the growth curves
- ☐ Explained the significance of the child's classification to the mother
  ☐ Explained the difference between the two forms of malnutrition
- ☐ Asked the mother what she gave the child to eat and gave feeding advice according to how she responded
- ☐ Explained how the mother should feed the child:
  ☐ Consistency ☐ Variety ☐ Quantity ☐ Frequency ☐ Method
- ☐ Reminded the mother how she should feed her child according to his/her nutritional status
- ☐ Reminded the mother how she should feed her child according to his/her age
- ☐ Asked the mother if she gave the child iron, folic acid etc. and if so in what form (syrup, micronutrient powder, capsule etc.)
- ☐ Reminded the mother of the importance of growth monitoring and counseling

The use of standardized criteria allowed for the collection of both quantitative and qualitative aspects of the provider-patient interaction such as the percentage of providers completing a specific activity as well as provider

tone, word choice and body language. This activity attempted to answer the second principal research question, *how do providers address nutrition in their daily work*?

3.6 Piloting

Both the quantitative and qualitative instruments were piloted in the health care center of Concepción Chiquirichapa, Quetzaltenango.

3.7 Data Collection Procedure

In June of 2013 the Quetzaltenango/Totonicapán area nutritionist arranged to administer the surveys after a county-wide nutrition training by the URC in Momostenango. In San Juan Ostuncalco, the surveys were distributed following a workshop that was organized and facilitated by state-level MOH officials regarding the goals, objectives and indicators of the Zero Hunger Plan. Due to time constraints, providers in San Juan Ostuncalco completed demographic information separately from the survey.

Each provider received verbal and written instructions, a three-page survey that included one page of demographic information, a paper-clipped stack of 20 statements for the pile sort and tape (to attach statements to the table in section three). Providers were instructed not to talk or collaborate during the survey. The answers were not discussed with any provider at any time in order to continue distributing surveys during site visits.

The structured observations were conducted in rural health centers and posts at the primary level of care. Nutri-Salud planned all health care center/post visits on vaccination and Vitacereal days because the highest volume of women and children in the 1000 days window visited the clinic on those days. Vitacereal, is a fortified "atol" or

drinkable cereal that the government distributes to pregnant women, nursing mothers and children under two years of age. On non-Vitacereal days, if women came to the health facility, the majority sought non-nutrition consultations, making nutrition observations impossible.

Overall, 11 health care centers and posts were visited and approximately 50 prenatal, sick and GMC observations were performed, 20 of which were quantified using the structured observations checklist. Only growth monitoring and counseling consultations with mothers of children under two were quantified since the research questions focused on women and children in the 1000 days window. The Nutri-Salud nutritionist for the Toto-Quetzaltenango area requested at least two observations per provider to assess each provider with more than one client.

3.7.1 Data cleaning and management

A random number generator was used to select 9% of surveys (n=11) for a quality control check. The check compared each data point entered into the EpiInfo questionnaire to the response the provider had actually given on their paper survey. Each survey had 33 data entry points total. Of a combined 363 checked data points over 11 surveys, there were a total of 5 errors, or .45 errors per survey.

3.8 Data Analyses

EpiInfo was used to enter the survey data into a structured file. Descriptive characteristics were presented as means or percentages for continuous and categorical variables respectively. Both a sectional and a composite average score were calculated for each provider using EpiInfo and Excel to assign one point to each correctly answered question. Differences in these characteristics were tested using chi-square or t-test. Crude odds ratios (95% confidence intervals) were estimated from cross-tabulations and the Mantel Haenszel method. Using the overall

score as the dependent, continuous variable, inferential analyses were performed with ANOVA (Analysis of covariance) and binary logistic regression while controlling for potential confounders/independent variables based on a conceptual framework. These independent variables included demographic information such as state, profession and number of years working in healthcare services. This analysis step addressed the research question, *does provider knowledge differ by state, profession, type of facility or years of experience?* Data analyses were conducted in SAS (SAS Institute, Cary, NC), SPSS (IBM SPSS, Chicago, GA) and EpiInfo (CDC, Atlanta, GA). Statistical significance was set at $p<0.05$.

Quotes from all observations were classified into two main categories: "true but uninformative" statements and "true and informative" statements. Reoccurring words, themes, behaviors or attitudes that helped explain the mood and nature of the provider-client relationship were recorded to answer the fourth principal research question, *in what context and how accurately do providers address nutrition during their daily consultations?*

The case study profiles of Laura and Yulissa are based largely on the observations and statistics of two real providers. Their data, however, have been supplemented with quotes or behaviors from other providers in order to gain a deeper understanding of the practices that distinguish adequate and quality nutrition consultations from poor quality consultations. Providers who failed to give quality counseling did not *exclusively* disseminate faulty or useless counsel. Similarly, even some of the most adept providers failed to address 100% of the GMC activities on the checklist or occasionally gave vague advice as well. Thus, the case study profiles are meant to loosely represent behaviors, language and attitudes embodied by either high-performing or low-performing providers without representing a specific provider with 100% accuracy.

4. Results

4.0 Overview

The quantitative survey was designed to answer the first three research questions about provider knowledge: Survey sections one and two addressed providers' overall understanding of the fundamental causes and characteristics of stunting. The pile sort in section three evaluated providers' ability to differentiate chronic malnutrition from acute and malnutrition and stratifying the data by state, profession, type of facility and years of experience identified differences in performance based on demographic information. The structured observation (the qualitative approach) focused on how providers addressed nutrition in their daily work by providing quotes and explanations of their mood, attitude, language etc. during consultations.

4.1 Demographic Characteristics of Healthcare Providers

Table 3 describes the sample's demographic information and compares the sub-samples of Quetzaltenango and Totonicapán to identify differences between the two populations of providers. Of 122 providers, 34% were from Quetzaltenango while the remainder came from a much larger county in Totonicapán. Auxiliary nurses, educators and professional nurses accounted for 60, 20 and 10% of the sample respectively. The remaining 10% of providers surveyed were in the "other" category, which included a nutritionist, five rural health technicians and three doctors. Three in five providers (60%) worked in rural health centers. Of the 122 providers surveyed, only 69 responded with how long they had worked in healthcare services. One in three had less than two years of experience while the majority, 52%, had between two and seven years. Only 14% had over seven years of experience.

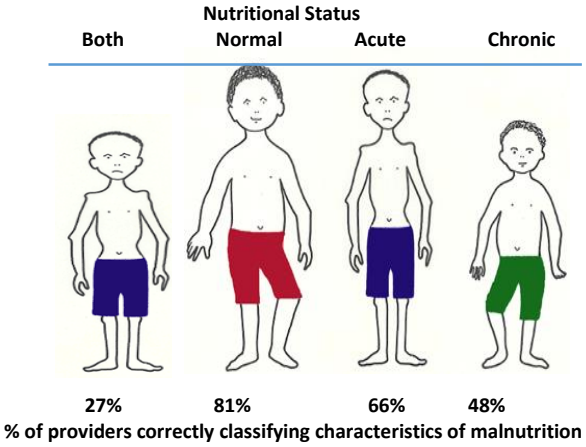
Table 3. Demographic information stratified by state with corresponding p values

Variable	Total Number of Participants N = 122	Quetzaltenango n = 41	Totonicapán n = 81	P-value for chi squared or t-test
Continuous	**mean (SD)/(range)**	**mean (SD)/(range)**	**mean (SD)/(range)**	
No. Providers	122	41 (33.6%)	81 (66.4%)	
Age	103 30 (8.2)/(19-68)	35 31.2 (10.9)/(19-68)	68 27.8 (6.3)/(19-51)	0.089
Years in Health Services	69 2.26 (4.6)/(0-32)	20 3.6 (5.86)/(0-32)	49 2.33 (3.8)/(0-20)	-
Categorical	**n (% column)**	**n (% column)**	**n (% column)**	
Years in Health Services	69	20	49	
1. 0-2 years	23 (33.3%)	7 (35%)	16 (32.7%)	0.227
2. 2-7 years	36 (52.2%)	8 (40)	28 (51.7)	
3. 7+ years	10 (14.5%)	5 (25%)	5 (10.2%)	
Sex	120	41	79	0.931
Female	100 (83.3%)	34 (83%)	66 (83.5%)	
Male	20 (16.7%)	7 (17%)	13 (16.5%)	
Professional Status	122	41	81	0.920
1. Auxiliary Nurse	76 (62.3%)	24 (58.6%)	52 (64.2%)	
2. Educator	25 (20.5%)	7 (17%)	18 (22.2%)	
3. Prof. Nurse	12 (9.8%)	4 (9.8 %)	8 (9.9%)	
4. Other	9 (7%)	6 (14.6)	3 (3.7%)	
Type of Facility	118	41	77	0.000
1. Government Operated	47 40%)	30 (73.2%)	17.(22.1%)	
2. NGO Operated	71 (60%)	11 (26.8%)	60 (77.9%)	

Quantitative Results

4.2 Survey Section I. Identifying the Physical Characteristics of Malnutrition: Stunting vs. Acute

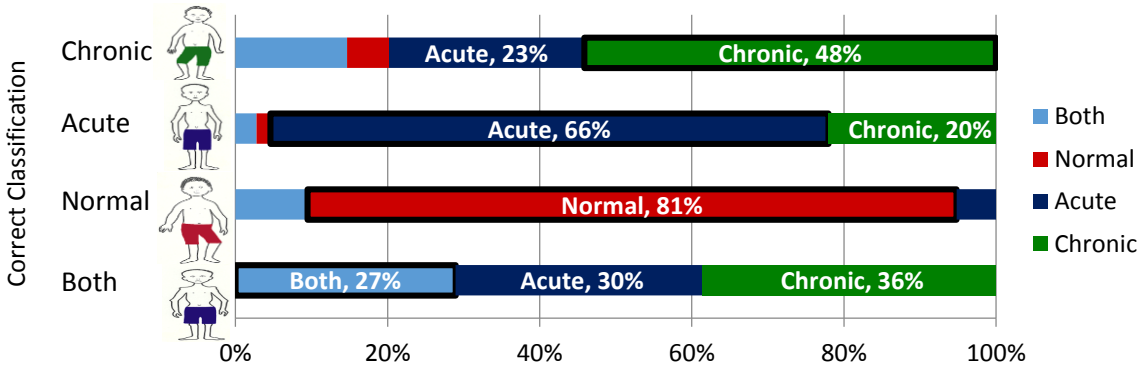
Figure 8. Percentage of providers that correctly identified the physical characteristics associated with chronic and/or acute malnutrition



The objective of this section was to determine if providers could successfully distinguish between the physical characteristics of chronic, acute and normal nutritional status. The average score for this section was 55%. Figure 8 suggest that the majority of providers—81%—identified the child with a normal nutritional status. 73% of providers did *not* think a child could suffer from both forms of malnutrition simultaneously. Additionally, less than half (48%) correctly characterized the chronically malnourished child (far right).

Figure 9 highlights how providers' *incorrect* answers can help explain their understanding of the physical characteristics of malnutrition. The bolded box in each row represents the percentage of providers that matched the child's physical trait with the correct form of malnutrition. The other boxes display the name and percent of the next most common (incorrect) response. For example, of the 42% of providers that did not correctly label the stunted child (top row), almost half misclassified the child as acutely malnourished.

Figure 9. Distribution of answers for section 1-characterization of physical manifestations of stunting (correct answer outlined and bolded)



The data suggest that many providers failed to recognize stunting as the physical manifestation of chronic malnutrition.

4.3 Survey Section II: Prioritizing the Causes of Stunting

The objective of section two was to determine how providers collectively prioritized the various causes of stunting in children. Providers scored an average of 70%, the highest score of all three sections. Five fundamental causes of chronic malnutrition are outlined in bold in Table 4. Providers found the two factors associated with good infant and young child feeding practices to be the *least* relevant of all the priority causes. At least two in five (41.9%) did not think it was very important to exclusively breastfeed for the first six months and more than half (54.9%) did not consider the introduction of complementary foods at six months as critical for growth.

The vast majority of providers, nine out of 10 (89%), correctly identified the mother's diet as a critical factor and almost seven in 10 (66.4%) thought her micronutrient intake was especially critical during pregnancy. Interestingly, providers prioritized the mother's nutrient intake as more important than the child's. Compared to almost 90%, only

62% of providers thought the *child's* diet played an important role in determining his/her nutritional status (Table 4).

Table 4. Percentage of providers that correctly ranked possible causes of malnutrition

The outlined box on the right of each row indicates the correct ranking and contains the percentage of providers that correctly responded to the question. For example, "regular" and "a lot" were both appropriate answers for "poor water and sanitation conditions" and 95.5% of providers selected one of these two responses.

POSSIBLE CAUSES	A Little	Regular	A Lot
Poor water and sanitation conditions that increase the presence of infections		95.5%	
Big families (a lot of children)		96.7%	
The family has little access to nutritious foods		84.4%	
A lack of vitamins and minerals (micronutrients) in the mother's diet			**89%**
The mother did not eat nutritiously during her pregnancy			**66.4%**
Lack of vitamins or minerals (micronutrients) in the child's diet			**62.3%**
The child didn't receive exclusive breast feeding during the first six months of life (s/he was given other food or liquids)			**58.1%**
The child begins to eat complementary foods late (later than at 6 months)			**45.1%**
The father was malnourished during his childhood	50%		
Heritage or genetics	58.2%		

4.4 Survey Section III: Pile Sorting to Differentiate Between Chronic and Acute Malnutrition

The objective of the pile sort was to determine if providers could differentiate between chronic and acute malnutrition. Of all three activities in the survey, the pile sort had the lowest overall average score at 38%. The five mutually exclusive phrases at the top of Table 5 are the essential differentiating characteristics between the two forms of malnutrition. They address the physical characteristics, timeline, urgency, treatment and mortality rates associated with each form of the condition. At most, 50% of providers correctly answered any one of these five questions. One in three (32%) correctly determined that acute malnutrition poses a more urgent mortality risk

compared to stunting and 33% knew that it can be treated while stunting is only preventable. The data from the pile sort suggest that as a collective, providers cannot differentiate between the two forms of malnutrition.

Table 5. Percentage of providers that correctly categorized the various causes, characteristics and consequences of acute and/or chronic malnutrition

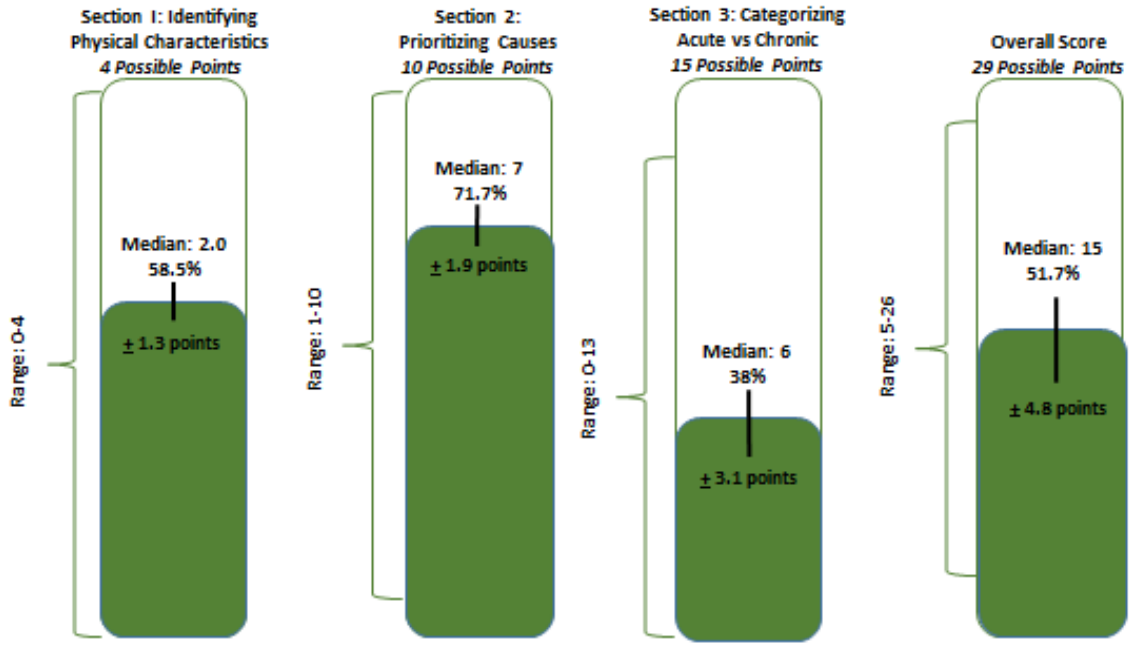
Chronic Malnutrition	**Acute Malnutrition**	**% of Providers Answering Both Questions Correctly**
Most strongly associated with being too short for their age (stunting)	Most strongly associated with being too thin for their height or not being able to gain weight (wasting)	**34.4%**
Is irreversible: long term effects can be seen over a person's lifetime	Is generally short term: effects disappear as food becomes available	**47%**
Generally not "urgent" or life-threatening	Poses more urgent, high priority, health risks that can be fatal	**40.2%**
Cannot be treated, only prevented	Can be treated	**33%**
Low mortality rate	Higher mortality rate	**32%**

Individual questions with % of providers that answered correctly					
Chronic Malnutrition		**Acute Malnutrition**		**Both Forms of Malnutrition**	
Due to lack of micronutrients in the diet like iron, vitamin-A and iodine	**31.1%**	Due to crisis or inability to buy food due to natural disasters etc.	**27%**	Due to a lack of funds to buy enough food	**56%**
Results in decreased cognitive ability and impaired brain development	**40.2%**	Associated with swelling due to fluid in the legs or feet (children look swollen)	**65%**	Due to a nutrient poor diet (too many carbs, little protein, vegetables, etc.)	**47%**
Negatively influences learning potential	**37%**	Decreases appetite	**36.1%**	Low weight and small height for age	**14.8%**
Decreases productivity and lowers lifetime earnings as an adult	**30.2%**	----		**----**	

4.5 Average Sectional Score

Figure 10 suggests that overall, providers are most knowledgeable about the causes of chronic malnutrition and least comfortable explaining the characteristics and consequences of stunting, especially as it compares to acute malnutrition.

Figure 10. Summary of descriptive data for all three survey sections and the composite score



4.6 Stratified Analysis

At the 0.05 level of significance, chi squared analysis did not identify any statistically significant differences between average overall +score based on state, years of experience or facility type, as illustrated in Tables 6, 8 and 9.

Independent t-tests by profession found statistically significant differences in survey scores when comparing auxiliary and professional nurses to the general population (Table 7). Therefore, we reject the null hypothesis that providers performed similarly regardless of professional status or training. The average overall score of auxiliary nurses, 13.9 of 29 points (± 4.4), was significantly lower than the aggregate score of educators and professional nurses, 16.7 points ($p<0.002$). Professional nurses' performance (17.7 points ± 4.4) relative to educators and auxiliary nurses' (14.7 points) was also significantly higher at a p-value of 0.04.

Tables 6-9. Average points, score and standard deviation (SD) for stratified analysis using independent t tests and ANOVA to compare means of various provider groups

6. Centers/Posts	NGO Employees (Centers)	Government Employees (Posts)	Odds Ratio
Average Points (SD)	15.3 (4.7)	14.2 (5.1)	
Average Score	52.8%	49%	0.53
Total Providers =121	n=87	N=34	

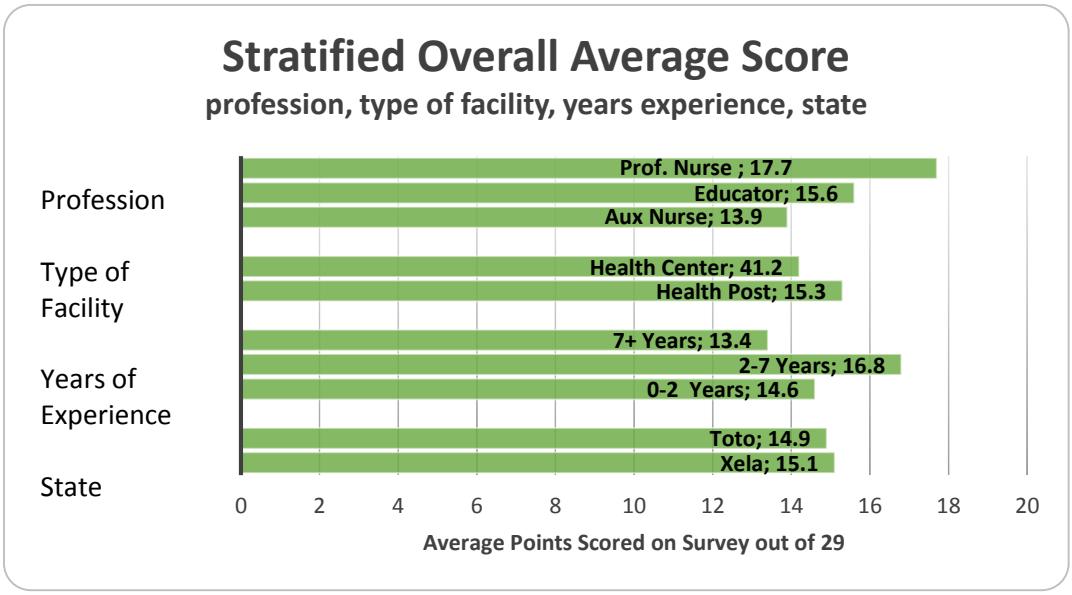
7. Profession	Aux Nurse (AN)	Educator	Professional Nurse	Odds Ratio
Average Points (SD)	13.9*(4.4)	15.6 (4.6)	17.6* (4.4)	
Average Score	47.9%	54.8%	61.7%	0.065
Total Providers =113€	n=76	n=25	n=12	

8. State	Quetzaltenango	Totonicapán	Odds Ratio
Average Points (SD)	15.1 (5.3)	14.9 (4.6)	
Average Score	52%	51.5%	0.017
Total Providers=121	n=42	n=79	

9. Years of Experience	0-2 years	2-7 years	7-30 years	Odds Ratio
Average Points	14.6	16.8	13.4	
Average Score	50.3%	57.9%	46.2%	0.092
Total Providers =69£	n=23	n=36	n=10	

*** Indicates a statistically significant difference in score**
€ 9 providers were excluded for not being AN, Educators or RNs
£ Many providers failed to answer this question

Figure 12. Average overall survey score stratified by the independent variables: Profession (n=113), Type of Health Facility (n= 121), Years of Experience (n=69); State (n=121)



Qualitative Results

4.7 Structured Observations

The objective of the structured observations was to use the checklist found in Figure 7 to evaluate providers' behavior and attitude during nutrition consultations and to determine how many of the essential GMC activities they performed during consultations.

Using the grounded theory approach, several themes based on provider behavior emerged:

Growth Monitoring and General Themes:

I. **Relationship with mothers:** In some clinics, providers had good relationships with the mothers and identified them by name. This was especially true in rural health centers serviced by mobile health teams

II. Providers were excellent at distributing micronutrient supplements and Vitacereal on schedule

Growth Counseling Themes:

I. **Prioritization:** In the rural health centers, most mobile teams utilized their personnel, time and energy to distribute fortified cereal and administer vaccines at the expense of even minimal nutrition counseling

II. **Growth curves**: Only 50% of providers marked a data point on the growth curves and a mere 15% explained the child's status to the mother using the growth curves

III. **Explained nutrition classification:** There appears to be a skip patter: if providers classified a child as normal, many did not offer suggestions for maintaining his/her nutritional status and skipped the rest of the consultation. Only 50% of all mothers left knowing their children's nutrition status

IV. **Language:** Although there were several exemplary health educators, the majority of providers at the primary level of care used very *vague* language when explaining feeding practices to mothers. Their suggestions lacked sufficient detail for mothers to change their feeding habits and might have encouraged mothers to think their current practices were adequate

V. **General approach to consultation:** Providers asked mothers closed questions and did not gain an understanding of how a mother's feeding practices contributed to her child's nutritional status

VI. **Supplements:** Providers across the board did very little listening during consultations. They prescribed, but did not probe. For example, they didn't ask if the mother actually gave the child the vitamins or micronutrient powder. It was also rare for a provider to explain the purpose of supplements or to check for comprehension ("*How often should you take iron prenatally/give the child iron?"*). Additionally, none asked if the children had experienced any negative reactions from taking the supplements

4.8 Case Study

The objective of the case study was to add depth to the statistics generated by the quantitative data with details of what providers were saying and how they delivered advice during consultations (body language, tone, timing, etc.).

Tables 10 and 11. Profile of providers that gave poor (10) and quality nutrition counseling (11)

Table 10. "Laura"	
Demographic Information	
Profession	Educator
Time Working in Healthcare	1 year
Average Score	36.6%
Nutrition Workshops Received	None
Observations	
Tone:	Chastising/None
Word Choice	Vague: -"eat well" -"take care of yourself"
Focus During Consultation	Vitacereal, getting children to vaccination station

Table 11. "Yulissa"	
Demographic Information	
Profession:	Educator
Time Working in Healthcare	7 years
Average Score	66%
Nutrition Workshops Received	3
Observations	
Tone:	Teaching
Word Choice	Detailed: "3 tablespoons of mashed beans as a mid-morning snack"
Focus During Consultation	Counseling moms on feeding practices

Laura

Providers like Laura rarely classified the child's nutritional status, either for her own knowledge or for the mother's. It was also uncommon for her to use the growth curve. If Laura asked a questions at all it was most likely a closed one: "Y*ou are still breastfeeding her, right?*" In general when it came to explaining the consistency, quantity, variety, frequency and feeding method, Laura was most likely to address consistency and frequency, "*Breastfeed him every two hours*". Laura was different from Yulissa in that she used blaming language more frequently. For example, when a child came into the center with moderate acute malnutrition, Laura said, "*This is*

purely your fault. You'll have to go to the hospital now." More quotes from providers like Laura can be found in Table 12.

Yulissa

Providers like Yulissa were good at explaining proper feeding practices: "*You have to monitor him personally because if you all eat from the same plate, how will you know how much he ate?"* She would also make goals for the mother, "*She has to gain 4 ounces by the next visit",* and explain what not to do, "*Don't bottle feed yet and no coffee or pop…wake him up to feed him*". Yulissa was also much more likely to include counseling about hygiene and how it impacted the infant's overall nutrition: "*Boil the baby's bottles for 15 minute to avoid diarrhea…you should wash the baby's hands too, or he will get diarrhea and lose weight quickly*". Occasionally, Yulissa made a point to explain why feeding practices matter: "*You have one year to help your baby grow or she will have problems in school*". Lastly, although very rare, occasionally, a provider might check for comprehension to improve adherence: "*How should you make the Vitacereal?"*

Table 12. Quotes from various providers during nutrition consultations

Low Quality Counsel: True But Uninformative	**High Quality Counsel: True and Informative**
"You are pregnant now, you have to take care of yourself and eat well." – Auxiliary Nurse	"Your baby was growing well all these months [showed mother the growth curve] but look—she fell below the line. You should feed her five times a day. Do you still breastfeed?...Ok good. Keep breastfeeding and give her a snack in the middle of the morning." – Educator
"Take these vitamins every other day. Drink enough liquids. Water please and not a lot of coffee." – Nurse	"You should be eating fruits, fortified cereal, vegetables and meat…. just eating fortified cereal is pure carbs. These [foods] have calcium for your bones and the baby's bones." – Auxiliary Nurse
"The baby lost weight because you didn't take care of her. Please take better care of your baby." – Educator	"Take 15 minutes a day to teach her how to eat solid foods. – Educator

Shaming was common among both providers who gave good counseling and those who did not. Many used the word "descuido", meaning uncared for, to chastise mothers of underweight babies. This vague criticism did not encourage or equip the mother to adopt proper feeding techniques. Providers across both groups gave advice too vague to implement, for example, "*You are pregnant. You have to take care of yourself*." The study classified this type of language as true but uninformative because it did not instruct mothers on how to change their habits nor can it improve the mother's or the child's health outcomes.

Despite low overall scores, one thing is clear: providers didn't have to master stunting knowledge to give good advice. The provider on which Yulissa is based scored a 66% on the survey, but still gave exemplary counsel on the importance of IYCF practices: *"We're not going to feed the baby like we feed out husbands…throw the plate at them and say, 'eat!' No. We have to teach them how to eat. Spend 15 minutes a day teaching them how to eat real food".*

4.9 Provider's Approach to Nutrition During Sick Child or Prenatal Consultations

The most frequent question asked during sick child consultations (as opposed to nutrition counseling) was, "*does s/he eat?"* followed by "d*oes s/he have diarrhea?"* Rather than follow up by asking what the child was eating, most providers never addressed feeding practices or nutrition again during the sick child consultation. In prenatal consultations, providers tended to give vague advice about "eating well" rather than asking any questions about the mother's current diet or suggesting specific foods to eat.

4.10 Summary of Results

The data suggest several things:

1. Providers did not understand the fundamental nature (i.e. causes, characteristics and consequences) of stunting
2. The majority of providers could not differentiate between chronic and acute malnutrition
3. There was no real difference between providers' knowledge across states, type of facility or years of experience but profession was a significant factor in knowledge of stunting
4. Some providers gave quality, detailed nutrition counsel while others used shaming or vague language that did not help the mother change her behavior
5. Providers were capable of giving quality counsel without having a complete understanding of the nature of stunting and its causes, characteristics and consequences

5. Discussion, Recommendations & Conclusion

5.0 Overview

This research addressed a critical gap in both the literature and the field—the absence of research and evidence on the knowledge, attitude and practice of healthcare providers regarding chronic malnutrition. The purpose of this study was to evaluate how providers conceptualized and addressed stunting in their everyday practice in order to improve the curriculum and materials used to train them. These objectives were accomplished by using a three-part survey to address provider knowledge on the causes, characteristics and consequences of stunting and by observing providers during nutrition consultations with mothers of children under two years of age.

The cross-sectional design of this study created a snapshot of providers' current KAP. Therefore, these data cannot be used to infer *why* certain groups outperformed others or to generalize findings to other states. However, the knowledge acquired from this study is still a valuable guide for the GMOH, Guatemalan NGOs and the URC as they design training curriculum and workshops to address the identified gaps and strengthen the healthcare workforce. Additionally, the data collection tools and techniques used could also be modified for use in different cultural settings with literate populations of providers.

5.1 Discussion

The Zero Hunger Plan demanded a difficult focus and behavior shift away from prioritizing acute malnutrition towards prioritizing stunting. This challenging transition was likely exacerbated by the fact that the majority of providers do not fully grasp the differences between the two types of undernutrition. An overall average survey score of 51.7% suggests that providers lack a fundamental understanding of the nature of stunting and the resulting

implications for morbidity and mortality. Many had a tendency to use acute malnutrition as the default answer in the survey and to gravitate towards talking about acute malnutrition during consultations. This could be because 47% of providers surveyed considered stunting a short-term condition and 40% did not associate it with a height for age deficit. This mentality might explain why many health facilities almost exclusively focused on underweight children or vaccinations at the expense of identifying and counseling mothers of stunted children. The observation further illustrate how misconceptions about IYCF practices and the characteristics of stunting manifest themselves during consultations.

Based on the data collected, we cannot say with confidence that providers' knowledge about chronic malnutrition differs by state, years of experience or type of health facility. Profession, however, seemed to influence provider knowledge of stunting. The data suggest that auxiliary nurses are the least knowledgeable about stunting. The observations support this distinction—among auxiliary nurses, educators and professional nurses, educators proved to be the most efficient, dynamic and helpful group of providers during nutrition consultations followed by professional nurses. Of all three professional groups, auxiliary nurses had the lowest overall score at 13.9 points, almost 3 points below the average.

Educators outperforming auxiliary nurses both in practice and knowledge is surprising. This is especially true because auxiliary nurses receive eight months of training plus an in-field practicum compared to educators who receive no formal training. Also surprising, educators provided better feeding advice than professional nurses. Nurses did not put their more advanced knowledge of stunting to use to improve the quality of their counsel. This could be because nutrition counseling is not professional nurses' primary job. The data begs the question, *where did the exceptional educators get their knowledge about stunting and superior counseling techniques? Did they are*

absorb information about chronic malnutrition from government sponsored trainings or from other sources on their own time?

Triangulating quantitative and qualitative data suggests that irrespective of consultation quality, providers have a weak understanding of how height for age is connected to stunting. Four of five providers observed failed to plot data on the growth curves during a consultation and only 34% correctly differentiated between the physical characteristics of stunting compared to wasting (Figure 8). Perhaps the majority of providers failed to address stunting during GMC because they did not fully grasp the *implications* of stunting for a child's classification and feeding regimen. (i.e. how a child's physical characteristics affect his nutritional status, or that the rest of the consultation should tailor feeding practices to the child's age and current nutritional status). If providers do not learn to correctly identify a stunted child or fail to conceptualize the implications of chronic malnutrition, it will continue to reflect in childhood and adult health outcomes.

Additionally, the majority of auxiliary nurses, professional nurses and doctors responsible for giving sick child or prenatal consultations either did not mention nutrition at all or failed to address it in a significant, behavior-changing way beyond asking, "*Is the child eating well*?" Although it is common to stop feeding a sick child, providers almost never incorporated nutrition or feeding advice into sick child visits. This is dangerous because several bouts of diarrhea could be very damaging to a child's growth and development. Additionally, when providers primarily ask yes or no questions like *"Is he eating?"* or *"Do you give her the supplements?",* mothers do not have the opportunity to ask specific questions or raise concerns that they might face at home. If given the opportunity to express the challenges they face implementing appropriate IYCF practices, perhaps mothers might be able to discuss creative solutions with providers.

According to Guatemala's 2008/9 Maternal and Child Health Survey, only 55% of children 0-3 months were exclusively breastfed. That number fell to less than one in three for 4-6 month olds. Interestingly, despite initiating complementary feeding too early in many cases, 15% of mothers were still not feeding their infants solids foods at 7-8 months (MSPAS, 2009). These data are not surprising considering less than half of providers identified complementary feeding and exclusive breastfeeding as fundamental factors contributing to stunting. If not even providers recognize the importance of optimal IYCF practices, mothers cannot be expected to spontaneously adopt these habits on their own. Although providers' lack of knowledge does not *cause* poor IYCF practices, it can help reverse current trends by providing mothers with evidence-based feeding counsel. Until providers prioritize IYCF as essential to preventing stunting, the majority of advice given during consultations will remain vague and ineffective.

Despite a low overall average on the survey (51.7%), there were several extraordinary educators. Almost all exceptional consultations were given by NGO-contracted educators belonging to a mobile health team. Like Yulissa, a provider might receive a low knowledge score but rate high for giving quality, detailed feeding advice to mothers without shaming them. This finding is very important because it indicates that providers don't have to know all the details about stunting to offer detailed, highly-applicable advice on optimal feeding practices. For the MOH and other aid agencies that provide technical support, this realization is a huge relief because it means they can focus provider trainings on only the most essential nutrition messages and still have a significant impact on counseling behavior.

5.2 Recommendations

The observations revealed that providers felt overwhelmed and were unable to perform all of their daily duties due to inadequate time and human resources. In order to improve nutrition counseling rather than pile more responsibilities onto overworked providers, the MOH must realize that *not all information is equally as important*. Provider training curriculum should *prioritize* only the most critical characteristics of stunting. For example, instead of distributing an entire binder of resources that describe the details of stunting, the MOH could use photos like Figure 11 to simply and succinctly capture the fundamental characteristics of stunting and its consequences.

Figure 11. A simple chronic malnutrition resource and sample explanation

All these children are of Mayan heritage. The group on the left reached the international growth standard (the blue line) for nine year olds because their mothers prevented stunting. They probably received quality complementary foods like mashed bananas or beans, chicken and eggs in addition to breast milk beginning at six months of age. The children on the right did not receive sufficient micronutrients during the 1000 days window. They are permanently stunted—too short for their age—and will never reach their appropriate height. They likely suffered from recurrent infections due to poor hygiene like hand-washing and received complementary foods with little nutritional value like watery atol, rice or tortillas. These foods didn't provide them with the nutrients needed for their brains or bodies to develop properly. It is very difficult, if not impossible, to reverse the negative effects of being starved of nutrient after two years of age.

Providers are already over-burdened with the number of tasks and health topics assigned to them. The qualitative data suggested that services offered at the primary level of care suffer because providers are spread too thinly to spend sufficient time giving quality feeding advice to mothers. For this reason, the goal of the planning-oriented recommendations in Table 13 is to prioritize and standardize the information taught to providers at the primary level of care through trainings and workshops. The data and recommendations should help the MOH *narrow* their focus on nutrition rather than generalize it.

The execution-oriented strategies in Table 13 focus on effective implementation. The majority of providers have less than one year of healthcare training and mothers often have very little formal education. The MOH should use simple explanations and applicable examples to convey essential IYCF practices. Teaching providers to use common words and easily understandable phrases will increase the effectiveness of training workshops and simultaneously prepare providers to give useful, comprehensible counsel to mothers.

Table 13. Recommendation to improve the MOH provider training strategy based on observations

Problem	Stage	Recommendation
Providers lack adequate human resources and/or time to sufficiently address family planning, nutrition, vaccines, hygiene etc.	Planning-Oriented	**PRIORITIZE** themes directly related to improving nutrition counseling (outcome-focused) instead of teaching generally about stunting (knowledge-focused). Use weaknesses identified by the study to prioritize topics (e.g exclusive breastfeeding or CF at six months)
Providers with less than two years of experience scored lower on the survey; in general providers did not share a common understanding of stunting	Planning-Oriented	**DEDICATE** time and resources to developing and instituting a series of standardized workshops for healthcare providers on the fundamental concepts of the 1000 days window
Workshops often use jargon that neither providers nor mothers understand; providers are inundated with nutrition	Execution-Oriented	**REQUIRE** simple, easily digestible but detailed language beginning with the workshops providers receive and extending to

materials but never translate it into feeding advice because of information overload		the consultations they give mothers (keeping in mind Spanish is not always the native language of mothers or providers)
The MOH's administrative role prevents it from assessing the impact of trainings on provider knowledge/behavior; providers don't get feedback on the quality of advice they give during nutrition consultations	Execution-Oriented	**COMMIT** to doing on-the-job observations and training in health posts and centers in order to give providers feedback and suggestion in real-time

5.3 Strengths and Limitations

This study had several strengths. As a result of being a foreigner to the MOH, the URC and the region, providers didn't treat the researcher as a threat. The data collected might not have been as accurate had the MOH nutritionist or other high level MOH official completed the observations. As providers completed their daily tasks, valuable observations and quotes that enriched the study overall were collected in a natural environment. One strength of the convergent parallel analysis design is the ability to use both qualitative and quantitative data to draw nuanced conclusions about *how* providers' perspectives and knowledge gaps regarding stunting drive their behavior during provider-client interactions.

This study has several limitation such as the small number of professional nurses (n=12). Small sample sizes and cell counts mean that differences in scores between professions should be view cautiously. Additionally, the survey distribution in Totonicapán was after extremely short notice. The original pile sort methodology was too time-consuming to complete in 12 hours and had to be altered. In order to distribute 90 surveys at once, the phrases in the pile sort were randomized and providers categorize the scrambled phrases (in the table itself rather than using slips of paper) by writing "chronic, acute or both" under each phrase. 38 out of 122 providers completed the

randomized table version of the survey. This difference in methodology could account for some of the variation in provider scores.

In section one of the survey, the objective could have been clarified by stating that the blue line in the diagram represented the median height for five year old boys instead of simply stating that the figures were are all five years old. In the absence of a standard (like the median height for five year olds), one could argue that all of the boys could be stunted. Finally, the second set of mutually exclusive characteristics in section three states that "'[chronic malnutrition] is irreversible, long term effects can be seen over a person's lifetime". This statement is not incorrect but could have been strengthened and made more accurate by the modification, "is irreversible after two years of age" to clarify that the efforts during the 1000 days window can have a positive impact on growth.

5.4 Implications for Guatemala

The data presented in this study are valuable because a nuanced overview of provider knowledge and practice regarding stunting did not exist before this research. As stated, the GMOH nutritionists and their staff are rarely able to spend time in the field. Armed with a snapshot of providers' knowledge, attitude and practice, the GMOH and other stakeholders will be better equipped to allocate their scarce human and financial resources to *tailor* trainings to providers' specific knowledge gaps. Ideally, the impact of this study is to improve both IYCF practices in the home and to decrease the incidence of chronic malnutrition in children under two. The WHO's projections for 2020 do not anticipate significant decreases in stunting prevalence in either Africa or Latin America (De Onis et al., 2012). Although many factors influence this projection, perhaps strategic use of resources to effectively equip healthcare providers for nutrition counseling can accelerate progress on controlling stunting.

5.5 Conclusion and Public Health Implications

In order to efficiently and effectively decrease the incidence of stunting through the implementation of community-based interventions, healthcare providers must fulfill their role as conduits of useful, accurate nutrition advice to mothers. To properly equip the healthcare workforce to advise on optimal IFYC practices, the MOH and other technical advisors must understand providers' knowledge gaps and misconceptions about stunting.

After requesting and collecting data on provider KAP, MOHs and NGOs working at the implementation level should:

1. appropriately apply study data to prioritize key 1000 days window concepts for future trainings
2. design workshops that successfully train providers on the *fundamental* aspects of stunting, ensuring that trainings strengthen and standardize providers' knowledge base and equip them to offer focused and quality advice on IYCF.

Data from Lassi et al. support this conclusion. Concise, focused messages from providers are more successful at improving HAZ scores than general messages about nutrition or education campaigns (Lassi et al., 2013). Knowing what to prioritize and how to frame it are critical steps in strengthening the healthcare workforce and implementing interventions with an educational component. Once a tailored training system is in place, continued monitoring and evaluation to assess the impact of such trainings on the incidence of stunting will be crucial.

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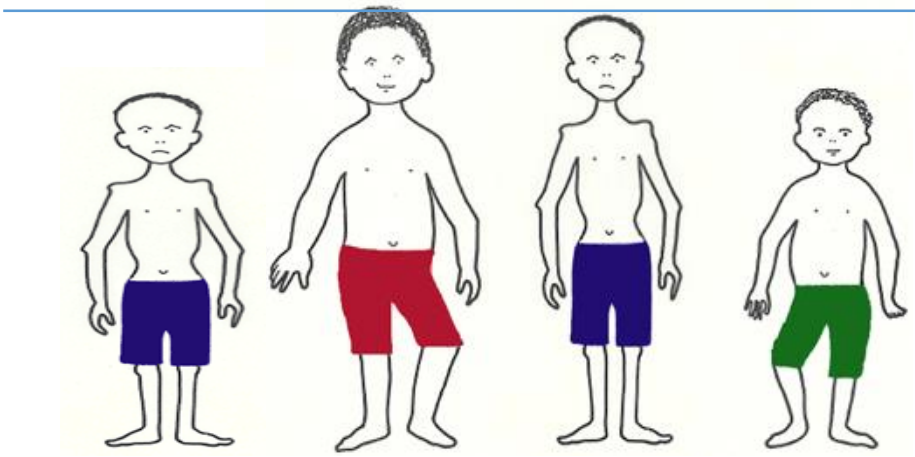
Appendix

A. Three-part baseline survey

Formulario #3 Para Proveedores

I. PARTE Instrucciones: Aquí encontrará cuatro figuras que representan a niños de cinco años de edad. Debajo de cada figura, escriba si ese niño tiene desnutrición crónica, desnutrición aguda, ambas o si tiene estado nutricional normal.



II. PARTE Instrucciones: Lea detenidamente las posibles causas que se describen a continuación y defina qué grado de influencia tienen en el desarrollo de la desnutrición crónica en niños menores de dos años.

POSIBLES CAUSAS	Poco	Regular	Mucho
El niño no recibe alimentos de buena calidad			
Condiciones de agua y saneamiento no apropiadas que incrementan las infecciones			
Porque el padre fue desnutrido durante su niñez			
El niño no recibe lactancia materna exclusiva durante los primeros seis meses de vida (se le dan otros alimentos y bebidas)			
Las familias tienen poco acceso a alimentos nutritivos			
Falta de vitaminas y minerales (micronutrientes) en la dieta de la madre			
El niño empieza a comer alimentos sólidos tarde (después de los 6 meses)			
La madre no se alimentó bien durante el embarazo			
Falta de vitaminas y minerales (micronutrientes) en la dieta del niño			
Familias grandes (muchos hijos)			
La herencia o genética			

III. PARTE <u>Instrucciones</u>: En base a sus conocimientos sobre desnutrición crónica y desnutrición aguda, deberá colocar en la columna que usted considere, cada tarjeta que contiene causas o consecuencias. Cada categoría puede contener un número diferente de tarjetas.

Desnutrición Crónica	Desnutrición Aguda	Ambos Tipos de Desnutrición

B. Demographic Information

Formulario #4 Información General de Proveedores

¡Escríba en letra de molde, por

Nombre:		**Fecha:**
Sexo: □ **H** □ **M**	**Edad y año de nacimiento:**	
Origen: Departamento:		**Municipio:**
□ **Centro de Salud** □ **Puesto de Salud** □ **Centro De Convergencia**		**Nombre del centro o puesto:**
Cargo actual: □ **Educador/a** □ **Auxiliar de Enfermería** □ **Enfermero/a Profesional** □ **Médico/a** □ **Nutricionista** □ **TSR**		
¿Cuánto tiempo lleva desempañando su cargo actual?:		
¿Cuánto tiempo ha trabajado en servicios de salud (tanto públicos como privados)?:		
En el servicio de salud actual: **1.¿Cuántos casos de desnutrición crónica en niños menores de 5 años ha visto usted en el último mes?:** **2.¿Cuántos casos de desnutrición aguda en niños menores de 5 años ha visto usted en el último mes?:**		
¿Ha recibido capacitaciones sobre la desnutrición? □ **Si** □ **No**		**¿Cuántas?**
Tema de las capacitaciones, por favor especifique:		
¿Cuándo recibió la(s) capacitación(s):		**¿Por quién?:**

C. Structured observation guide for providers and mothers

Formulario #2: Guía de Observaciones

(proveedores de salud/niños menores de 2 años)

Instrucciones: El investigador observará la consulta brindada a niños menores de dos años en el servicio de salud y marcará con una (√) en el cuadro correspondiente a la actividad realizada por el proveedor de salud y un (-) guion en el cuadro correspondiente a la actividad no realizada.

Sexo del niño/a:	Edad:	Peso:	Talla:
Motivo de consulta:		Fecha de próxima cita:	

☐ Realiza monitoreo de crecimiento ☐ Peso ☐ Talla ☐ Nuevas curvas de crecimiento

☐ Clasifica el estado nutricional del niño/a usando las curvas de crecimiento

☐ Bajo peso ☐ Retardo de crecimiento ☐ Desnutrición aguda

☐ Explica a la madre el significado de la clasificación de su hijo/a

☐ Explica la diferencia que existe entre las clasificaciones

☐ *Pregunta* qué le da de comer o beber a su niño y aconseja según corresponda.

☐ *Explica* cómo debería de dar de comer o beber a su niño

- Consistencia
- Cantidad
- Frecuencia
- Variedad
- Modo de Dar

☐ Le recuerda a la madre cómo necesita dar de comer a su niña (o) según su **estado nutricional**

☐ Le recuerda a la madre cómo necesita dar de comer a su niña (o) según su **edad**

☐ Revisa el carné del niño. Le da a la madre según requiera el niño(a):

☐ Vitaminas ☐ Micronutrientes en polvo ☐ Vitacereal ☐Zinc

☐ Pregunta si le da hierro y el ácido fólico a su niño y cómo se lo ha dado (micronutrientes en polvo, jarabe, etc.)

☐ Recuerda a la madre la importancia del monitoreo del crecimiento

Formulario #2 Entrevista de Salida con Madres

¿Por qué vino hoy al servicio de salud?

Si su niño(a) presenta un problema ¿Qué le dijeron que debe hacer al respecto?

☐ ¿Realizaron el monitoreo de crecimiento? ☐ ¿Pesaron al niño/a? ☐ ¿Le tomaron la talla?

☐ ¿Le mencionaron alguna situación relacionada a la enfermedad del niño/a por la que tenga que regresar inmediatamente a este servicio o ir al hospital?

☐ ¿Le dijeron alguna información sobre: ☐ El peso de su niño/a? ☐ La talla

☐ ¿Le dijeron si el niño/a es desnutrido?

☐ ¿Anotaron el peso y/o la talla en algún lugar? (pedir el carné y ver si ese día anotaron peso y/o talla y también si los puntos en el carné están graficados y unidos)

☐ ¿Le dijeron alguna instrucción o información sobre cómo debe alimentar al niño/a?

- Cantidad
- Variedad
- Frecuencia
- Consistencia
- Modo de Dar

☐ ¿Le dieron algún medicamento o vitaminas?

- ¿Le explicaron cómo usarlo? ☐ Cantidad ☐ Consistencia ☐ Frecuencia ☐ Otro _____

☐ ¿Le dijeron cuándo debe regresar? Fecha:

☐ Comentarios: