Improving Childhood Nutrition in Rural Dominican Republic

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Improving Childhood Nutrition in Rural Dominican Republic

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Acknowledgements

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Intervention Summary

This nutrition education intervention seeks to decrease malnutrition and increase overall health status of rural Dominican Republic children in the village of El Cercado, Dominican Republic. Working with the Child Nutrition Program run by Solid Rock International, this educational intervention will target caregivers of children enrolled in the nutrition program. Using a multi-level strategy, this intervention focuses on hygiene practices and safe food preparation, formalized nutrition education, food access and introduction of new foods. Caregivers will take part in five interactive lesson sessions where they will engage in hands-on learning and skill development associated with the target areas. Additionally, clinic visits and home visits will serve to reinforce and assess the implementation of the information presented during the intervention.
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Improving Childhood Nutrition in Rural Dominican Republic

A recent series of articles in *The Lancet* in 2008 tackled issues associated with undernutrition in the world and stated that nutrition needs to be a primary focus of international aid efforts. This series points out that the developmental disabilities and early mortality associated with poor nutrition are nearly completely preventable with evidence-based proven interventions (Scaling Up Nutrition [SUN], 2010a). Indeed, the first of the United Nations’ Millennium Development Goals is to eradicate poverty and extreme hunger. Related goals include reducing child mortality and improving maternal health.

The Dominican Republic (DR) is a medium-developing country, as classified by the United Nations. As such, the country struggles with many aspects of poverty, including poor economic development and job opportunities, low family incomes, poor nutrition, lack of adequate health care, and lack of adequate education. While the country has experienced some improvements in some regions due to tourism, the rest of the country has not necessarily benefitted in the same way. In rural Dominican Republic, there are many remote ‘barrios’ where residents have very low income levels, limited access to educational opportunities, limited availability of adequate health care, and limited access to adequate food and nutrition.

Poor nutritional status often leads to developmental issues. Parents with developmental issues may then raise more children with poor nutritional status. Educating parents about affordable and accessible ways to better meet the nutritional needs of their children is one way to improve nutritional status of children today and break the possible cycle of future poor nutrition.

This nutrition education intervention seeks to increase exclusive breastfeeding to six months; and increase hygiene practices regarding hand-washing, food preparation, and cleanliness of dishes; increase knowledge of the importance of a balanced diet and food groups;
increase the variety of foods eaten, and the creation or expansion of gardens to produce micronutrient-rich foods. These goals will be accomplished through a multi-level intervention based on evidence-based practices to address improved nutrition and health. This intervention utilizes five dedicated lesson sessions and demonstrations, monthly clinic follow-up and professional reinforcement, and at least four informal home visits. Mothers and primary caregivers of children enrolled in a child nutrition program sponsored by a non-governmental charitable organization (NGO) are targeted.

This proposed health promotion program will work in conjunction with the existing child nutrition program in El Cercado, Dominican Republic, targeting primary caregivers of children enrolled in the program to help create sustainable change in nutritional status. Children who are underweight or who appear to be malnourished received a monthly supply of milk and medical monitoring and treatment to interrupt the effects of malnutrition. This program does not provide supplements throughout a child’s life. By educating primary caregivers in conjunction with providing additional nutritional aid to the at-risk child while the child is in the program, this intervention has the potential to create lasting changes for the child, and indeed for the whole family, in the future beyond the child’s time in the nutrition program.

**Literature Review**

**Profile of the Dominican Republic**

The Dominican Republic is a Caribbean country that occupies roughly two thirds of the island of Hispaniola and is bordered by its only neighbor, Haiti. In area, this country is slightly larger than twice the size of New Hampshire. The estimated population of this country in July 2011 will be 9,956,648 people (Central Intelligence Agency [CIA], 2012). The country is geographically diverse, including crystal blue Caribbean beaches, rugged mountain terrain, and
austere deserts (Montgomery & Montgomery, 2009). Sixty-nine percent of the population in 2010 was living in urban settings (CIA, 2012), and the 2010 life expectancy was 72.8 years (United Nations, 2010).

The Dominican Republic is considered a medium developing country\(^1\) by the United Nations. The Human Development Index is a statistical measure that combines indicators of life expectancy, educational attainment and income into a composite development index score between 0 and 1, rating the Dominican Republic at .689 or 100 out of 187 countries. Medium human development includes countries with HDI scores between .5 and .79 (United Nations, 2010; United Nations Development Programme [UNDP], 2011).

The 2010 gross national income per capita for 2008 was $5,030, and the mean years of schooling in 2010 was 6.9 years (CIA, 2012). According to the Oxford Poverty and Human Development Initiative (2011) in 2007 48.8% of people in the DR live below the national poverty line, 13.6% live below $2.00 a day, and 4.3% live below $1.25 per day. In one study, interviews with mothers between 16 and 45 years of age reported an average family income of less than 28,500 pesos ($868 U. S. dollars) per year (Babington, 2006). According to the 2002 census, 87% of people age 15 and over can read and write, although at what level is not specified (CIA, 2012). To provide a comparison, the gross national income per capita for 2008 in the United States was $43,700, the average life expectancy was 78.37 years, and literacy was 99% (CIA, 2012).

\(^1\) The Human Development Index is based on life expectancy at birth, mean years of schooling, expected years of schooling, and GNI per capita. In 2011, the Dominican Republic ranked 100 out of 187 countries with an HDI of .689. High Developed Countries have an HDI > .8; Low Developed countries have an HDI < .5 (UNDP, 2011).
**Nutritional Status**

In the Dominican Republic, nutrition-related problems of poor nutrition/malnutrition and obesity-related concerns are significant health issues. According to *Scaling Up Nutrition: A Framework for Action* (2010b), the number of under-nourished people in the world has been growing steadily since 1995, and reached over one billion in 2009. While infant and under-five child mortality rates related to malnutrition have declined in developing countries, there are still a significant number of preventable deaths among this population (Zulfiqar, Darmstadt, Hasam, & Haws, 2005). The percentage of underweight children has fallen from 33% in 1990 to 26% in 2006, but these numbers still greatly exceed the Millennium Development goal of 16.5% by 2015 (SUN, 2010b).

**Malnutrition.**

Malnutrition is associated with over 50% of childhood deaths (Kelly and Black, 2001). Both stunting (low height for weight) and malnutrition (low weight for age) are prevalent in the Dominican Republic. Stunting rates in the Dominican Republic were around 10% in 2000 (Lutter & Rivera, 2003). In 2008, the prevalence of stunting among children under five years of age in the Caribbean region was 23.5%, and in the Dominican Republic the rate was 9.8%, not showing much change over time (Cespedes, Lechtig, & Francisch, 2011). In Santo Domingo, the capital of the Dominican Republic, 1.8% of children are estimated to be moderately to severely malnourished based on World Health Organization data (McLennan, Mills, & Fick, 2008). In a study of 110 social protection programs in eight Caribbean countries and the Dominican Republic, the key nutritional problems that were noted included “stunting, underweight, acute undernutrition (or acute malnutrition), anemia, overweight and obesity” (Cespedes et al., 2011, p. 173). In a study of three Dominican communities, approximately 17%
of children were stunted and “7% had a BMI-for-age z-score that was <5th percentile” (Mills, Mills, & Reicks, 2007, p. 62).

Higher energy availability, higher female literacy, and higher levels of health expenditures are associated with lower levels of malnutrition and stunting in developing countries, including those in Latin America. Sixty-seven percent of the variability in wasting was explained across regions based on these economic, demographic and social factors. Frongillo, de Onis, and Hanson (1997) found that “most national variability for stunting (76%) and wasting (66%) was explained by national factors and geographic region” (p. 2302).

Early faltering and stunting is problematic since “stunting in length after 24-36 months is permanent, and therefore, unlike the pattern with weight, no catch-up is observed” in height growth (Lutter & Rivera, 2003, p. 2943S). Re-feeding is most successful when it occurs with children during the first two to three years of life (see Lutter & Rivera, 2003). Cespedes, Lechtig, and Francisch (2011) make a strong argument for improved efficiency and efficacy in targeting children under two years of age and pregnant women with regard to nutrition aid and programs:

Efficacy improved notably when the priority groups are children under two and pregnant women because the highest rate of return on social investments are obtained from these groups. The probability of having a nutritional impact on children over 2 years of age is practically zero. The total program cost is less than half only when children under two are covered, because they are 1.3% of the total population, whereas children under 5 constitute 3.3% of the population (2.5 times more in absolute and relative numbers). (p. 178)
Evidence shows that reducing malnutrition can indeed help in childhood survival rates. Decreasing the prevalence of low weight-for-age by 5% in developing countries by 2005 would have yielded a total decrease in child mortality by 30% and would have decreased under-five child mortality by 13%. That there is clear evidence that addressing malnutrition is key to childhood survival (Pelletier & Frongillo, 2003).

**Obesity-related concerns.**

Nutritional status also impacts a variety of other aspects of health and quality of life. Some of the more noted impacts include physical growth, work capacity, cognitive development, reproduction, and adult-onset chronic diseases, including obesity (Caballero, 2001; Pelletier & Frongillo, 2003). Obesity is quickly becoming a leading global health risk, even in developing countries, and there is mounting evidence that chronic malnutrition, something common in low-development countries, is a risk factor for obesity and other chronic diseases in adulthood (Caballero, 2001; Milman, Frongillo, de Onis, & Hwang, 2005). Stunted children in Brazil showed significant impairment of fat oxidation compared to non-stunted children, lending support to this body of research on the relationship of early malnutrition and later obesity (Hoffman, Sawaya, Verreschi, Tucker, & Roberts, 2000). Obesity prevention is recognized as being important as a message in nutrition programs in developing countries (Uauy & Kain, 2012).

**Levels of Factors Impacting Nutritional Status: Immediate, Underlying, and Basic Causes**

Three levels of factors impact nutritional status of children in the Dominican Republic. The three levels of factors that impact child growth are:

1) immediate factors (adequate dietary intake for age and health issues, such as chronic disease, parasites and diarrheal illnesses);
2) underlying factors (food security, maternal and child care, and health services and environment); and

3) basic factors (formal and non-formal institutions, political and ideological factors, economic structures, and potential resources) (Frongillo et al., 1997).

![Figure 1. Nutrition-related issues in rural Dominican Republic](image)

**Immediate factors.**

Adequate dietary intake for age and health status are the two primary factors that impact child growth. Nutritional concerns, mainly malnutrition and obesity-related issues, impact the lives of many Dominicans, especially children, as discussed earlier. The problem is so pervasive that it may be considered normative in the population.
Adequate dietary intake.

Some common malnutrition-related issues in the DR include low levels of protein consumption; missing micronutrients, such as vitamin A; and low levels of iron intake, leading to anemia. In the Caribbean region the prevalence of anemia was 39.5%. The main nutritional problems affecting children under the age of two are stunting and iron-deficiency (Cespedes et al., 2011). Iron, zinc, and vitamin B-6 are the nutrients most likely to be lacking in the complementary feeding diets of young children in developing countries (Lutter & Rivera, 2003). The greatest risk for malnutrition and stunting occurs during the first months of a child’s life when breastfeeding and complementary feeding is taking place (PAHO/WHO, 2003). Most faltering of growth happens in the first eight months of life, beginning around three months and continuing rapidly until about 12 months, and then slowing and being basically completed by 15 months (Kelly & Black, 2001; Lutter & Rivera, 2003; SUN, 2010a).

Exclusive breastfeeding provides increased immunologic protection and “eliminates the ingestion of pathogenic micro-organism through contaminated water, other fluids, and foods” (Lutter, 2011, p. 1). In addition to the importance of exclusive breastfeeding, early initiation of breastfeeding is critical—preferably within the first hour so that the infant can benefit from the protective factors of colostrum (the first milk) (Lutter, 2011; PAHO/WHO, 2003; World Health Organization [WHO], 2008).

The risks of not breastfeeding are many, including increased risk of acute illness and/or mortality, increased risk of chronic illness, and reduced intelligence. Introducing complementary foods too early can also lead to infants receiving inadequate nutrition for proper growth and development (Inayati et al., 2012). Undernutrition is a significant risk that can impair physical growth, impair cognitive development, increase morbidity and mortality, reduce economic
productivity, and later in life, increase the risk of chronic diseases (Prost, 2009). Research shows that globally, lengthening begins to decrease immediately after birth, and weight begins to falter around 3-6 months. For infants 2-5 months of age, early introduction of complementary foods affects both length and weight growth. Insufficient micronutrients are associated with decreased linear growth, while insufficient energy intake is associated with wasting (Prost, 2009).

Exclusive breastfeeding for the first six months of life is crucial to meeting the nutritional needs of infants. As in many places, most Dominican women breastfeed their children. According to the World Health Organization (2007), 93.7% of children in the Dominican Republic are breastfed at some point in infancy. The World Health Organization recommends exclusive breastfeeding for six months before introducing complementary foods. Complementary foods are introduced only when the child’s nutritional needs can no longer be met by breastfeeding alone—usually around six months of age (PAHO/WHO, 2003).

Exclusive breastfeeding rates for Dominican children less than four months was 14% and for children less than 6 months was 9.4%. While exclusive breastfeeding is not the norm, clearly the vast majority of women (93.7%) have breastfed and demonstrate the skill and ability to do so, as well as the belief that breastfeeding is beneficial for infants. The mean breastfeeding duration in the Dominican Republic is only 10.7 months, the second shortest length of time among countries in Latin American and the Caribbean (Lutter, 2011).

In one study, all Dominican mothers reported breastfeeding their children a minimum of at least six months, and most reported breastfeeding for at least one year (Babington, 2006). However, the rates of exclusive breastfeeding among infants younger than 6 months of age have decreased in the Dominican Republic (Lutter et al., 2011). With regard to the mean duration of breastfeeding in the Dominican Republic between 1986 and 1999, the average increase in total
duration of breastfeeding was 1.6 months greater. Between 1999 and 2007, the difference was a
decrease of exclusive breastfeeding by -0.2 months. Not only has the rate of exclusive
breastfeeding among infants up to six months of age decreased, but so has the mean length of
breastfeeding (Lutter et al., 2011).

In addition to breastfeeding practices, complementary feeding practices also need to be
addressed. Complementary feeding is providing the child with additional foods when breast
milk alone or infant formula alone is insufficient to meet the nutritional needs of the child
(WHO, 2008). The targeted age for using complementary feeding practices is between 6 months
and 24 months of age, although breastfeeding can occur beyond two years of age (PAHO/WHO,
2003).

Helping caregivers understand which foods contain critical nutrients is an important part
of introducing complementary feeding and changing eating behaviors and improving nutrition.
Of special importance is emphasizing animal source proteins as an important part of diets
foods are key sources of zinc and iron, nutrients often lacking in the diets of children in
developing countries (Dewey, 2005).

The information presented in this intervention is based, in part, on information presented
in Guiding Principles for Complementary Feeding of the Breastfed Child, published by the Pan
American Health Organization (2003). See Lesson 2 in Appendix B for complete PAHO
guidelines.

**Overall health status.**

A second immediate factor is health-related issues that impact nutrition, such as chronic
diseases, parasite infections, and diarrheal illnesses often caused by contaminated water
(Frongillo et al., 1997). Any of these health conditions can impact nutritional status by creating dehydration, lack of absorption of nutrients, or simply lack of appetite. Almost 90% of diarrhea-related diseases can be attributed to unsafe water, poor hygiene, and poor sanitation practices (UNICEF, 2012). Since diarrheal diseases contribute to malnutrition, addressing hygiene concerns that may help decrease the prevalence of these illnesses is of paramount importance. Issues associated with malnutrition can also lead to obesity and the chronic disease states associated with obesity, such as diabetes, high cholesterol and coronary heart disease (Caballero, 2001; Pelletier & Frongillo, 2003).

Recommendations from A Road Map for Scaling Up Nutrition (SUN, 2010a) note that there is a benefit for societies to have “a fuller understanding about the nutritional benefits of different dietary, consumption, and hygiene practices” (p. 7). Much of the lesson material is based on the recommendations from the SUN research and programming. The first lesson on hygiene and food preparation practices is an integral part of improving nutrition and overall health status because of the contribution to malnutrition as a result of diarrheal illness caused by pathogens in unpurified water and from poor hygiene practices (WHO, 2012). Lesson materials developed by the Pan American Health Organization will be used as part of this lesson on hygiene and food preparation (Fernández & Janzen, 2005). See Appendix C for the complete materials.

**Underlying factors.**

Underlying causes related to child growth include factors such as health services, maternal and childcare, access and food security, and the environment (Frongillo et al., 1997).
Health services.

The statistics with regard to health care access and affordability in the Dominican Republic are less than positive. In 2002, public health expenditure represented 1.9% of GDP, decreasing to 1.7% in 2003, and to 1.2% in 2004, which explains the country’s high out-of-pocket expenditures in health. According to the World Health Statistics 2006, out-of-pocket expenditure in the Dominican Republic accounted for 70.8% of private health expenditure and 47.9% of the total health expenditure (WHO, 2009, p.1). As of 2009, the Dominican Republic ranked in the bottom quarter of all countries with regard to health expenditure (Montgomery & Montgomery, 2009).

In the Dominican Republic, there are four modes of health care access. There are three “separate and overlapping public health delivery systems designed to provide health care services to approximately 80% of the population. Actual reports suggest, however, actual coverage extends to fewer than 40% of the country’s population” (Babington, Kelley, Patsdaughter, Soderberg, & Kelly, 1999, p. 21). The Secretaria de Estado de Salud Publica Y Assistencia Social (SESPAS) provides social aid and public health care to the general Dominican population. The Instituto Dominicano de Seguros Sociales (IDSS) is the basic social security service for Dominicans and their dependents. The Instituto De Seguridad Social de las Fuerzas Armadas (ISSFAPOL) serves members of the armed forces. In addition, people of the Dominican Republic may seek health care from private health care clinics if they have the financial means to do so (Babington et al., 1999; Dohn, Chávez, Dohn, Saturria, & Pimentel, 2004).
Access and food security.

As discussed previously, many families in rural Dominican Republic lack financial resources to purchase a wide variety of food items. Financial security is but one demographic factor that impacts nutrition.

Geographic region is of particular importance in rural Dominican Republic. Many individuals do not have ready access to water—for cooking and personal needs or for agricultural needs. El Cercado, the proposed community site for this health intervention, is located in the Western part of the country and in the mountains. There are seasons that are arid and not suitable for growing crops or gardens unless there is access to water for irrigation. This geographic limitation impacts access to water and access to practicing agriculture for many individuals.

Dominican people understand the value of a garden and have the skills to maintain a garden; however, there are a number of barriers, including lack of irrigation, to maintaining one’s own garden. Home gardens are often considered a vital part of food-based nutrition programs in developing countries. These family gardens often provide micronutrient-rich foods that can enhance a family’s diet (Burchi et al., 2011; Food and Agriculture Organization of the United Nations [FAO], 2010; Marsh, 1998a, 1998b; Petty, Morrison, & Hine, 2003). Crop foods are often grain and provide the majority of the energy needs, while garden foods yield the vitamin-rich fruits and vegetables that provide necessary micronutrients. Home gardens provide a number of benefits to poor families, including increased access to and food security for nutritious foods, increased variety of foods that provide greater quantity of nutrients, and potentially an increased source of income for families (Marsh, 1998a, FAO, 2010). For many families, gardens provide more than 50% of the fruits and vegetable consumed by the family.
There is also the possibility of growing medicinal plants and herbs that could benefit the family (Marsh, 1998a).

An important aspect of promoting gardens as a means of food security and food diversity for poor families is helping families know what to do with the foods they grown (Burchi et al., 2011). The FAO recommends that any gardening or agriculture development program also include nutrition education, and that nutrition programs contain information about best gardening practices for the area targeted (FAO, 2010; Marsh 1998a, 1998b). Using local community leaders, as this intervention does, is one way to help bring local knowledge to the target population. In addition, creating recipes and providing cooking and tasting demonstrations is one way to help increase this knowledge that can be put into practice (FAO, 2010; Marsh 1998a, 1998b).

Gardens may also serve as an additional source of income for families. Successful agriculture and garden efforts not only increase food security, but also allow families the potential for bartering or selling some of the produce to benefit the family in financial or other material ways (Petty et al., 2003; FAO 2010). An indirect benefit of gardens is also improvements in human capital. Being able to grow produce leads to a sense of accomplishment and pride in caring for one’s family, promotes better child health and nutrition, and often leads to increased self-esteem among women, who are more likely to be the tenders of the gardens (Petty et al., 2003).

Mills, Mills, and Reicks (2007) found that roughly two-thirds of Dominicans in three rural communities had a garden. The gardens ranged in size from less than one acre to about nine acres. One third of residents had no access to land for a garden, roughly one-third had less than one acre of land for a garden, and the remaining one-third had between one and nine acres
of land. Many residents used patio space or yard space as their gardening area. Of the residents in these communities, 84% reported having knowledge about planting and maintaining a garden (Mills et al., 2007). Such small gardens greatly limit the amount of food that can be produced.

Residents who were able to maintain a garden believed the garden allowed them to save money by not having to buy all produce at the local market or from street vendors. Sixty-six percent of respondents in one study reported that the garden helped to save money, while only 8% reported that the garden was good for meeting dietary needs or diversity of food options (Mills et al., 2007). Many participants in the communities studied by Mills et al. (2007) ate only the most basic staple vegetables from their gardens, such as yuca and guandules (pigeon peas), and sold the more seasonal vegetables such as eggplant, tomatoes and peppers. These seasonal items were seen as being more valuable as a source of income than as a nutritional source.

North’s (2012) experiences and observations are consistent with the reports of participants in Mills et al. (2007) study. In the local communities surrounding El Cercado, Elias Piña, and San Juan de la Maguana, most local gardens contain starchy root vegetables for family consumption, and other vegetables are often grown for sale at the market. Similar patterns can be seen with egg production among families who have chickens and adequate eggs to sell. While eggs provide an excellent source of protein, many families choose to sell the eggs rather than eat them. They see greater value in the income than in the nutritional value. Eggs sell for 5 RD each (about $1 US per dozen), and are an expensive food commodity when living on poverty income (Babington, 2006; North, 2012). These economic factors impact food choice and eating habits among the Dominican people.

Basic gardening practices and information for this lesson is taken from recommendations from the Food and Agriculture Organization of the United Nations (2010) and from an FAO
publication entitled Growing Vegetable for Home and Market (Nichols & Hilmi, 2009). The materials will be adapted to utilize evidence-based sociocultural and constituent-involving strategies. See Appendix B for the complete lesson plan.

**Environment.**

Certain foods are more accessible than others for the rural Dominican population. There is a wide variety of foods grown or produced in the Dominican Republic, including a diverse set of fruits and vegetables. As discussed previously, rural Dominican Republic is largely agricultural, providing access to a wide range of fruits and vegetables including, auyama (a pumpkin-like squash), yuca (cassava), mangoes, tomatoes, peppers, sweet potatoes, rice, beans, bananas, plantains, melons, papaya, guandules (pigeon peas), and corn. While a few of these products, such as mangoes, are seasonal, most are able to be grown year-round. Farmers raise chickens, pigs, goats, and cattle for meat sources. Cheese and eggs are also available food products from the agricultural community (Babington, 2006; Mills et al., 2007; North, 2012). But again, without adequate land or irrigation situations, or adequate income, having these foods in one’s home can be a challenge.

Despite the prevalence of agriculture as an industry, the availability of fresh fruits and vegetables has decreased “from 625 to 346 g per person per day” in the past 20 years (Mills et al., 2007, p. 59). Other foods might be seasonal in nature, such as mangoes, and therefore are not available sources of micronutrients, such as vitamin A, on a year-round basis (Mills et al., 2007). Rural markets often do not get regular deliveries of all goods, so residents must make do with whatever goods happen to be available in the market on any given day (North, 2012).
Basic factors.

A third level of factors that impacts nutrition are basic factors, such as formal and non-formal institutions, political and ideological factors, economic structures, and potential resources (Frongillo et al., 1997). In addition to health care access and access to food, there are a variety of other social and cultural factors that may impact an individual’s health and nutrition (Bourke-Taylor & Hudson, 2005).

Education and health literacy.

Dominican residents often have low levels of health literacy for many different health-related issues. Limited formal education and limited access to health care in general may contribute to these lower levels of health knowledge. For example, in a study of a cervical cancer prevention program, “none of the women seen by the mission team had an understanding of cervical cancer or its causes and preventative measures” (Montgomery & Montgomery, 2009, p. 496). In another study examining women’s health-seeking and self-care practices for lymphoedema [sic. British spelling] of the leg, most women did not understand their diagnosis of filariasis (a parasite that can cause lymphoedema and elephantiasis of the leg) and often attributed their condition to spider bites, pregnancy, menopause, heredity, varicose veins, accidents, and magical or superstitious events (Person et al., 2006). Likewise, knowledge about healthy eating and nutrition is limited, and often inaccurate (North, 2012). Nutrition knowledge will be discussed in greater detail later in the manuscript.

Underlying cultural belief systems.

In addition to low health literacy rates, cultural belief systems also impact access to health care. Dominicans often blame spiritual or superstitious causes for medical conditions (Person et al., 2006). Babington, Kelley, Patsdaughter, Soderberg, and Kelly (1999) also found
that spiritual and mystical practices were highly influential in seven rural villages in the Northern Dominican Republic. As a result, individuals often sought care from curanderos (folk healers), ensalmadores (special herbalists) or brujos (witch doctors) (Schumacher, 2010). Other spiritual influences have to do with religious beliefs. In a study looking at maternal mortality in Monseñor Nouel Province, DR:

The strong Catholic influence of the past and the lack of religious leaders in the present have created religious cults comingle with superstition. The modest infrastructure of the country, including sub-standard public transportation, electricity and telephones, have kept rural Dominicans isolated from the larger urban centers where myths and beliefs from the past have been suppressed by modernization (Westhoff, Calcan, McDermott, Trudnak, & Lopez, 2009, p. 712).

Many Dominicans are Catholic and hold strong religious beliefs, which impact their lives on a number of levels, including health beliefs and behaviors (Babington et al., 1999). Religious background is related to the ideology of fatalism (that people may be destined to get a disease, so nothing they do will make a difference in preventing disease) and their concept of hope (e.g., Flórez et al., 2008; Holt, 2000; Ingoldsby, 1991). In order to best serve this population, these deep structure beliefs will need to be acknowledged and accommodated into the programming. Trying to change these long-standing underlying beliefs is not feasible for this intervention. Using socio-cultural based programs and materials that accommodate those beliefs alongside new information allows for a culturally-sensitive educational process (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003).

Another belief system that may impact decisions to access health care has to do with the concept of machismo. Machismo is defined as “being authoritarian within the family,
aggressive, promiscuous, virile and protective of women and children” (Bull, 1998, p. 3). Such belief structures inhibit men from seeking health care and often limit women’s ability to access health care without the approval and support of a husband or father (Ingoldsby, 1991). This belief of machismo is prevalent among a variety of Latin American cultures, and male social role expectations, such as “being emotionally guarded, risk-taking, self-reliant, self-sufficient, independent and leaders” are associated with health problems (Salyers, Hunter, & McGuire, 2006, p. 388). These researchers go on to state that young boys are taught to “tough it out” in the face of illness. While in most Latin American cultures women are responsible to seeking health care and providing for those who are ill, machismo may impede a woman’s ability to make decisions independently to seek that health care (Salyers et al., 2006).

As can be seen by the information presented, a number of economic, educational, and social issues may affect health care and an individual’s well-being among the population of the Dominican Republic. Issues of undernutrition in the Dominican Republic are linked to a variety of issues, including a lack of education and knowledge about healthful nutrition practices, cultural belief structures that are not necessarily based in sound nutritional knowledge, and limited access to appropriate nutritional resources. A lack of formal education and accurate knowledge about nutrition is a primary concern in rural Dominican Republic.

**Formal nutritional knowledge/education.**

Many people in the Dominican Republic receive limited formal education. In the education that they do receive, often times nutritional education is not provided. Among participants in three Dominican Republic communities, only 20% reported having ever received any formal nutritional education (Mills et al., 2007). Female literacy has a curvilinear relationship with childhood stunting, such that low levels of literacy are associated with
increased stunting, whereas high literacy levels are not (Frongillo et al., 1997). These findings are echoed by others (i.e., Zulfiqar et al., 2005; Milman et al., 2005). Initial literacy level of females impacted the success in decreasing the rates of stunting among children when examining a number of specific interventions and underlying variables (Milman et al., 2005).

North (2012), while working with mothers at a local health fair in El Cercado found that rarely were mothers of children enrolled in the Child Nutrition Program able to identify which foods provide particular nutrients or the importance of particular nutrients, such as calcium for strong bones or iron to prevent anemia. In a study examining three different communities in the Dominican Republic, only about 55% of caregivers could identify a food that was believed to be a good source of vitamin A, and only 46% were able to choose a high vitamin A food from a list of five different food choices. Common foods thought to contain high levels of vitamin A were milk (24%), cherries (16%), and eggs (15%). Of foods rich in vitamin A, such as mango, only 13% were able to identify it as a vitamin A-rich food. One third of respondents were not able to identify a color associated with vitamin A-rich foods. These findings were consistent across socio-economic status and educational level for all three communities (Mills et al., 2007).

**Breastfeeding knowledge/beliefs.**

Many Dominican women have a variety of beliefs and knowledge about breastfeeding. In working with women who did not breastfeed exclusively for six months, mothers were supplementing infant breastfeeding as early as three months, and almost all mothers were supplementing by six months. When asked why they chose to do so, similar to mothers in other cultures (i.e., Binns, Graham, & Oddy, 2009), the Dominican mothers reported to North that infants would be stronger and healthier with the addition of other foods besides just breast milk.
Dominican mothers believe that teas made from various plants are good for babies and help calm babies’ stomachs if upset. Babies are given tea in a bottle as early as 3-4 months of age (Babington, 2006). Babies are also provided sugar water or water from cooking beans prior to six months of age. These liquids tend to fill up the babies’ stomachs and stop crying, but fail to provide much, if any, nutritional value (Babington, 2006). This belief leads to positive reinforcement of stopping hungry children from crying. The belief and subsequent behavior can also save a family money by substituting a “free” item for another food item. While many of the teas may indeed serve a variety of health functions, for example replenishing electrolytes, they may not provide adequate protein, iron or other micronutrients necessary for optimal growth. These teas may also introduce diarrhea-causing microbes to the infants (North, 2009). The parents believe that these liquids are providing some benefit for the infant and that these liquids are “better than nothing” (Babington, 2006; North, 2012).

Food beliefs.

Closely related to a lack of knowledge and formal education about nutrition is the belief structure of many of the Dominican mothers about foods and nutrition. Common beliefs about food and meals are based on culture and the passing down of local traditions within the family. In part because of tradition and in part due to a lack of formal education, many of these cultural beliefs are deeply ingrained and taken-for-granted. These beliefs must be integrated into more nutritionally complete eating behaviors to help improve nutritional status of children.

One belief common among Dominican mothers is the role of meat in a child’s diet. Dominican mothers in focus group interviews reported that “children don’t eat much meat since it is so greasy” (Babington, 2006, p. 156). Since rural Dominicans generally cook using some form of cookstove, most meats are often fried, thus making the meat greasy (North, 2012).
Additionally, meat tends to be expensive, and therefore is consumed on a less regular basis than other types of foods. If meat is expensive and hard to come by, this belief that meat makes children fat is a convenient way to address the cognitive dissonance of wanting to serve meat and not being able to do so. This belief about greasy meat is related to another belief about childhood obesity.

During focus group interviews, Dominican mothers agreed that “children are healthy if they are ‘not fat’ and ‘got lots of exercise running around all day” (Babington, 2006, p. 156). The mothers said overweight children were more likely to have asthma and that they have trouble running and that it hurts their heart. However, despite Babington’s findings, North (2012) has observed that a number of children appear to be somewhat “chubby” for their height and tend to consume a great deal of processed foods and sugared beverages.

There are also beliefs about breastfeeding as it related to a mother’s health. Comments from older participants in one study expressed concerns about the physical effects of breastfeeding for the mother. One woman noted, “after having a couple of kids and breastfeeding for so many years, your breasts start to sag and it’s bad for them” (Babington, 2006, p. 156). This mother said that since she could not afford formula and had no other options other than to breastfeed, she continued to do so, despite her belief that doing so was bad for her breasts. North (2012) witnessed a similar situation when a 42-year-old mother offered reasons to a physician as to why she was not breastfeeding. She stated her concern about her own physical state.

Mothers also clearly believe that providing supplements to infants at an early age is beneficial. The beliefs about which foods are healthiest for children impact the nutritional status of those children. Many Dominican women believe rice and beans are among the healthiest
foods one can feed children (Babington, 2006; Mills et al., 2007; North, 2012). While rice and beans are healthy foods, they lack many essential micronutrients for optimal development. The five foods participants in one study reported as most likely to help children grow were 1) milk, 2) beans, 3) rice, 4) starchy root vegetables (such as yucca or cassava) and 5) juice (Mills et al., 2007). Mothers in focus groups reported feeding 6-month-old babies water beans are cooked in and feeding children mashed rice with bean water in lieu of cereal, which is often too expensive to buy (Babington, 2006).

North (2012) interviewed physicians and health care workers in a child nutrition program in El Cercado, Dominican Republic, and also found most parents believe rice and beans are the most important dietary staples for child growth. When asked what foods are most important for their children besides the milk supplements provided by the program, rice and beans were consistently the most common answer. Fruits and vegetables were not listed as important parts of a child’s necessary dietary intake, despite the prevalence of gardens and available fruits and vegetables. Indeed, when asked specifically about eating fruits and vegetables, some of the Dominican mothers told North (2012) that they do not eat vegetables because “vegetables aren’t as good for you as rice and beans.” When asked why they believed that vegetables were not as nutritious, several Dominicans said that vegetables do not fill a person up, thereby rendering them less nutritious in the Dominicans’ eyes.

**Ideological factors.**

Like most mothers, Dominican mothers have strong intentions to raise healthy children. In one study, women reported that they would try to purchase vitamins for their babies when they ran out of free ones given to them by the breastfeeding clinic because the doctors said that babies needed vitamins until they are a year old. These mothers also noted that their children
were healthier than American children because Dominican children “walk everywhere” (Babington, 2006, p. 156) and “don’t have some of the snacky food that we see on TV” (p. 156). North (2012) also noticed this intention toward ensuring that children were healthy among the families participating in the child nutrition program in El Cercado. To be part of this program, mothers are required to make a monthly trip to the clinic to have the child weighed and evaluated by the clinic physician. Additionally, random visits to the home are made where parents are asked to demonstrate how the milk is mixed and to check to see that children are wearing shoes and engaging in other healthy behaviors. For most of these families, travel to the clinic is long and difficult, and maintaining clean water and making sure children are wearing shoes, etc., and not diluting the powdered milk to make it go further for other children, is difficult for these families. To engage in these behaviors requires a commitment. Failure to do so results in removal from the program. The parents are consistently committed to requirements of the program, demonstrating at least some anecdotal evidence of intent to do what is best for their children, even if the underlying goal is free milk for the enrolled child.

Current support networks.

While many rural Dominican people are at risk for under-nutrition or poor dietary intake, there are some protective aspects of the communities that can aid and assist in making and maintaining desired changes. Social support in a variety of forms has long been shown to be a protective health factor. Numerous programs are in place to help educate the residents of rural Dominican Republic and remind them about making healthy food choices for their children. According to the World Fact Book, 97% of babies in the DR are born under the supervision of some trained medical professional, and usually in a medical facility (CIA, 2012). At various clinics throughout the region, reminders about breastfeeding and the importance of iron and
protein can be seen in posters on the walls (North, 2012). In El Cercado, home visits by the health care workers serve to provide regular reminders and aid in improving nutritional patterns for the children enrolled in the program and their siblings (North, 2012).

Another protective factor to aid in preventing/reversing undernutrition is the strong cultural emphasis on family and mutual aid within the community. Creating social networks that can support new behaviors may make a significant difference in the impact of a health intervention (DiClemente, Salazar, & Crosby, 2013; Frongillo et al., 1997). Family is a significant part of the social and cultural structure of community in rural Dominican Republic and serves to provide mutual support (Babington, 2006; Findlay, 1989; North, 2012). North (2012) found that when families come to the mobile clinics that are set up to serve the most remote villages in the Dominican Republic, often aunts bring nieces and nephews, and grandmothers bring grandchildren. Caretaking is shared by many in the family, not just performed by the mother. Efforts to improve nutritional intake and change may be improved by tapping into the community structure and mutual support. For example, an interactive nutrition program tested against a more traditional lecture-style program in Indonesia showed that community support and interaction created greater learning and retention among the women in attendance. These researchers note that using local community leaders and creating community involvement was beneficial to the success of the program (Inayati et al., 2012).

In addition to the less formal supports of family and community, there are a variety of formalized programs that exist to help parents with meeting the nutritional needs of their children. North (2012) has worked with a child nutrition program in the community of El Cercado where stunted children are identified and enrolled in the free program. This program provides enough powdered milk for the malnourished child on a monthly basis. Families then
receive additional hygiene and nutrition education and training, impacting others in the family setting. In another formal support effort, a parental support system for children in a re-alimentation program affiliated with a local health care facility outside of Santo Domingo was established and helped to improve results in re-alimentation (Farrelly & McLennan, 2009; McLennan, Leon, Hafey, & Barker, 2009). Kelly and Black (2001) review Integrated Management of Childhood Illness and the programs that seek to help ameliorate malnutrition as a contributing factor to childhood illness. Many such formal programs offer support to those who are fortunate enough to have access to them. However, these programs, like most health initiatives, tend to be limited in scope. For example, the child nutrition program in El Cercado currently has 139 children enrolled, and therefore impacts only those 139 children and their immediate contacts (North, 2012).

**Evidence-based Strategies to be Utilized in Nutrition Education**

**Relationships for sustainable change.**

In order to change nutritional practices and outcomes in rural Dominican Republic, establishing relationships with the local community and the target population is paramount. Research bears out that establishing relationships with communities is key to creating long-term sustainable change, whether in the U.S. or elsewhere (see Bornstein & Davis, 2010; Foster, 2009; Leffers & Mitchell, 2010; Lupton, 2011). Working in another country precludes being on site at all times, so these relationships become even more critical in gaining access in a timely fashion and maintaining efforts between site visits.

Relationships are also important for creating lasting change that will be sustainable once the aid organization is no longer actively engaged in the change process. “Drop and run” mission trips do not ultimately help the people they are meant to help. “Drop and Run” mission
trips is the name adopted by some who work in these developing countries for groups that come in for one or two weeks to bring things and help, and then take off and go back home, never to return (North, 2012). In these cases, the communities being helped do not receive consistent, lasting aid necessary to lead to permanent changes. Rather those being helped receive numerous handouts from the charitable organization and wait until the next group comes along to give them something else. As a result, these community members engage in learned helplessness—the concept that if they just wait long enough, someone will bring them something, and they will not have to work for it (Corbet & Fikkert, 2009; Foster, 2009; Leffers & Mitchell, 2010; Lupton, 2011; Suchdev et al., 2007).

**Solid Rock International.**

One critical partnership for this intervention that has already been developed is with Solid Rock International, a nonprofit charitable organization headquartered in Indianapolis, Indiana. Solid Rock has been working primarily in San Juan de la Maguana, Dominican Republic, and does not work in any other countries. According to Solid Rock’s Website (2012), “When Solid Rock International (formerly Solid Rock Missions) was first beginning as an organization in the early 1990s, the desire was, and still is today, to holistically serve the poor in the Dominican Republic by focusing on all aspects of health.” This organization currently has two different Dominican-run clinics, one in San Juan de la Maguana, and the other in El Cercado, as well as five schools that they sponsor. One school is in the capital city of Santo Domingo, and the remaining four are located in the San Juan de la Maguana region.

Solid Rock International was started in the 1980s. Two missionaries, with the help of two Dominican Physicians, created Clinica Cristiana, which opened in 1989. A guesthouse was built on the clinic compound site where visiting teams of volunteers could stay while they
worked. This model is the one still in existence today. As the mission in San Juan de la Maguana grew, the Christian Center for Educational Development (CCED) opened in September of 1995 with 170 students in grades one through four. Additional grade levels were added, as were some vocational programs, and today, the CCED educates over 1100 students each year (Solid Rock International, 2012).

One program Solid Rock implements is the Child Nutrition Program. “This life-saving ministry works to provide malnourished infants and children with milk and vitamins, as well as education for their mothers” (Solid Rock International, 2012). This program takes place in the community of El Cercado, a rural area in the San Juan province of the country. Currently, the program supplies milk and vitamins with regular health care check-ups for the children enrolled. Some informal training of mothers takes place in random home visits and regular check-up visits with the children at the clinic. A more systematic plan of administering and assessing educational programming is desired. This organization is a key partnership for making this health education intervention work. Solid Rock has regular employees who are located in the community on a full-time basis, and who would be an important part of the program delivery and maintenance, as well as a valuable resource for cultural practices and information.

Solid Rock is committed to helping the poor in San Juan de la Manguana achieve better health and education. A new emphasis has begun on creating sustainable, lasting change that is less dependent upon the efforts of volunteers and external donations. Solid Rock International will be a critical partner in the implementation of the following proposed nutrition intervention.

**Culturally-appropriate strategies and materials.**

Drawing on research by Kreuter, Lukwago, Bucholtz, Clark, and Sanders-Thompson (2003), lessons of this intervention draw on five strategies: peripheral strategies, evidential
strategies, linguistic strategies, constituent-involving strategies, and sociocultural strategies. Peripheral strategies involve creating a program “packaged” in such a way that it appeals to the culture being targeted. Such “packaging” may include the appearance of materials, choice of media, and mode of delivery. Evidential strategies involve using primarily epidemiological data directly related to the target population. In this case, such evidential strategies may include data and examples of the prevalence and impact of poor nutrition in the Dominican Republic. Linguistic strategies involve making the health promotion program in the native language of the population—in this case, Spanish. Dominican assistance will help ensure that the Spanish in the materials is consistent with the Dominican dialect of Spanish (Kreuter et al., 2003).

Especially important to this health intervention will be constituent-involving strategies. Constituent-involving strategies focus on the experience of the target population. For example, the use of local community health leaders to administer the lessons is drawing on the experiences of the local community. Likewise, having participants gather in a group setting to talk together and engage in experiential and active learning draws on the women’s common experiences. Using local women also engenders a sense of trust among the caregivers and adds credibility to the information being presented (Bernal, Bonilla, & Bellido, 1995; Betancourt, Green & Carillo, 2002; Kreuter et al., 2003).

Sociocultural strategies are those efforts to present and discuss materials in the broader context of the social situation, cultural values, and culturally accepted practices. For example, not incorporating rice and beans into a proposed nutrition plan for Dominican families would go against tradition, food availability concerns, and cultural taste preferences. These sociocultural aspects must all be integrated into the intervention if the intervention is to resonate and relate to the target population (Coreil & Mayard, 2009; Kreuter et al., 2003).
**Hands-on learning.**

The lessons will be conducted/led by trained community leaders or trained aid workers affiliated with the Child Nutrition Program. Community leaders will be identified through local public health facilities and through local schools. Using community residents as community leaders is consistent with constituent-involving strategies (Kreuter et al., 2003). Once these individuals have been identified, they will spend time learning the lesson plans and how to engage the mothers in an interactive learning style, as opposed to a lecturing style. The intent is to create as much active learning and hands-on experiences as possible with the mothers. Given the low education levels and perhaps possible cognitive developmental issues among malnourished mothers, demonstration and active learning techniques are especially useful in creating learning and understanding (Peréz & Luquis, 2008; Weare, 1992; Werner & Bower, 2012). The education intervention will use the facilitated groups approach, use pictures, and use practices that have demonstrated success in other education programs (see Chaudhuri, 2005; Inayati et al., 2012; Werner, 2011; Werner & Bower, 2012). The community health leaders will demonstrate their own knowledge and skills prior to working with the first group of caregivers to be sure the activities and demonstrations are being conducted accurately.

Hands-on, or active learning, such as role-plays, demonstrations, and team problem-solving are techniques especially well-suited to learning new behaviors. Education goes beyond merely providing information (Weare, 1992). In the case of this nutrition education intervention, skills to engage in the desired behaviors are crucial to achieving the long-term objectives of decreasing malnutrition and increasing overall health status.
**Nutrition Education Intervention**

**Overall goals of nutrition education intervention.**

The discussion of immediate, underlying and basic factors clearly demonstrate the complexity of issues associated with malnutrition and poor health status. No intervention could clearly address all of the impacting elements of nutrition. However, evidence-based research demonstrates that educational interventions can make a substantial impact on addressing this public health issue. This intervention seeks to increase caregiver knowledge about appropriate nutrition for children and potentially change behavior with regard to hygiene practices, breastfeeding, complementary feeding, and child nutrition. Mothers will engage in exclusive breastfeeding for six months before introducing complementary feeding. Caregivers will demonstrate knowledge about appropriate foods and feeding practices for complementary feeding. Caregivers will also understand the importance of a balanced diet and will be able to identify with 80% accuracy which foods belong to which food groups/types. Caregivers will also be able to respond with 80% accuracy as to what aspect of health and development is tied to which nutrients/foods (i.e., calcium for bones, or protein for muscles). While education alone does not guarantee behavior change, this intervention is designed to provide a variety of support systems to help encourage and maintain behavior change over time. Social support systems in the community using community health leaders and small group support in education sessions is one approach to creating and sustaining new behaviors. Additionally, professional support from Solid Rock and the El Cercado clinic and improved health of children as a result of supplements and monitoring will potentially serve as positive reinforcements to the changes in behavior.
Setting and participants.

This nutrition education intervention will take place in the community of El Cercado, Dominican Republic. This mountainous community is located in the Western part of the country near the Haitian border.

Participants in this intervention will be mothers/caregivers of children who are currently enrolled in the Child Nutrition Program in El Cercado. When children are taken into the Child Nutrition Program, mothers and caregivers will be expected to participate in this intervention as a part of the conditions of receiving the powdered milk assistance from Solid Rock International.

The emphasis on caregivers and not only mothers is important. Dominicans are community-oriented. As a result, having an older child, grandmother, aunt, or even a close neighbor, care for children is a common occurrence. Targeting all caregivers accomplishes two distinct goals. First, educating all caregivers increases the chance that nutritional change will occur in the household since many more individuals will learn and implement the information that is presented. Second, educating all caregivers, rather than only mothers, increases the social/peer support among these caregivers and allows for mutual encouragement and reminding about the information and behaviors. Social networks and social environments are key influences on health behavior. These caregivers are identified because they are caring for a child who has been identified as “at risk” for or is already stunted/wasted. Since many families have more than one child, helping these caregivers learn about proper nutrition and best practices will help not only the child enrolled in the program, but all other children and family members, as well.
Assessment.

Prior to caregivers participating in the multi-level nutrition education intervention, baseline data about current nutritional behaviors and knowledge needs to be assessed. This process measure provides information about participant knowledge and current practices related to the behavioral objectives and long-term outcomes. Obtaining this information will allow for adjustments to lesson plans to ensure that the materials and time spent on each subject is appropriate for the target audience.

Data collection.

Pretest and posttest data will be collected using interviews. Many of the intervention participants would likely not have adequate literacy skills to read and complete a written survey. Additionally, conversational style data collection is more in line with the local culture than paper and pencil questionnaires. Local health care workers living in El Cercado; the physician at the El Cercado Clinic, Operated by Solid Rock International; and foreign aid workers working with Solid Rock International will be trained to conduct the interviews and gather data. The interview schedule can be found in Appendix A.

Intervention implementation.

Five lessons will be delivered either at the El Cercado Clinic on a day when the women come to bring their children enrolled in the Child Nutrition Program to be weighed, or at another time when multiple individuals in the community are able to gather in one area. For example, caregivers of three families may be able to gather together at the home of one for the lesson. Offering lessons in groups allows for peer reinforcement and for a sense of community. Community is important to the Dominicans, so this model would likely be effective. Additionally, providing lessons in groups allows personnel needs to be kept to a reasonable level.
**Lesson topics and learning objectives.**

The goals of this intervention are to decrease malnutrition and to increase overall health status of Dominican children. The lessons are centered around information and behaviors that will support the desired behavioral outcomes. The five lessons are:

1. Basic hygiene/food safety/food handling
2. Breastfeeding and complementary feeding
3. Food groups/nutritional balance/new foods
4. Food groups/nutritional balance/new foods, part 2
5. Food access/gardens/new foods

There are a number of learning objectives associated with each lesson. A block plan outlining the nutrition education intervention can be found in Table 1.

The logic model for this intervention outlines the basic antecedent conditions, the involved parties and the lesson interventions to achieve the desired short-term and long-term outcomes (see Figure 2).
### Table 1

**Nutrition Education Intervention Block Table**

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Learning Objectives</th>
<th>Key Content</th>
<th>Strategy</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Basic hygiene and food preparation and handling | • Can purify water by boiling or using chlorine  
• Create Tippy Tap for household  
• Demonstrate correct sanitary food preparation for meats and vegetables | • Handwashing  
• Water purification  
• Safe food handling  
• Cleaning/sterilizing dishes and prep surfaces | • Interactive discussion  
• Demonstration  
• Participation in creation of Tippy Tap  
• Participation in food preparation activities  
• Giant microbes  
• *Las 5 Claves* packet/activities | • During home visit can demonstrate how to purify water  
• Demonstrates proper use of Tippy Tap  
• Can state how to prepare foods safely with sterile surfaces/dishes |
| Breastfeeding and complementary feeding      | • Understand the importance of exclusive breastfeeding for 6 months  
• Be able to explain the link between own nutritional status and ability to breastfeed  
• Can list appropriate food choices for complementary feeding | • Duration of exclusive breastfeeding  
• Importance of exclusive breastfeeding  
• Responsive feeding  
• Appropriate complementary foods and amounts | • Interactive discussion  
• Complementary food preparation activities, demonstrations, and discussions | • Can state appropriate length of time for exclusive breastfeeding  
• Will not have introduced complementary foods prior to six months of age  
• Can list appropriate complementary foods |
| Food groups and nutritional balance (2 sessions) | • Can identify with 80% accuracy which foods belong to various food groups.  
• Can identify with 80% accuracy which foods are good sources for protein, calcium, vitamin A, iron  
• Can state the need of each micronutrient above  
• Can state importance of animal proteins in children’s diet | • Balanced diets  
• Micronutrients and their function for health  
• Integration of new foods to create balanced diet  
• Importance of limiting sugar  
• Health issues associated with poor nutrition | • Interactive discussion  
• Food preparation: actual preparation/tasting  
• Pictures and activities teaching food groups  
• Discussion/pictures of people with nutrition-related health issues (bloated bellies, broken arms, emaciation) | • Can accurately group foods into food groups using pictures  
• Using pictures, can choose foods that are sources for protein, iron, calcium, vitamin A  
• Using pictures, can create a balanced meal  
• Can state importance of animal protein in children’s diet |
| Food access and gardens as sources of new foods | • Can explain the relationship between a home garden and balanced diet  
• Continues/expands existing garden (or starts garden if is not already gardening)  
• Can explain at least two ways to improve soil | • Importance of gardens as food source  
• Key foods for gardens  
• Obtaining seeds or cuttings  
• Water conservation | • Interactive discussion  
• Food preparation/recipes/tasting  
• Cultivating seeds | • Is currently maintaining garden with at least one key food discussed (or has started a garden)  
• Can explain how to obtain seeds or plantings to grow  
• Can list at least two ways to improve soil for improved yield |
Figure 2. Nutrition Intervention in rural Dominican Republic logic model

Complete lesson plans can be found in Appendix B.
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Appendix A. Interview Schedule for Pre-intervention/Post-intervention

(All questions will be translated into Spanish by a Dominican worker to ensure that the questions are culturally appropriate).

Name: _______________________________  Age: _________________
Number of children: __________
Child Age: 
Child Sex: 
Length of time breastfed: 
Age for complementary foods

If breastfeeding and using complementary foods: What foods do you typically feed the baby? How much?

Number of people living in the household: __________
Describe what your family eats most days:
Morning:
Mid-day:
Evening:

Do you eat between meals? ______ yes ______ no
If so, what do you commonly eat?

When was the last time you ate meat?          Cheese?          Eggs?

What vegetables does your family eat on a regular basis?
What fruits does your family eat on a regular basis?
Do you use purified water? How do you get purified water?

How many times a day do you think you wash your hands? When do you wash your hands?

Explain to me how you wash your hands. [If necessary (if it isn’t volunteered), ask about soap.]

Do you have a garden? ______ yes ______ no
If yes, what do you grow in your garden?

Which food(s) is/are a good source of iron? (picture cards)
Which food(s) is/are a good source of protein? (picture cards)
Which food(s) is/are a good source of vitamin A? (picture cards)

Additional questions to be used during the posttest
Since starting in the Child Nutrition Program, have you added any new food(s) to what you normally eat? ______ yes ______ no
If so, what new food(s) have you added?
How often do you eat these new foods?
What is a balanced meal? What foods would you serve in a balanced meal? (Picture cards to demonstrate)
Do you have a Tippy Tap? Please demonstrate how to use the Tippy Tap
Appendix B. Lesson Plans

Lesson 1: Basic Hygiene/Food Safety/Food Handling

<table>
<thead>
<tr>
<th>Key Content/Skills</th>
<th>Teaching Methods</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germs and Microbes</td>
<td>Discussion/Q&amp;A</td>
<td>Las 5 Claves packet (Appendix C) Giant Microbes</td>
</tr>
<tr>
<td>Clean water usage/Purifying water/hand washing</td>
<td>Discussion/Demonstration</td>
<td>Soap, water, chlorine</td>
</tr>
<tr>
<td>Tippy Tap</td>
<td>Demonstrate/participation</td>
<td>Bottle w/ handle, something to cut with/rope</td>
</tr>
<tr>
<td>Choosing safe/fresh food</td>
<td>Demonstration/ Q&amp;A</td>
<td>Meat that is safe/not safe</td>
</tr>
</tbody>
</table>

* All information needed for this lesson can be found in Las 5 claves para mantener los alimentos seguros (PAHO, 2006) in Appendix C.

**Microbes and Germs:** (20 minutes)
1. Find out what they know about microbes and germs. Do they know what they are? Do they know what they do?
2. Discuss specific microbes/germs: Typhoid, Cholera, Dengue, Cold/Flu, Botulism, Malaria
3. Discuss what illness each microbe causes.
4. Discuss ways to prevent the spread of the microbes

**Clean Water Prep:** (30 minutes)
1. Ask for descriptions of how to purify water. See how much they know.
2. Ask when to use purified water and what to use it for. Be sure to emphasize that rain water must also be purified.
3. Purify water. You can both boil and use chlorine.
4. Discuss the importance of using only purified water to wash hands when preparing food and handling dishes and foods.
5. Discuss how to maintain and guard purified water so that it does not get re-contaminated.

Break, if needed, is appropriate.

**Tippy Tap:** (40 minutes)
1. Discuss why a tippy tap is important for hand washing, especially for preparing food.
2. Create a Tippy Tap. Have the attendees help with the process so that they are able to do the same thing at home. Be sure that the bottle they use is sanitized so that there is no microbial contamination.
3. This is a good point to review why water needs to be purified to get rid of microbes and reiterate that hand washing needs to be done with soap and purified water.
4. Have everyone wash their hands for an appropriate length of time and with soap so that they are familiar with length of time and the process.

**Food Handling and Preparation:** (1 hour)
1. Now that everyone has clean hands, they can handle foods and dishes.
   a. All dishes need to be cleaned with purified water and stored in a clean place.
   b. Avoid using baby bottles. They are especially hard to keep sterile. Breastfeed until the infant can use a cup.
2. Ask the women how they know if the food they have is safe to eat or not.
3. Discuss the guidelines for safe foods, correcting inaccurate information, where appropriate.
4. Discuss the order of food preparation to prevent raw meat from coming into contact with other foods.
5. Discuss cans and preparing foods from cans to avoid the possibility of botulism.
6. Discuss how to prepare and clean/sanitize the food preparation area.
7. Discuss covering food to protect it from flies and other insects that could contaminate the food. This is especially important when there is livestock and/or latrines nearby.
8. Finally, talk about how to store/manage food that is not consumed.

Summary/Review
- Take time to review what the main learning points were for the session.
- Have the women describe in their own words what they learned.
- Provide corrective feedback where needed, if necessary. This reinforcement is crucial to help move these women toward healthy behaviors and to reinforce the healthy behaviors they are already doing.

Lesson 2: Breastfeeding and Complementary Feeding

<table>
<thead>
<tr>
<th>Key Content/Skills</th>
<th>Teaching Methods</th>
<th>Materials</th>
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<tr>
<td>Duration of breastfeeding and appropriate age to introduce complementary feeding</td>
<td>Discussion/Q&amp;A</td>
<td></td>
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<tr>
<td>Maintenance of breastfeeding and responsive feeding</td>
<td>Discussion/Q&amp;A</td>
<td>Bottle, chlorine, water, pot for boiling and place to boil</td>
</tr>
<tr>
<td>Safe preparation of complementary foods</td>
<td>Discussion/Q&amp;A/Demonstration</td>
<td></td>
</tr>
<tr>
<td>Amounts of complementary foods</td>
<td>Discussion/Q&amp;A/Demonstration</td>
<td></td>
</tr>
<tr>
<td>Frequency of complementary foods/Energy density of foods</td>
<td>Discussion/Q&amp;A</td>
<td></td>
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</tbody>
</table>

**Duration of breastfeeding and appropriate age to introduce complementary feeding:** (20 minutes)
1. Why is breastfeeding important for babies? (Initial discussion question to gauge audience knowledge and beliefs).
   a. Engage women in a discussion of current beliefs and practices regarding breastfeeding.
   b. When do they breastfeed for the very first time? (Goal is within the first hour of birth).
   c. When do they begin to supplement breastfeeding?
   d. Why do they supplement when they do?
   e. What do they use as supplements for breast milk?
   f. Do they engage in responsive feeding?

**Maintenance of breastfeeding and responsive feeding:** (40 minutes)
Present the recommendations put forth by the WHO at the beginning of this lesson plan:
1. Exclusive breastfeeding until infant is 6 months of age. No supplements.
   a. Engage in responsive feeding. Emphasize the importance of this practice throughout the child’s growing up years—especially until 2 years of age.
   b. Discuss what responsive feeding is.
   c. *How many of you feed your children this way?*
   d. *Why don’t you feed your baby this way?* (identify barriers they perceive and address the barriers).
2. Explain why responsive feeding is optimal for infants and young children and what can happen if responsive feeding is not used. Put emphasis on using meal times as a time to bond with the child and nurture the child.

Brief break if needed.
Safe preparation of complementary foods: (40 minutes)
1. Do you use bottled for your children? How do you wash and prepare those bottles? This is an excellent chance to review materials presented in lesson 1 about cleaning dishes with purified water and storing them in clean places. Remind them about hand washing with soap and purified water before doing any food preparation.
2. Review that bottles are not recommended since they are difficult to keep clean. Breast-feeding is best until a child can take liquids slowly from a cup.
3. Be sure that all dishes are properly sanitized after eating, as well.
4. In the event that bottles must be used, demonstrate how to boil and maintain a clean bottle.
5. Reiterate the steps to creating purified water that were presented in lesson 1.

Amount of Complementary foods: (30 minutes)
1. Begin by reiterating that NO complementary foods should be introduced prior to 6 months. Babies who get nothing but breast milk for 6 months are healthier than babies who receive complementary foods.
   a. Exclusive breastfeeding means no teas, juices, or other liquids.
   b. If the under 6-month infant is being fed a bottle for some reason, it should have ONLY formula in it.
   c. Explain that breast milk has ALL of the nutrients in the right balance for infants until they are 6 months old.
   d. Explain that infants who are exclusively breastfed until 6 months are healthier and more intelligent than those who are not.
2. At 6 months of age, small amounts of complementary foods can be introduced 2 to 3 times a day.
   a. At 6 months, children need additional ENERGY. Complementary feeding should focus on nutritional energy rather than teas and liquids that do not have strong nutritional value.
   b. At this age, it is especially important that infants and young children get foods from all of the food groups in order to develop properly. Begin to introduce the idea of food groups, which is covered in lesson 3.
   c. Stress that sugar water, pop, and sugary drinks are to be avoided since they don’t have any nutrients to them.
   d. Stress that if children are drinking milk, sugar should NOT be added to the milk.
3. Complementary foods in the way of snacks is appropriate

Brief break, if needed.

Frequency of complementary foods/Energy density of foods: (30 minutes)
1. Begin by providing complementary foods 2-3 times a day (6 mos. To 8 mos.)
2. From 9-24 mos., 3 to 4 times a day is appropriate.
3. Foods need to be nutrient rich; not high fat and high sugar.
4. Reinforce that a variety of foods are important.

Review/Summary:
Have the women talk about what they learned. Ask them to name one thing that they learned that they will do before they come back to the next meeting.
Fact Sheet 1. Guiding Principles for Complementary Feeding of the Breastfed Child

SUMMARY OF GUIDING PRINCIPLES

1. DURATION OF EXCLUSIVE BREASTFEEDING AND AGE OF INTRODUCTION OF COMPLEMENTARY FOODS: Practice exclusive breastfeeding from birth to six months of age, and introduce complementary foods at six months of age (180 days) while continuing to breastfeed.

2. MAINTENANCE OF BREASTFEEDING: Continue frequent, on-demand breastfeeding until two years of age or beyond.

3. RESPONSIVE FEEDING: Practice responsive feeding, applying the principles of psycho-social care. Specifically:
   - feed infants directly and assist older children when they feed themselves, being sensitive to their hunger and satiety cues;
   - feed slowly and patiently, and encourage children to eat, but do not force them;
   - if children refuse many foods, experiment with different food combinations, tastes, textures and methods of encouragement;
   - minimize distractions during meals if the child loses interest easily;
   - remember that feeding times are periods of learning and love − talk to children during feeding, with eye to eye contact.

4. SAFE PREPARATION AND STORAGE OF COMPLEMENTARY FOODS: Practice good hygiene and proper food handling by:
   - washing caregivers’ and children’s hands before food preparation and eating;
   - storing foods safely and serving foods immediately after preparation;
   - using clean utensils to prepare and serve food;
   - using clean cups and bowls when feeding children;
   - avoiding the use of feeding bottles, which are difficult to keep clean.

5. AMOUNT OF COMPLEMENTARY FOOD NEEDED: Start at six months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding. The energy needs from complementary foods for infants with “average” breast milk intake in developing countries are approximately 200 kcal per day at 6−8 months of age, 300 kcal per day at 9−11 months of age, and 550 kcal per day at 12−23 months of age. In industrialized countries these estimates differ somewhat (130, 310 and 580 kcal/d at 6−8, 9−11 and 12−23 months, respectively) because of differences in average breast milk intake.

6. FOOD CONSISTENCY: Gradually increase food consistency and variety as the infant gets older, adapting to the infant’s requirements and abilities. Infants can eat pureed, mashed and semi-solid foods beginning at six months. By eight months most infants can also eat “finger foods” (snacks that can be eaten by children alone). By 12 months, most children can eat the same types of foods as consumed by the rest of the family (keeping in mind the need for nutrient-dense foods, as explained in 8. below). Avoid foods that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as nuts, grapes, raw carrots).

7. MEAL FREQUENCY AND ENERGY DENSITY: Increase the number of times that the child is fed complementary foods as he/she gets older. The appropriate number of feedings depends on the energy density of the local foods and the usual amounts consumed at each feeding. For the average healthy breastfed infant, meals of complementary foods should be provided 2−3 times per day at 6−8 months of age and 3−4 times per day at 9−11 and 12−24 months of age. Additional nutritious snacks (such as a piece of fruit or bread or chapatti with nut paste) may be offered 1-2 times per day, as desired. Snacks are defined as foods eaten between meals, usually self-fed, convenient and easy to prepare. If energy density or amount of food per meal is low, or the child is no longer breastfed, more frequent meals may be required.

8. NUTRIENT CONTENT OF COMPLEMENTARY FOODS: Feed a variety of foods to ensure that nutrient needs are met. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vegetarian diets cannot meet nutrient needs at this age unless nutrient supplements or fortified products are used (see 9. below). Vitamin A-rich fruits and vegetables should be eaten daily. Provide diets with adequate fat content. Avoid giving drinks with low nutrient value, such as tea, coffee and sugary drinks such a soda. Limit the amount of juice offered so as to avoid displacing more nutrient-rich foods.

9. USE OF VITAMIN-MINERAL SUPPLEMENTS OR FORTIFIED PRODUCTS FOR INFANT AND MOTHER: Use fortified complementary foods or vitamin-mineral supplements for the infant, as needed. In
some populations, breastfeeding mothers may also need vitamin-mineral supplements or fortified products, both for their own health and to ensure normal concentrations of certain nutrients (particularly vitamins) in their breast milk. [Such products may also be beneficial for pre-pregnant and pregnant women.]

10. FEEDING DURING AND AFTER ILLNESS: Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favorite foods. After illness, give food more often than usual and encourage the child to eat more.

Lessons 3 and 4: Food Groups/Nutritional Balance/New Foods

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<th>Teaching Methods</th>
<th>Materials</th>
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<tbody>
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<td>Why nutrition is important</td>
<td>Discussion/Q&amp;A</td>
<td>Pictures of malnourishment</td>
</tr>
<tr>
<td>Main foods and helper foods</td>
<td>Discussion/Q&amp;A</td>
<td>Pictures or actual samples of foods</td>
</tr>
<tr>
<td>Ways to improve nutrition/</td>
<td>Discussion/Q&amp;A/Demonstration</td>
<td>Iron pot, purified water, Yuca, Yuca</td>
</tr>
<tr>
<td>new foods</td>
<td></td>
<td>leaves, seasonings</td>
</tr>
<tr>
<td>Nutrition for children</td>
<td>Discussion/Q&amp;A/Demonstration</td>
<td></td>
</tr>
<tr>
<td>Things to avoid in the diet</td>
<td>Discussion/Q&amp;A</td>
<td>Examples/samples/pictures</td>
</tr>
</tbody>
</table>

* There is a lot of information in this lesson, so it is best divided over two different sessions.

**Why nutrition is important:** (20 minutes)

1. Effects of Malnutrition in children:
   - failure of a child to grow or gain weight normally (see p. 297)
   - slowness in walking, talking, or thinking
   - big bellies, thin arms and legs
   - common illnesses and infections that last longer, are more severe, and more often cause death
   - lack of energy, child is sad and does not play
   - swelling of feet, face, and hands, often with sores or marks on the skin
   - thinning, straightening, or loss of hair or loss of its color and shine
   - poor vision at night, dryness of eyes, blindness
2. In anyone:
   - weakness and tiredness • sores in the corners of the mouth
   - loss of appetite
   - painful or sore tongue
   - anemia
   - burning or numbness of the feet
3. Discuss the importance of nutrition during pregnancy
   a. Avoid anemia
   b. Avoid birth defects
   c. Have a strong baby

**Main foods and helper foods:** (60-75 minutes)

1. Ask the participants to share what they eat for a “normal” or “average” meal.
2. Make a list so that all the foods can be later classified as helper food or main foods.
3. Discuss the definition of main foods: Those one or two foods that you eat nearly every meal and that is the basis of the diet.
   a. Have participants identify what those foods are.
   b. Main foods are generally inexpensive and easy to get.
   c. Rice
   d. Beans
   e. Plantains
   f. Yuca
4. Main foods do not provide enough balanced nutrition for a person. There must also be helper foods.
5. Helper foods are foods that have important vitamins, minerals and micronutrients
   a. Without these micronutrients, people become sick or begin to have problems with their health.
   b. Vitamin A for good eye sight
i. Carrots
ii. Orange and red fruits and vegetables

c. Iron for strong blood and to prevent anemia
   i. Especially important for pregnant women and breastfeeding women.

d. Certain foods help to prevent birth defects
   i. Liver
   ii. Beans
   iii. Peanuts
   iv. Cereals

e. Protein for strong muscles and bones
   i. Milk
   ii. Meats
   iii. Beans
   iv. Eggs
   v. Fish
   vi. Nuts

f. Dairy foods for strong bones
   i. Milk
   ii. Cheese

g. Dark green, red, and orange vegetables
   i. Spinach
   ii. Peppers
   iii. Auyama (squash)
   iv. Sweet potatoes
   v. Tomatoes
   vi. Carrots

A brief break, if needed.

**Ways to improve nutrition/New foods:** (90 minutes)

1) First and foremost, focus on what the people are doing that is RIGHT!
   a) Many foods people eat are healthy.
   b) Recognizing what they are doing correctly helps built trust and solidarity.
   c) Recognizing what is right helps to empower and motivate people.

2) 10 simple ways to help food access and diverse diets: (Many of these ideas are best demonstrated with taste tests to help show and reinforce the information)
   a) Emphasize the health and cost benefits of breast milk. Reinforce that babies should be exclusively breastfed until they are 6 months of age.
   b) Look to eggs as a form of nutrition. Eggs are a renewable resource, especially if one has chickens. Provide an emphasis on the possibility of producing one’s own eggs or share with a neighbor.
      i) Good source of growth foods, especially children.
      ii) If cleaned properly, eggshells can be finely ground and put into foods for additional calcium.
   c) Organ meats and blood.
      i) High in iron and protein
      ii) Usually less expensive than meats
      iii) Can be shared with neighbors
   d) Maximize bean nutrition by allowing them to sprout before eating.
      i) Can be used for baby foods by peeling and mashing.
   e) Dark, leafy green vegetables
      i) Use leaves of pumpkin, sweet potatoes, squash, peas and beans.
      ii) Dry the leaves, grind them into powder, and use in baby foods.
      iii) These leaves contain vitamin A, iron and protein.
   f) Yuca leaves have 7 times the protein that the root has.
      i) Cook young leaves and eat with the root for more nutrition.
g) Corn soaked in lime provides more calcium than corn alone and allows the body to absorb more vitamins and minerals.

h) Cook vegetables with only a little water and not until they are very soft. Cooking vegetables for less time provides more nutrients.

i) Cook in iron pots. Some of the iron will leach into the foods providing a source of iron.

j) Take advantage of wild fruits and berries.

Brief break, if needed.

**Nutrition for children:** (30 minutes)
1. Reiterate the importance of breastfeeding and then complementary foods at 6 months.
2. Reiterate the need for responsive feeding.
3. Review how much and how often to feed children complementary foods:
   a. 6-8 months feed complementary foods 2-3 times per day.
   b. 9 months to 2 years, feed complementary foods 4-5 times per day.
4. Reinforce that foods should be nutritious and not high fat or high sugar.
5. A great activity to do here is to have parents choose which food(s) are the best for children to eat from a variety of pictures of foods. For example, show a parent chocolate milk and regular milk and have the caregiver choose the healthy option. Or choose between milk and pre-packaged fruit juice.

**Foods to avoid:** (30 minutes)
1. What foods should you avoid? Have the caregivers make a list.
2. Discuss avoiding foods high in fat and high in sugar—especially soda/pop, candy, and other snack foods that are high in fat, calories and sugar and have little nutritional value.
3. Reiterate that caregivers should not put sugar into children’s milk.
4. Avoid alcohol.
5. Avoid tobacco.

**Feeding people who are sick:** (30 minutes)
1. Often times, people who are sick do not feel like eating. This is a time where eating is especially important.
2. Sick people’s bodies need more energy and fluids to heal. They need more nutrition and food and water rather than less.
3. When children do not want to eat, be patient and work with the kids to get them to eat something.
4. Have the caregivers role play how they might encourage a child who doesn’t want to eat because the child is sick.

**Summary/Review:**
1. Review main foods and helper foods.
2. Review complementary feeding timetables.
3. Review some of the cooking ideas. Get each person to commit to trying at least one new idea or food before the next lesson.
4. Review foods to avoid.

The more times the information is reviewed or the foods are prepared and eaten, the greater the likelihood of adoption. Also, if all members are trying and sharing their experiences with these foods, then others are more likely to join in.
Lesson 5: Food Access/Gardens/New Foods

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<tr>
<th>Key Content/Skills</th>
<th>Teaching Methods</th>
<th>Materials</th>
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<td>Why a home garden is important</td>
<td>Discussion/Q&amp;A</td>
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</tr>
<tr>
<td>Foods that can be grown in a home garden</td>
<td>Discussion/Q&amp;A</td>
<td>Pictures or actual foods</td>
</tr>
<tr>
<td>Basic gardening techniques</td>
<td>Discussion/Q&amp;A/Demonstration</td>
<td>Demonstrations</td>
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</tbody>
</table>

Why a home garden is important: (30 minutes)
1. Do a quick survey to find out how many people have a home garden.
   a. What do you grow in your garden?
   b. Why don’t you have a garden? (For those who do not)
   c. What would you like to be able to grow?
2. Gardens provide most of the helper foods that have many of the vitamins and nutrients that are essential for growth and health.
3. Gardens can help provide food security.
4. Gardens can be used as a potential source of income or as a means of barter for other foods or goods from neighbors.

Foods that can be grown in a home garden: (40 minutes)
1. Discuss the foods that were listed above. Why do some people only grow some things?
2. Brainstorm about other foods that can be grown and how to locate sources for these foods/seeds.
   a. Purchasing seeds
   b. Drying seeds from produce eaten
   c. Getting cuttings from a neighbor
3. Could anyone grow additional things in their garden? Why or why not?

Basic gardening techniques: (60-75 minutes)
1. Engage in a problem-solving activity that allows the caregivers to help figure out ways that they could create a garden or diversify and existing garden.
   a. Perhaps get help preparing the land
   b. Layer the plants so that taller plants have other plants underneath.
   c. Learn about natural fertilizers as a way to improve the soil.
      i. Compost
      ii. Manure
      iii. Urine and wood ash combined (Grunbaum, 2010).
   d. Problem solve about container gardens and ways to collect rainwater to help keep the crops from drying out and dying.
   e. Is there any possibility of working together with a neighbor or creating a community garden?
2. Growing peas and beans helps to enrich the soil. Interspersing beans with corn, for example, is a way to help preserve the soil.
3. Embrace local knowledge. Most people in this region know best what crops will grow and how to grow them.
4. The goal is to provide community support and community knowledge to create best practices in multiple households.

New foods from the garden: (60-75 minutes)
(Refer to lessons 3 & 4)
1. Preparing and trying new foods is essential to food practice adoption.
2. Ask about the participants’ experiences trying something new at home.
3. Create a new recipe or dish and have caregivers aid in the process.
4. Using this opportunity to create a lunch that can be shared is a great way to work on new foods ideas and preparation.

**Summary:**
1. Review the importance of gardens.
2. Review the kinds of foods that can be grown and how to obtain the seeds/plants.
3. Review ideas for improving soil and yield, such as free, organic fertilizers.
4. Review the need for a varied diet and how gardens contribute to helper foods.
5. Seek a commitment among participants to implement at least one new food before the next health check for the child at the clinic.
Appendix C. Las 5 Claves

For the complete manual, go to the following link:
## Appendix D. List of Tier 1 Core Public Health Competencies Met

### Domain #1: Analytic/Assessment
- Identify the health status of populations and their related determinants of health and illness (e.g., factors contributing to health promotion and disease prevention, the quality, availability and use of health services)
- Describe the characteristics of a population-based health problem (e.g., equity, social determinants, environment)
- Use variables that measure public health conditions
- Use methods and instruments for collecting valid and reliable quantitative and qualitative data
- Identify sources of public health data and information
- Recognize the integrity and comparability of data
- Adhere to ethical principles in the collection, maintenance, use, and dissemination of data and information
- Describe the public health applications of quantitative and qualitative data
- Collect quantitative and qualitative community data (e.g., risks and benefits to the community, health and resource needs)
- Use information technology to collect, store, and retrieve data
- Describe how data are used to address scientific, political, ethical, and social public health issues

### Domain #2: Policy Development and Program Planning
- Participate in program planning processes
- Incorporate policies and procedures into program plans and structures
- Identify mechanisms to monitor and evaluate programs for their effectiveness and quality
- Apply strategies for continuous quality improvement

### Domain #3: Communication
- Identify the health literacy of populations served
- Communicate in writing and orally, in person, and through electronic means, with linguistic and cultural proficiency
- Solicit community-based input from individuals and organizations
- Convey public health information using a variety of approaches (e.g., social networks, media, blogs)
- Participate in the development of demographic, statistical, programmatic and scientific presentations
- Apply communication and group dynamic strategies (e.g., principled negotiation, conflict resolution, active listening, risk communication) in interactions with individuals and groups

### Domain #4: Cultural Competency
- Incorporate strategies for interacting with persons from diverse backgrounds (e.g., cultural, socioeconomic, educational, racial, gender, age, ethnic, sexual orientation, professional, religious affiliation, mental and physical capabilities)
- Recognize the role of cultural, social, and behavioral factors in the accessibility, availability, acceptability and delivery of public health services
- Respond to diverse needs that are the result of cultural differences
- Describe the dynamic forces that contribute to cultural diversity
- Describe the need for a diverse public health workforce

### Domain #5: Community Dimensions of Practice
- Recognize community linkages and relationships among multiple factors (or determinants) affecting health (e.g., The Socio-Ecological Model)
- Demonstrate the capacity to work in community-based participatory research efforts
- Identify stakeholders
- Collaborate with community partners to promote the health of the population
- Maintain partnerships with key stakeholders
- Use group processes to advance community involvement
- Describe the role of governmental and non-governmental organizations in the delivery of community health services
- Identify community assets and resources
- Gather input from the community to inform the development of public health policy and programs

### Domain #6: Public Health Sciences
- Describe the scientific evidence related to a public health issue, concern, or intervention
- Retrieve scientific evidence from a variety of text and electronic sources
- Discuss the limitations of research findings (e.g., limitations of data sources, importance of observations and interrelationships)
<table>
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<th>Domain #7: Financial Planning and Management</th>
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</thead>
<tbody>
<tr>
<td>Describe the local, state, and federal public health and health care systems</td>
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<tr>
<th>Domain #8: Leadership and Systems Thinking</th>
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<tbody>
<tr>
<td>Incorporate ethical standards of practice as the basis of all interactions with organizations, communities, and individuals</td>
</tr>
<tr>
<td>Describe how public health operates within a larger system</td>
</tr>
<tr>
<td>Participate with stakeholders in identifying key public health values and a shared public health vision as guiding principles for community action</td>
</tr>
<tr>
<td>Identify internal and external problems that may affect the delivery of Essential Public Health Services</td>
</tr>
<tr>
<td>Use individual, team and organizational learning opportunities for personal and professional development</td>
</tr>
<tr>
<td>Describe the impact of changes in the public health system, and larger social, political, economic environment on organizational practices</td>
</tr>
</tbody>
</table>