



Global Food and Nutrition: Central America

Culturally Appropriate Resources for
Nutrition and Dietetics Practitioners



Introduction

The Academy's position on nutrition security in developing nations is “that all people should have consistent access to an appropriately nutritious diet of food and water, coupled with a sanitary environment, adequate health services, and care that ensure a healthy and active life for all household members.” As nutrition experts, registered dietitian nutritionists can help combat malnutrition and provide valuable nutrition education worldwide. However, often when health professionals perform humanitarian assistance work in foreign countries, appropriate educational materials can be difficult to obtain.

The Global Food and Nutrition: Central America project, developed through an educational grant from the Academy of Nutrition and Dietetics Foundation, aims to be the practitioner’s go-to site for open-access to relevant and effective international nutrition education materials.

The Global Food and Nutrition: Central America project was supported by the Academy of Nutrition and Dietetics Foundation's Wimpfheimer-Guggenheim Fund for International Exchange in Nutrition, Dietetics and Management.

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How to Explain Basic Nutrition Concepts

According to a 2015 Academy of Nutrition and Dietetics survey of health professionals with experience in Central America, populations in developing areas of this region lack basic knowledge of biology and physiology. Beginning with a discussion of basic health concepts and then explaining how nutrition affects our bodies is a good strategy.

Explaining Organ Functions

- Lungs: provide oxygen to blood
- Heart: circulates blood throughout the body
- Stomach: helps digest food
- Intestines: absorb nutrients from food
- Liver: removes toxins from blood and processes nutrients from food
- Kidneys: filter blood of waste and extra fluid

Explaining Nutrition

Nutrition is how food affects the health of the body. Food is essential—it provides vital nutrients for survival, and helps the body function and stay healthy. Food is comprised of macronutrients including protein, carbohydrate and fat that not only offer calories to fuel the body and give it energy but play specific roles in maintaining health. Food also supplies micronutrients (vitamins and minerals) and phytochemicals that don't provide calories but serve a variety of critical functions to ensure the body operates optimally.

Explaining Macronutrients: Protein, Carbohydrate and Fat

Protein: Found in beef, pork, chicken, game and wild meats, fish and seafood, eggs, soybeans and other legumes included in traditional Central America cuisine, protein provides the body with amino acids. Amino acids are the building blocks of proteins which are needed for growth, development, and repair and maintenance of body tissues. Protein provides structure to muscle and bone, repairs tissues when damaged and helps immune cells fight inflammation and infection.

Carbohydrates: The main role of a carbohydrate is to provide energy and fuel the body the same way gasoline fuels a car. Foods such as corn, chayote, beans, plantains, rice, tortilla, potatoes and other root vegetables such as yucca, bread and fruit deliver sugars or starches that provide carbohydrates for energy. Energy allows the body to do daily activities as simple as walking and talking and as complex as running and moving heavy objects. Fuel is needed for growth, which makes sufficient fuel especially important for growing children and pregnant women. Even at rest, the body needs calories to perform vital functions such as maintaining body temperature, keeping the heart beating and digesting food.

Fat: Dietary fat, which is found in oils, coconut, nuts, milk, cheese, meat, poultry and fish, provides structure to cells and cushions membranes to help prevent damage. Oils and fats are also essential for absorbing fat-soluble vitamins including vitamin A, a nutrient important for healthy eyes and lungs.

Explaining Micronutrients: Vitamins and Minerals

Vitamins and minerals are food components that help support overall health and play important roles in cell metabolism and neurological functions.

Vitamins aid in energy production, wound healing, bone formation, immunity, and eye and skin health. **Minerals** help maintain cardiovascular health and provide structure to the skeleton.

Consuming a balanced diet including fruits, vegetables, dairy, protein foods and whole or enriched grains helps ensure the body has plenty of nutrients to use. Providing a few examples of specific micronutrient functions can enhance the effectiveness of nutrition education:

- **Vitamin A** helps the eyes to see.
- **Calcium** and **magnesium** help muscles and blood vessels relax, preventing cramps and high blood pressure.
- **Vitamin C** helps wounds heal and the body's ability to fight off germs.
- Iron helps the blood transport oxygen throughout the body and prevents anemia.

Explaining the Concept of Nutrients as Building Blocks

Building blocks include protein for growing babies in utero, for child and adolescent growth, and for repairing damaged skin, blood, and other body parts in adults who aren't growing. Some parts of the body are replaced regularly, like blood and skin, so even adults are building new body parts regularly. Calcium is also a building block for building bones. Iron is a building block for blood. Since blood cells only last a few months, the body constantly needs more iron and protein to make new blood.

Using Metaphors to Explain Nutrition

According to registered dietitian nutritionists with experience teaching nutrition in developing areas of Central America, metaphors and simple concepts are useful in teaching basic nutrition. An example of this could be conveying foods rich in carbohydrate as "go" foods, protein-rich foods as "grow" foods and colorful produce as "glow" foods. Health educators should emphasize that good nutrition requires eating at least one serving of these three types of food at each meal:

<i>Foods</i>	<i>Simple Concept of Function</i>
Carbohydrate-rich foods	Fuel
Protein-rich foods	Building blocks
Fruits and Vegetables	Helpers and protectors

Using Illustrations to Convey Basic Nutrition Concepts

Using actual local foods for hands-on meal planning and for teaching food categories helps low-literacy adults and children to understand nutrition. Health educators should try to acquire local foods to use in nutrition education in addition to laminated illustrations.

Due to minimal literacy among Central Americans, illustrations are as important as words in all visual materials. The following are examples of symbols that can represent the three basic reasons why the body needs a variety of foods:

<i>Symbol</i>	<i>Representing Function</i>
Running child	Food as fuel and carbohydrate for energy
Children stacking blocks	Food and protein as building blocks
Child flexing muscle	Protein for growth and strength
Growing child	Growth made possible by good nutrition
Blood droplet	Healthy blood made possible by eating iron-rich foods

Skeleton	Healthy bones made possible by eating calcium-rich foods
Eye	Healthy eyes made possible by eating foods containing vitamins A, C, E, zinc and phytochemicals
Food rainbow	Vitamins, minerals and phytochemicals that serve as "helpers and protectors" and to help the body "glow"

Additional Resources

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Breast Feeding and Complementary Feeding for Infants

Nutrition from 0 to 6 Months of Age

The World Health Organization recommends newborns begin breastfeeding within the first hour after birth and continue to exclusively breast-feed until six months. Exclusive breastfeeding means breast milk is the only nutrition the infant consumes. A mother's milk is the ideal nutrition for her infant for the first six months of life. Helping mothers understand that the milk she produces contains the correct amount of macronutrients and micronutrients her child needs is essential. Exclusive breastfeeding also helps protect infants from potentially life-threatening diarrheal illnesses caused by contaminated water used to make infant formulas or substitute beverages.

Breastfeeding is the accepted norm for infant nutrition in Central America. In 2013, 38% of infants born in Latin America were exclusively breast-fed during their first six months of life, which is slightly above the global average. Reasons mothers in Central America may not exclusively breast-feed during the first six months of their child's life include:

- They are unaware of the many benefits breastfeeding provides.
- They receive advice from other mothers to add supplemental foods and beverages.
- They supplement with or switch completely to formula. There are a variety of reasons mothers may feed formula to their child, but it's important to note that in Central America, there is a great deal of infant formula marketing, which may persuade mothers to not exclusively breast-feed.
- They receive a lack of support from family and community members, or receive advice contradicting recommendations. In particular, adolescent mothers may be less comfortable breastfeeding as their social circles may be less supportive.

Nutrition after the First Six Months

As infants grow and approach one year of age, breast milk continues to be a significant source of protein and other nutrients. However, complementary foods – especially food sources containing iron – should be introduced to infants at six months to provide sufficient nutrition to support their growth. Delaying the introduction of complementary foods has been associated with stunting in some communities in Central America. The World Health Organization urges that when introducing complementary foods, breastfeeding should continue and not decrease.

Central American Foods to Include after Six Months

A baby's iron stores begin to deplete around six months, making it necessary to introduce iron-rich foods at this time. This includes beans, beef, chicken, fish and eggs. Since beans are typically the most accessible iron source, simultaneously introducing foods rich in vitamin C, such as cantaloupe, mango, potatoes and plantains, is essential to enhance iron absorption.

Rice that is enriched with iron may not be available in many areas of Central America. Iron-enriched oatmeal and grain drinks may be available but may not be affordable to many families in these areas. Depending on availability and cost, iron-fortified infant cereal is a good complement to breast milk. Cereal may be mixed with breast milk or infant formula if the formula has already been introduced. Also, cereal should never be served in a bottle.

When infants reach six months of age, complementary foods should be pureed or mashed and initially offered only a few spoonfuls a day. Mothers should remember to maintain the frequency of breastfeeding to avoid malnutrition and stunting. Infants should also be introduced to drinking from a

cup around six months. When introducing a cup, it should be filled with nutritious options such as small amounts of potable water, cooked grain drinks and 100% fruit juices. Still, those drinks should complement, not replace, breast milk. Fruit drinks with added sugar, coffee and other sugar-sweetened beverages are not appropriate infant beverages and can lead to oral health issues.

Around nine months, foods that are easily picked up with a thumb and index finger, or "finger foods," can be introduced. By 12 months, infants are generally able to eat most of the same foods eaten by the rest of family, with modifications to make them easier and safer to chew and swallow. Foods that carry a high choking hazard like nuts, whole grapes, hard candy, chunks of meat, cheese and many raw vegetables should be avoided until the child is at least four years old.

Introducing one new food at a time is recommended so the food source of any allergic reactions can be easily identified.

Examples of Complementary Foods and Feeding Frequencies for Infants 6 to 12 Months Old in Central America

6 Months: Offer 2 – 3 Times Per Day

- Ground, cooked grains in cereal or drink such as rice, corn, oats and barley
- Mashed bananas and plantains
- Mashed potatoes and yucca
- Mashed beans
- Mashed egg
- Mashed avocado
- Mashed mango

9 Months: Offer 3 – 4 Times Per Day

- Cooked beans
- Small pieces of tortilla
- Slices of banana and plantain
- Small pieces of melon
- Sliced cooked eggs
- Grated coconut
- Minced meats

12 Months: Offer 3 Meals and 2 Snacks

- Whole eggs
- Soft cooked meats
- Tortillas
- Soups with little broth
- Small pieces of fruit including citrus
- Small pieces of cooked vegetables including tomatoes
- Milk or powdered milk

How to Educate Mothers and Caregivers about Breastfeeding and Complementary Foods

Health educators should include lessons on the importance of breastfeeding as well as the benefits of exclusively breastfeeding for the first six months. It is important for educators to explain that human breast milk provides all essential nutrients needed for healthy infant development along with antibodies to fight illness. Proper breastfeeding techniques and the importance of mother and infant bonding time should be explained. Mothers should understand that their breast milk is the ideal nutrition and most

sanitary food for their infants and therefore, if possible, it should be the only source of nutrition until the infant is six months old.

It is also important to educate mothers and caregivers that although grain beverages may seem to satisfy their baby's hunger, grain beverages do not contain the same nutrients as breast milk and are not a good substitute for it. Due to the low protein content of these beverages, babies consuming them in place of breast milk will be at risk of stunting and poor immunity.

When introducing complementary foods, cross-contamination of pathogens may occur. Education on feeding infants must include instruction on proper hand-washing and produce washing in addition to maintaining food hygiene in the food preparation area, which requires potable water. Infants' and caregivers' hands should be properly washed with soap and water before preparation and eating. Food should be prepared with clean utensils and clean cups and bowls should be used to serve food. Bottles should be avoided as much as possible as they are hardest to clean and may hide harmful bacteria. Uneaten food should be discarded and not saved for later.

When educating mothers on how to introduce complementary foods, educators should present food visuals and discuss how to prepare these foods that are familiar and available to the community. The health educator may use the illustrations below to provide examples of how to prepare foods to feed infants at different ages as well as feeding schedules that include breast milk and complementary foods. A hands-on demonstration of how to prepare complementary foods for children of various ages is another effective method of nutrition education for mothers. For instance, the health educator may demonstrate washing hands, mashing infant foods and keeping food preparation equipment clean.
Download Illustrations

Additional Resources

- American Academy of Pediatrics, Health Children. Working Together: Breastfeeding and Solid Foods. Accessed March 10, 2016.
- Infant and young child feeding. WHO website. Updated January 2016. Accessed June 20, 2016.
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Iron Deficiency Anemia in Central America

Iron deficiency anemia is a health condition characterized by a decrease in the number or volume of red blood cells or a decrease in the amount of hemoglobin in the blood. Common symptoms include brittle nails, fatigue, hair loss, headache, rapid heartbeat, shortness of breath or sallow skin. Individuals of low socioeconomic status have a higher prevalence of iron deficiency anemia; especially in children and women of childbearing age.

Prevalence of Iron Deficiency Anemia in Central America

According to 2013 data from the Pan American Health Organization, 44% of children under the age of five, and 30% of pregnant and lactating women in Latin America and the Caribbean have iron deficiency anemia.

Iron deficiency anemia is a serious public health problem throughout Central America, especially in El Salvador, Panama, Guatemala and Haiti. People residing in these countries, particularly in rural areas, may have poor access to iron-rich foods, such as beef, pork and fish, and iron-fortified foods.

Rice, a staple food in Central America, is typically polished and rarely iron-fortified. Beans, the most common iron-rich staple food, contain non-heme iron which is poorly absorbed without a vitamin C source. However, vitamin C-containing foods aren't often consumed with meals featuring beans.

High-Risk Individuals in Central America

Gastrointestinal infections and parasitic diseases can cause impaired iron absorption and infectious diseases such as malaria, which further increase the risk for iron deficiency anemia. Individuals with a higher risk include:

- Pregnant women and children – due to increased iron needs
- Those who experience acute or chronic inflammation
- Individuals with hematological disorders

Children who are actively growing and women of child bearing age who are pregnant or may become pregnant have increased iron needs and are more susceptible to iron deficiency anemia. Pregnant women have more blood in their bodies due to the developing fetus, thus increasing their iron needs. Maternal anemia has serious consequences, including increased maternal mortality, adverse birth outcomes, poor mental health, fatigue and delayed child development. Mothers with inadequate iron status, babies with low birth weight, premature births (born at less than 37 weeks gestation) and improper umbilical cord clamping after delivery also increase an infant's risk of developing iron deficiency anemia.

Preventing Iron Deficiency with Breastfeeding and Proper Complementary Nutrition

Infants, who are exclusively breastfed for the first their six months of life by mothers with normal iron status, generally don't develop iron deficiency anemia at six months of age. Lack of exclusive breastfeeding with introduction of other liquids or solid foods can interfere with the absorption of iron from breast milk. Although breast milk is usually not rich in iron, infants easily absorb the iron it does contain. Substituting coffee with sugar, or other iron-poor grain beverages for breast milk increases anemia risk.

Breast milk is naturally a sanitary beverage, whereas any food or beverage substitutes that may need to be mixed with water or require refrigeration increases the risk of infant diarrhea and its associated risk of malnutrition.

If proper iron-rich foods such as iron-enriched rice, egg yolks, beans and iron-fortified cereals aren't introduced with weaning, children are at a significantly higher risk of developing iron deficiency anemia. Failure to offer solid foods to six-month-old infants can also contribute to anemia and growth failure as iron stores in an infant do not last beyond six months.

Approaches to Educating Central American Populations about Preventing Iron Deficiency

It is essential to educate mothers on the importance of exclusive breastfeeding for six months, good quality breastfeeding experience without distraction where mother and child can bond and appropriate introduction of complementary foods.

Health educators should include lessons on iron-rich foods to help increase understanding of nutrition's relationship to anemia. Nutrition education should include animal sources of iron available in the local food supply, as well as how to pair plant sources of iron with a vitamin C source to promote adequate iron absorption. Similarly, absorption of iron from beans is enhanced if the beans are soaked and the water is discarded to remove phytates, a naturally-occurring compound in plants that inhibits iron absorption. Encouraging women to discard the soaking water and include vitamin C-rich foods with beans can significantly enhance the available iron in a diet with few heme iron sources (such as beef). Examining the types of rice available in a community to identify if enriched rice is available, enables an educator to discuss what role rice can play in preventing anemia.

If the population consumes coffee or tea, the health educator should communicate that these beverages shouldn't be consumed with meals as they inhibit iron absorption. In most areas of Central America, people cook with aluminum pots (instead of cast iron pots) so iron from cooking pots is not as available as it is in some other regions of the world. It is imperative to present foods that are available in the community and are familiar to and commonly eaten by the population. Gaining this information in advance and properly preparing for the lesson is ideal.

Iron supplements are often made available for infants and pregnant women through government or other organizational programs. Sometimes the supplements are not used or are incorrectly used due to misunderstandings. Health educators should inquire about the availability of supplements and their actual use.

Using concise and simple education tools with ample illustrations is an effective method of nutrition education for populations in developing areas of Central America. Due to minimal literacy among this population, text should be limited in health education materials.

Including actual foods and food models are encouraged. Health professionals with experience in these areas note that Central Americans tend to enjoy health education including interactions such as song, dance, plays, skits, and open communication. Concluding with interactions or hands-on activities can improve the effectiveness of health education.

Examples of Foods to Discuss in Lessons on Iron Deficiency Anemia

Animal foods with iron:

- Beef
- Wild meats such as deer, paca, iguana and other game
- Lamb pelibuey (local sheep)
- Turkey
- Chicken
- Pork
- Liver
- Veal
- Fish
- Turtle
- Egg yolks (bird, iguana, turtle)

Plant foods with iron:

- Beans
- Soybean products including soy milk
- Nuts
- Peanuts
- Vegetables
- Raisins
- Coconut
- Cocoa powder
- Dark green leaves
- Squash seeds
- Potato skins
- Fortified rice
- Fortified cereals

Vitamin C-rich foods to pair with plant sources of iron:

- Citrus fruits
- Mango
- Guava
- Guanabana
- Papaya
- Pineapple
- Tomatoes
- Peppers
- Greens
- Potatoes
- Cabbage
- Radishes
- Cantaloupe
- Watermelon
- Onions

Additional Resources

- American Society of Hematology. Iron-Deficiency Anemia. American Society of Hematology. 2016. Accessed February 2, 2016.
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Malnutrition and Stunting in Central America

According to the World Food Programme, malnutrition is the top health risk worldwide. Malnutrition can lead to impaired physical and mental development, which can sometimes be irreversible. It can also lead to death. Worldwide, about one-third of children who die before the age of five have malnutrition. One major outcome of malnutrition is stunting – low height for a child's age, which affects almost half of children in Latin America. One in five stunting cases is due to poor growth in utero, which is a highly impactful time for good maternal nutrition.

Overnutrition is also a form of malnutrition and is increasing in many countries, including in Latin America and the Caribbean. This article and accompanying illustrations focus on malnutrition caused by undernutrition.

Causes of Malnutrition

In developing areas of Central America, pregnant and breastfeeding women, as well as their children may have limited access to adequate quantities and types of food. Lack of access to nutritious food combined with the high energy demands of the mother's daily physical labor, and nutrition needs of frequent pregnancies and breastfeeding put expectant and new mothers, along with their children, at risk of malnutrition.

Mothers who give birth to infants who are small for their gestational age, live in poverty, have limited education or are in poor health are at a greater risk for being unable to provide adequate nutrition in the form of breast milk and complementary food to her infant, putting the child at risk for malnutrition.

Outcomes of Malnutrition

Health-related outcomes of malnutrition depend on which nutrients are missing from the diet. Macronutrient malnutrition can lead to stunting, wasting and being underweight. Severe protein-energy malnutrition can lead to marasmus, a form of starvation, marked by extreme wasting. Kwashiorkor is a form of protein-energy malnutrition which commonly occurs in young children subsisting on mainly carbohydrates and includes a variety of clinical symptoms, mostly notably edema.

Micronutrient malnutrition is typically less visible but can be just as detrimental. According to the World Health Organization, iron, vitamin A and zinc deficiencies are among the top 10 leading causes of death in developing countries. According to the Academy of Nutrition and Dietetics' position paper on nutrition security in developing nations, folate and iodine also are deficiencies of concern.

Malnutrition and its Effect in Central American Communities

Wasting and underweight are commonly seen in impoverished urban communities and in rural areas of Central America. In Guatemala and Nicaragua, the poorest children are six times more likely to be underweight when compared to their wealthy peers. In El Salvador and Peru, children are 13 to 16 times as likely to be underweight. Children affected by malnutrition and stunting are at a greater risk for poor school performance, disease and death. Malnourished children are more likely to drop out of school, which can lead to social and economic stress.

Knowledge gaps of the necessity of a balanced, varied diet including protein and ample feedings during the day contribute to childhood stunting and malnutrition in developing areas of Central America. Delayed introduction of solid foods is an example of inadequate feeding practices which should be

assessed and discussed with mothers and caregivers. When many children in a community are stunted it may be considered a community norm unless parents are educated and healthy standards are discussed.

Half of the nutrition-related issues in Central America occur in communities exposed to environmental risks such as natural disasters. Earthquakes, droughts and floods may directly affect food sources and impair a community's access to food. Malnourished individuals also commonly live in households without adequate safe drinking water and proper water sanitation. This increases the risk of developing diarrhea-related diseases which can compound malnutrition.

According to the Food and Agriculture Organization of the United Nations, diets of many people living in Central America are low in total fat, protein and micronutrients, particularly in El Salvador and Guatemala. Some families that grow and produce protein-rich foods may sell them to purchase other foods or household items. Health educators should gather information on local food availability and economics and emphasize the importance of nutrition and appropriate allocation of scarce financial resources.

Combating Malnutrition in Central America

The World Food Programme declares "the first 1,000 days," the time from conception to age two, as the most important time for tackling malnutrition.

Educating mothers on maternal health and nutrition is a key strategy to preventing malnutrition in Central America. Pregnant women should consume a balanced diet of protein-rich foods, grains and starchy foods, fruits and vegetables. Adequate calories and protein are also essential for proper growth of the infant. Nutrients of concern during pregnancy depend on demographic, sociologic and ecologic factors and may include folic acid, iodine and iron.

Educating all women of child-bearing age in a community can further reduce the odds of malnutrition as preconception nutrition can significantly affect pregnancy outcomes. Exclusive breastfeeding for the first six months followed by the proper introduction of complementary foods in addition to continued breastfeeding is a key strategy for ensuring adequate child growth and development.

Community programs that weigh all children on a regular basis and compare their growth to expected norms can help mothers identify and seek remedies for poor growth. These programs generally include simple education for mothers who bring their children for weigh-ins. Health professionals can support and enhance these education sessions, which are often run by lay educators or volunteers. Similar programs may be available for monitoring weight gain in pregnant women and can provide a great forum for providing educational programs with visuals and demonstrations.

Ensuring children have access to safe drinking water along with proper sanitation is essential for disease prevention, management and treatment. Children who have access to clean water are more likely to experience expected gains in height compared to children without access to clean water.

What to Include when Conducting Malnutrition Education

Including lessons on the importance of maternal health, breastfeeding, infant and young child nutrition, as well as water safety and sanitation, will help minimize the risk of malnutrition in Central American communities. Health educators should include lessons on accessible nutrient-dense foods to eat during

pregnancy and breastfeeding, as well as complementary foods to be introduced when infants are six months of age.

Additional Resources

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Pregnant and Breastfeeding Women in Central America

Proper nutrition during pregnancy and while breastfeeding is not only important for mothers, it is also crucial to the health of their infants. Women with poor nutrition put themselves and their growing fetuses at a greater risk of disease and death.

Malnutrition is a major concern for women who are pregnant or who may become pregnant in developing areas of Central America. Insufficient energy intake during pregnancy can cause low infant birth weight. Low birth weight affects 20 million children in underdeveloped countries and accounts for most of the deaths in the first week of life. Those who survive beyond the first week can be affected by irreversible consequences such as cognitive impairments, short stature and a higher risk of disease. Other fetal or infant health consequences of malnutrition include birth defects and brain damage. Consequences of maternal malnutrition include increased risk of infection, anemia and weakness. Monthly weight monitoring supported by simple health education for pregnancy can be very effective for producing positive maternal and infant outcomes.

Encouraging Breastfeeding and Adequate Nutrition for Pregnant Women in Central America

To encourage adequate calorie, protein and micronutrient intake among pregnant and breastfeeding women, advise them to consume three meals a day with one or two snacks between meals. Consuming adequate amounts of food as well as a variety of foods daily helps ensure the mother and infant are obtaining proper nutrition needed for growth and development. Health educators can show expectant mothers nutrient-dense foods that should be included in the diet during pregnancy to promote maternal and infant health.

Methods for obtaining key nutrients such as iron, calcium, vitamin A, folic acid and protein should be emphasized during nutrition education for pregnant and breastfeeding women. Realistic strategies such as soaking beans and consuming vitamin C-rich foods with meals to increase iron bioavailability and using calcium salts to add calcium to homemade tortillas should be included in the lesson, emphasizing local foods. Dairy foods are an excellent source of calcium if available.

Nutrition during the First Trimester

The World Health Organization recommends pregnant women consume an additional 90 calories and 1 gram of protein during the first trimester of pregnancy. Some additional nutrient requirements, particularly iron, folic acid and vitamin A, are difficult to achieve through food sources alone during pregnancy. For this reason, supplements or fortified foods should be promoted throughout the entire pregnancy. Adequate micronutrient consumption decreases the risk of maternal and fetal complications that could inevitably lead to death.

Nutrition during the Second Trimester

During the second trimester, an extra 290 calories and 10 grams of protein are required. Extra calories should come from nutrient-dense foods including fruits, vegetables, beans and grains. Extra protein should come from meat, seafood, beans and eggs. Inadequate weight gain during this time can lead to low birth weight which may increase the infant's risk of death.

Nutrition during the Third Trimester

During the third trimester, an extra 470 calories and 31 grams of protein should be added to the diet. Processed foods containing added sugars and fats should be kept to a minimum, while fruits, vegetables, grains and protein-rich foods should be consumed for extra calories and protein.

The WHO found that a total gestational weight gain of 10 to 14 kilograms (22 to 31 pounds) was associated with optimal infant birth weights. Undernourished women may need to gain as much as 18 kilograms (40 pounds) during pregnancy. The Institute of Medicine recommends a weekly weight gain of one pound per week during the second and third trimesters for women with normal pre-pregnancy body mass indices.

Adolescent Pregnancy

Most of the world's births that take place during adolescence occur in low- and middle-income countries. Eighteen percent of all births in Latin America and the Caribbean are from women 15 – 19 years old. Pregnant adolescents in Latin America have a higher risk of maternal death, infant death, anemia, low birth weight and pre-term delivery.

Because pregnant adolescents are supporting their own growth as well as the fetus', they need to consume extra protein – up to 101 grams at term, or 1.5 grams per kilogram of pregnant body weight. The Institute of Medicine encourages adolescents to follow general pregnancy weight gain guidelines until more research is available to determine if specific guidelines are needed for this population.

Discussing the necessity of weight gain and nutrient-dense foods to eat to support both mom's health, and baby's growth and development should be included in nutrition education for pregnant adolescents.

Nutrition while Breastfeeding

Nutrition while breastfeeding is just as important as nutrition during pregnancy. A breastfeeding mother needs to continue to eat to support her own as well as her baby's nutrition. A varied diet with a focus on nutrient-dense foods helps mom make nutritious breastmilk. A mother who is exclusively breastfeeding (only feeding her child breast milk) requires about 670 extra calories and 19 extra grams of protein a day; the WHO recommends exclusively breastfeeding for the first six months of a child's life. Fluid needs increase during breastfeeding and health educators should encourage ample safe water intake. This discussion should include safe drinking water and limiting sugar-sweetened beverage intake. When a baby's diet includes more complementary foods and less breastmilk, the energy needs of the baby's mother will decrease as well.

Dietary Supplement Use While Pregnant or Breastfeeding

Nutrient needs are increased during periods of growth such as pregnancy. Because of this, dietary supplements may be recommended during this important period of the life cycle. Individual needs will vary, and should be assessed for each patient.

The Academy of Nutrition and Dietetics recommends any pregnant woman who is abusing alcohol or drugs, suffers from iron deficiency anemia, follows a vegan diet or generally has a poor-quality diet should take a multivitamin and multimineral supplement.

The WHO recommends a daily iron supplement of 60 milligrams per day for all pregnant women. However, researchers have found that supplemental micronutrients can reduce the risk of having an infant of low birth weight but may not have an effect on perinatal mortality in developing countries.

Along with pregnancy, breastfeeding is a time characterized by increased nutrient needs that may not be able to be fulfilled through diet alone. There is little evidence regarding supplement use during lactation and no consistent recommendations are available. Mothers who consume little dairy or other calcium-rich foods may be recommended to take a calcium supplement.

Health educators should learn about any governmental or aid organization efforts to provide supplements to community members. Supplement form and dosage can vary greatly depending on availability. Health educators should tailor their dietary supplement education to complement any supplement programs occurring in the community.

Assessing attitudes toward and beliefs of dietary supplements in the community will also help the health educator deliver an effective lesson including this topic. Appropriate usage and supplement safety, such as keeping these items out of reach of children, should also be discussed.

Tips for Teaching Nutrition for Pregnancy and Breastfeeding

Health educators should become familiar with the local food supply and include lessons on accessible nutrient-rich foods to consume while pregnant and breastfeeding. Emphasizing fruits and vegetables, protein-rich foods and foods that can satisfy nutrient requirements within the local food supply are key topics to discuss. Doing a cost comparison between high- and low-nutrient dense foods can be an effective strategy.

Discovering cultural beliefs surrounding appropriate foods to consume during and after pregnancy will help the health educator provide relevant and effective information. Health educators should also emphasize that alcohol and tobacco products, as well as other drugs, should be avoided during pregnancy.

Additional Resources

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- Rush D. Nutrition and maternal mortality in the developing world. *Am J Clin Nutr.* 2000;72(1 Suppl):212S-240S.
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- World Health Organization. Exclusive Breastfeeding. 2016. Accessed May 27, 2016.
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Sugar-sweetened Beverages and Low-Nutrient Foods in Central America

Over consumption of highly processed foods and sugar-sweetened beverages is a growing health concern in Central America. According to a 2015 Academy of Nutrition and Dietetics survey of health professionals with experience in Central America, many communities in Central America have easy access to low-nutrient density foods with added fats and sugars — foods that supply calories but few micronutrients — and poor access to a variety of nutrient-dense foods. Low-nutrient density foods with added fats and sugars are commonly prominent in stores and are typically less expensive than nutrient-dense foods.

Marketing of sugar-sweetened beverages and westernized foods in Central America is rampant and includes in-store, television and billboard advertisements. Community members often lack awareness of the risk of these foods and the harm they can do to the body when overconsumed. Survey respondents voiced concern that since low-nutrient density foods with added fats and sugars are readily available and nutrient-dense fresh goods are either difficult to find or more costly, Central Americans are consuming more nutrient-poor foods than ever before.

Rising Health Issues and Dietary Concerns

Obesity is an increasing health trend in Latin America, especially in countries with urban areas and those that are emerging from poverty. Rural diets tend to be higher in fruits, vegetables and grains while urbanized diets are associated with higher levels of total fat, refined carbohydrates and added sugars with reduced amounts of dietary fiber. Poor diet along with a sedentary lifestyle increases the risk of chronic diseases such as obesity, diabetes, hypertension and dyslipidemia, all of which are becoming more common in Central America. Research predicts diabetes rates will exponentially increase by 2030 in Central America, with countries like Costa Rica and Panama at an even greater risk of diabetes prevalence to more than 10% in 2025 due to their larger urban population.

In rural areas of Nicaragua, researchers estimate that 42% of 6-month-old children and 32% of 8-month-old children regularly consume highly processed snacks and sugar sweetened beverages. When the consumption of sugar-sweetened beverages and refined foods begins at such an early age, it disrupts exclusive breastfeeding. These high-sugar foods and beverages replace nutrient-dense options and therefore raise concerns for various growth and development issues. Even the smallest villages in rural Central America may have stores that sell both high- and low-quality food items, with the low-quality food items often being more accessible and affordable.

Health concerns regarding consumption of highly processed foods and sugar-sweetened beverages at an early age include increased risk for obesity, hypertension, infections and inadequate intake of key macro- and micronutrients, which may impair growth and promote stunting. Sugar-sweetened coffee, tea, soda and heavily sweetened grain drinks are commonly given in bottles as infant foods in lieu of breast milk. Health educators should communicate to caregivers the importance of exclusive breastfeeding until six months along with proper foods to introduce in the weaning process with adequate macro- and micronutrients that promote successful growth and development.

Poor oral health is another issue resulting from the over consumption of sugary foods in Central America. Communities that have limited or no access to toothbrushes, toothpaste and dental care are especially affected from problems related to tooth decay.

Educating Communities about Nutrient-Rich Foods

In developing countries, where a third-grade education is often the average educational level, the concepts of nutrients such as protein and vitamins are poorly understood. It is not common knowledge that foods with added sugar can be harmful. Health educators should include lessons on nutrient-dense foods to help increase understanding of foods that support healthy lifestyles. Nutrition education should explain what nutrients are, how they benefit the body, and the difference between nutrient-dense and low-nutrient density foods.

Explaining the benefits of nutrient-rich food may also require discussions with families about allocating enough money to purchase those foods. People who live in developing areas of Central America typically have a limited food budget, and since low-nutrient foods are often the most affordable, families may think it's in their best interest, financially, to purchase those types of foods. Finding healthier choices that fit in a family's budget is imperative, as is presenting nourishing foods that are available in the geographical region and commonly eaten by the local population. Gaining this information in advance and properly preparing for the lesson is ideal.

Communicating the Importance of Drinking Water

Community attitudes and norms affect food and beverage consumption. Community members in developing areas of Central America commonly believe sugar-sweetened beverages to be healthier, cheaper or more sanitary than water. There is seldom a culture of drinking plentiful water, perhaps because clean running water is often not available. Education about the benefits of water and how clean water can be made available could help change attitudes about sugar-sweetened beverage consumption. Bringing potable water to rural communities is a key priority for public health efforts that also could help to reduce sugar-sweetened beverage consumption.

Techniques for Teaching about Nutrient Density

An effective format for nutrition education is simple educational tools with colorful, realistic illustrations. Because this population has minimal literacy, it is essential for education materials to have limited text. Educators should show refined foods containing added fats and sugars that supply calories without many nutrients, including sugar-sweetened beverages, along with nutrient-dense foods to replace them with in the diet.

It is encouraged to show actual foods or use food models if available. Nutrient comparison cards for nutrient-dense and nutrient-poor foods are also very helpful visuals for populations that do not know much about nutrients but can understand the contrasting visuals these cards provide. Demonstrations of how the money used for purchasing nutrient-poor foods could be used to purchase various nourishing foods are also powerful.

Additional Resources

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Teaching Dietary Protein Basics

This page contains:

- Sample descriptions you can use when teaching people about the basics of protein.
- Background information about the types of food containing protein found in Central American diets.
- Tips for relating to a Central American audience and approaches to teaching them about protein.

Sample Descriptions to use When Explaining Protein

Overview:

Protein is an essential nutrient present in every cell in the body. It's made of amino acids which are building blocks that help grow and maintain the body's tissues — including muscles, tendons, blood vessels, skin, hair and nails. Protein is also involved in synthesizing and maintaining enzymes and hormones to keep the body's systems functioning properly.

Humans are unable to naturally produce some amino acids, so they need to be consumed through food. Amino acids that can only be acquired by eating food are called essential amino acids. It's important to consume a variety of protein sources to obtain all the essential amino acids, especially if a diet relies on plant-based proteins such as legumes and grains. Individually, most plant foods don't contain all of the essential amino acids in the amounts humans need.

Protein Needs:

Everyone needs to eat protein daily. Protein needs are greater during accelerated times of growth, like infancy and childhood. Pregnant or lactating women also have increased protein needs, and adolescents who are pregnant or lactating have even higher protein needs than pregnant adults. Protein consumed by expectant mothers helps unborn babies grow. Once her baby is born, breast milk provides the newborn and infant high-quality protein to support their growth.

Protein in Food:

Protein is found in many different foods, including meat, fish, milk, beans, nuts and whole grains. Meat, poultry, fish and eggs contain the most protein. Protein from these animal foods is considered high-quality protein and supplies all the essential amino acids.

Protein and Central American diets

The most universal and inexpensive source of protein in Central America is beans. There is one main type of bean commonly consumed, although some community nutrition programs have introduced soybeans, which are also a great source of high-quality protein.

Grains such as rice, wheat and corn contain modest amounts of protein but comprise a large portion of the diet of many Central Americans and thus are a significant source of protein. Portions and the variety of carbohydrate foods commonly eaten in developing areas of Central America are usually much larger than what people from developed areas of the world are accustomed to. For instance, a large serving of rice, tortillas and cooked plantains are commonly served at the same meal, providing a significant amount of lower quality protein.

Very low-income families may rarely eat animal sources of protein and might find beans unaffordable. When eating beans, they're often accompanied by small amounts of cheese, egg or meats mixed into rice which enhances the amount and quality of protein at a meal.

Nuts are sometimes eaten as a snack but aren't a standard protein source in Central America. The most common fruits and vegetables are poor sources of protein. Since animal protein intake is typically low, grains and beans should be consumed daily to ensure adequate essential amino acid intake.

High protein foods in Central America

- Beef
- Chicken
- Eggs
- Fish
- Pork
- Wild game
- Queso duro
- Queso fresco
- Milk
- Breast milk
- Soybeans

Medium protein foods in Central America

- Beans
- Nuts
- Masa
- Tortillas
- Corn
- Rice
- Pasta
- Bread

Low protein foods in Central America

- Vegetables
- Fruits
- Crema

Infants and Protein

Although breastfeeding is common in Central America, sometimes a mother wants to provide her infant with a breast milk alternative. In these cases, she commonly uses a low-protein homemade substitute and not a standard commercial infant formula. She might offer her infant beverages like coffee with sugar or boiled grain waters instead of breast milk. When mothers make these substitutions, the infant won't get the protein and other key nutrients they need to grow, fight infections and thrive. An infant's growth, both weight and length often falls off after six months, when inappropriate or possibly no additional foods are offered to complement or replace breast milk. To address these traditional infant feeding practices, education on appropriate infant and complementary foods is vital and should include a discussion of sources of age-appropriate protein, including breast milk.

Tips for Providing Protein Nutrition Education in Central America

Before conducting a lesson on protein, health educators should familiarize themselves with the high-protein foods available in the local food supply and tailor the lesson to include these foods. Educators should also investigate income limitations and food availability before planning lessons.

Educators should also explain that small amounts of beans and high-protein foods like meat, eggs and cheese can be eaten with grain staples at each meal to enhance protein quality and quantity. Using brief and simple education tools with ample illustrations is an effective method of nutrition education for populations in developing areas of Central America. For example, an illustration of building blocks or actual blocks are a useful symbol to demonstrate protein's function. Including hands-on activities will further enhance the effectiveness of nutrition education.

Additional Resources

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Importance of Food Safety in Central America

Similar to other developing countries, Central America struggles with issues related to improper food sanitation and contaminated water. Between 1993 and 2002 in Latin America and the Caribbean, the Pan American Health Organization and the World Health Organization discovered there were 10,400 outbreaks of food and waterborne illnesses causing 500 deaths. Outbreaks may be attributed to:

- Hygiene issues
- Lack of refrigeration
- Cross contamination
- Improper food handling and preparation

Infants and children are especially susceptible to diarrheal illnesses when they ingest contaminated food or water. Multiple incidents of diarrheal illness can cause loss of key nutrients, potentially causing malnutrition and a weakened immune system. Exclusive breastfeeding until six months of age and good sanitation practices with infant foods are extremely important health measures to prevent diarrheal illness.

The Role of Water in Food Sanitation

Water sources, especially in rural areas of Central America, are usually contaminated and may be far from the community, thus limiting its accessibility for cooking, drinking and hygiene. Although community residents may understand the need to improve food and water sanitation in their communities, but they may be unaware of proper sanitation methods. Health educators should educate community members on the concept of germs, especially those in unclean water that may contaminate food when it's used for cleaning produce and cooking.

Working within the means of locally accessible water sanitation systems is imperative to helping community members develop realistic and sustainable food sanitation behaviors.

Strategies to Improve Food Safety

In Central American communities where much of the population uses primitive kitchens and does not have access to clean water sources, it's important to teach community members how to safely prepare, consume, clean and store food. Below are food safety methods to teach community members.

Preparation: Before preparing food, the cook must wash their hands with soap and clean water, even if they appear clean.

Educators should explain the concept of cross-contamination in kitchen preparation areas, food vessels and utensils. If utensils or dishes are used to prepare raw meat or fish they should be thoroughly cleaned with soap and clean hot water before being used again to prepare fresh fruits or vegetables. Utensils can also be sanitized with boiling water or with a sanitizing solution containing chlorine. Keeping preparation areas clean of insects and animals is important for avoiding pathogens carried by these species to food items.

Consumption: A hand-washing station must be available to everyone, and they should be taught to wash hands before eating. Alternatively, hands may be rubbed with an alcohol-based solution.

Because the concept of germs is not well understood, there may be considerable sharing of utensils, bowls and glasses. There may also be contamination of prepared food by tasting or using dirty utensils for stirring or turning. Education about cross-contamination should include this issue.

Clean up: Once food is prepared, all preparation materials should be cleaned with clean hot water and soap or sanitized with boiling water or with a sanitizing solution. Clean utensils and kitchen tools should be dried thoroughly either with a clean cloth or air-dried in an area away from bacteria and dirt. Dry, clean kitchen tools should be stored away from soiled areas, dust, animals or any area where contamination is possible.

Storage: Once food is cooked it should be covered as soon as possible to avoid possible contamination by flies and other insects that may have come in contact with animal waste.

Leaving food out at room temperature for more than two hours or at temperatures above 90 degrees Fahrenheit (32° Celsius) for more than one hour can cause bacteria to grow. Community members should understand that properly preparing, cooking and storing food items can prevent pathogen contamination and growth which could ultimately cause illness.

Milking and Slaughtering and Safety Measures

In dairy communities, the issue of milk safety needs to be addressed, as all fresh milk contains bacteria that can proliferate if the milk is left out at room temperature. Animal udders need to be properly sanitized before milking, containers need to be sterilized or cleaned with potable water and milk needs to be consumed or turned into cheese quickly. Milk products such as soft cheese and custards require care in handling as well.

Animals are often slaughtered in unclean conditions and educating community members to cook meat promptly and thoroughly after slaughtering is important. All fresh meats should be refrigerated or kept on ice until they can be cooked. If meat is unable to be cooked immediately, it should be processed for preservation by drying, salting or other forms of preventing bacterial growth. To kill germs effectively, meat should be cooked at high heat. All parts of the food must reach at least 160°F(70°C). Identifying potential food poisoning sources in communities is the key to prevention.

Tips for Communicating and Working With Community Members

Before explaining proper sanitation methods, health educators should plan interventions that are culturally acceptable with an understanding of local customs and beliefs about food sanitation. Because health educators from the developed world are typically unaccustomed to managing food preparation in developing world conditions and because health educators from the developing world may be unaware of pathogen control measures, it's essential to work as a team in identifying practical actions that families can take to avoid foodborne illness.

Using graphics with limited text and including some sort of interaction in the education session are effective teaching strategies. Providing demonstrations on how to correctly prepare, cook and store food will enhance the learning experience.

Additional Resources

- World Health Organization. Five Keys to Safer Food Manual. 2006.
- World Health Organization. Improving Nutrition Outcomes with Better Water, Sanitation and Hygiene: Practical Solutions for Policies and Programmes. 2015.

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Improving Handwashing Practices in Central America

Proper hand-washing is one of the most effective strategies to prevent the spread of microbial infections and illness. For instance, practicing good hand-washing habits with soap and water can reduce the occurrence of diarrhea by almost 50 percent. Common diarrheal diseases such as cholera, typhoid, intestinal worms and Shigella are the leading cause of death of children five years and younger worldwide.

Tips for Teaching Hand-Washing Concepts and Practices in Central American

Health professionals with experience working in Central America have found the following approaches to teaching hand-washing practices to be effective:

- **Using brief and simple education tools with plenty of illustrations:** Due to minimal literacy among this population, text should be limited on health education materials.
- **Providing interactive demonstrations:** A hands-on demonstration on how to correctly construct a hand-washing system and correctly wash hands will enhance the learning experience.

Explaining How Germs Can Lead to Disease

Another important aspect of hand-washing education is the concept of germs and their relationship to disease. Parents don't want their children to get sick but often lack understanding of what germs are and how they can cause disease. In remote areas, diseases may be attributed to spirits and magic spells. Health educators should assess local beliefs related to causes of illness. Any hand-washing education needs to incorporate basic information about the existence of germs, how they cause diseases and how to control them.

Steps to Improve Hand-Washing Methods and Systems in Central America

The Centers for Disease Control and Prevention recommends the following method for washing hands:

- Wet hands with clean, running water (warm or cold), turn off the tap and apply soap.
- Lather hands by rubbing them together with the soap. Lathering the backs of hands, between fingers and under nails.
- Scrub hands for at least 20 seconds.
- Rinse hands well under clean, running water.
- Dry hands using a clean towel or air-dry them.

Putting this into practice in Central America often entails modifications in places where hand-washing is done using bowls to scoop water from cisterns or buckets. If hand-washing is done with bowls, cisterns and buckets, here are steps to make the process safer and more sanitary:

- Scoop water from cistern or bucket with a bowl and pour over one hand, using this water to wet both hands.
- Lather hands by rubbing together using soap, being sure to lather the backs of hands, between fingers and under nails. If no soap is available, remember that scrubbing also plays a role in dislodging germs and should be done regardless.
- Rinse hands in the bowl and discard the water. If other people are available, as in a school or food service environment, have another person pour water over lathered hands to rinse (instead of rinsing hands in the bowl).
- Be sure to have a second bucket or a catch basin to capture the waste water if a wash station isn't available. Discard waste water in a drainage system or pour into a garden, latrine or into greenery where it will not create a mosquito-breeding mud puddle.

- If possible, hang a clean towel by the hand-washing station. If this isn't possible, include information on how to air-dry as part of instruction. Otherwise, children may dry their clean hands on their dirty clothing.

There may also be an opportunity to create a hand-washing station even in a community with limited resources. The CDC provides instructions on how to create a "Tippy Tap", a homemade hand-washing station made using commonly available materials in areas with limited piped water. The CDC also provides additional information about safe water systems.

Understanding Barriers to Clean Water and Soap

Without clean water, it's difficult to achieve proper hygiene. The less clean water available, the less likely it is that communities and households will practice good hygiene. However, evidence indicates that using unsafe water to clean hands still reduces the spread of disease and is more effective at reducing the spread of pathogens than not washing hands at all.

Limited access to soap may be another barrier to proper hand-washing in Central America. Health educators should educate community members on the benefits of using soap to wash hands and encourage them to use it, if available.

Improving Access to Hand-Washing Stations

The location of hand-washing stations can affect hand-washing frequency. A goal of hand-washing promotion should be to have a child-accessible hand-washing station in every home and by every latrine. Schools should have functional hand-washing stations outside the banks of latrines.

Communities need to determine whose responsibility it is to ensure these stations are functional with daily fresh water. Where community feeding centers provide meals for children, an adult staff member or volunteer should be in charge of hand-washing stations and all children should be required to wash before eating. Hand-washing will only occur where there are hand-washing facilities and someone in charge of ensuring there is fresh water and other required supplies.

Additional Resources

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Feeding Children with Diarrhea

Childhood diarrheal diseases cause 1 out of 9 childhood deaths worldwide. Approximately 88% of diarrhea cases are due to unsafe drinking water, poor sanitation and insufficient hygiene. Diarrhea is defined as experiencing more than three liquid stools a day.

Germs causing diarrhea originate from stool and usually spread to contaminate water, food or other objects, ultimately causing diarrhea. Reasons for the spread of germs that cause diarrhea include:

- People or animals defecating near drinking water
- Farmers using contaminated water to irrigate crops
- People failing to practice proper hygiene once hands become contaminated
- Food preparers failing to practice sanitary practices while cooking

A Problem in Central America

Diarrhea is a pertinent public health problem in Central America. For instance, in 2013 in Guatemala, diarrhea caused 18% of all deaths of children under five. Although there is no shortage of water in Central America, some countries and communities do not allocate appropriate resources to provide clean water for all residents. This contributes to the 2.1 million urban and 13.2 million rural individuals who lack access to safe drinking water.

The use of pit latrines for toilets and open defecation are common practices in Central America, both of which can lead to the spread of germs that cause diarrheal diseases. In some Central American countries, the resources the government expends to control and treat diarrhea may be up to four times the amount it would cost to improve water sanitation systems.

Acute and Chronic Diarrhea

Poor nutrient absorption in the gastrointestinal tract and dehydration are of major concern with acute diarrhea, which is defined as diarrhea lasting less than 14 days. When diarrhea exceeds 14 days, it is considered chronic diarrhea, and nutrient malabsorption can become severe. Diarrhea can also lead to death by depleting hydration and disrupting electrolyte status. Recurring diarrheal illness can lead to malnutrition which renders a child's immune system incapable of coping with illnesses such as respiratory infections and measles, resulting in increased morbidity and mortality.

Childhood Diarrhea and Malnutrition

Childhood diarrhea plays a significant role in malnutrition. Infections within the intestine can lead to loss of key nutrients, damage to the gut mucosa and impaired nutrient absorption, which could then induce more severe malnutrition.

Proper nutrition is imperative to breaking the vicious cycle of malnutrition and diarrhea. Well-nourished children are more resilient during a diarrheal illness. Continual feedings during diarrheal episodes and increased breastfeeding is crucial for better clinical outcomes.

Because caregivers may not understand the importance of continual feedings during diarrhea, nutrition education for parents and caregivers is essential for the health of the child. Whereas it may be beneficial to avoid raw fruits, milk and greasy foods, it's important to continue offering a balanced diet. For children under six months, increasing breastfeeding during illness is highly encouraged as it provides

ample nutrition and acts as an oral rehydration solution. Inquiries should be made within communities to understand the common feeding and breastfeeding practices for children with diarrhea.

Preventing Diarrhea

Primary prevention of diarrhea is to control fecal-oral transmission of pathogens through water sanitation and hygiene. Effective interventions include rotavirus vaccinations, breastfeeding and oral rehydration therapy as well as community education on safe water, sanitation and hygiene practices. The World Health Organization and The United Nations Children Emergency Fund recommend including household water treatment methods, proper disposal of feces and promotion of hand-washing with soap and water to prevent diarrhea.

With safe drinking water, adequate sanitation, improved hygiene and routine vaccines, diarrhea is a preventable disease.

Current WHO and UNICEF guidelines for managing diarrheal diseases in children include evaluating hydration status, fluid replacement, continued feeding, increased breastfeeding, zinc supplementation and sometimes antibiotics for 10 to 14 days.

Low osmolarity, glucose-based oral rehydration solutions are recommended to prevent or treat diarrhea. Low osmolarity solutions reduce the need for intravenous fluids and decrease stool output in children when compared to a standard formula.

Oral rehydration salts are commonly available over the counter in local pharmacies and general goods stores in many Central American communities. These need to be added to water that is potable, either bottled or from a source treated by chlorine, ultraviolet light, boiling or micro-filtering.

A Recipe for Rehydration

Where over the counter oral rehydration salts are not available, a simple mixture of 1 liter clean water, ½ teaspoon salt and 8 teaspoons sugar can be used. Alternatively, 8 heaping teaspoons of powdered rice or other grains can be used instead of sugar. This version needs to be boiled for 5 to 6 minutes to create a very thin gruel and then has to be cooled. One-half cup mashed bananas, coconut water or fruit juice can be added to either drink to provide potassium. Children should be fed rehydrating drinks every few minutes, even if vomiting, until they are able to urinate and appear well hydrated.

Additional Diarrhea Education Resources

Straightforward education on water safety and sanitation and proper hand-washing is a key part of diarrhea prevention and management education. The Global Water, Sanitation, & Hygiene section of the Centers for Disease Control and Prevention website contains health promotion materials including how to make oral rehydration solution. The Centre for Affordable Water and Sanitation Technology websites provide free, downloadable materials on the topics of sanitation, hygiene and health, including the concept of microbes and how to prevent them for spreading.

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Water Safety and Sanitation in Central America

According to the World Health Organization and UNICEF, as of 2012, in Latin America and the Caribbean, 36 million people didn't have access to an improved drinking water source and 110 million people didn't have access to an improved sanitation facility.

Unsafe drinking water and poor water sanitation can lead to infectious diseases, including diarrheal diseases. Diarrheal diseases are a major public health concern and cause 1 of every 9 child deaths worldwide, being the second leading cause of death for children under five years of age. In 2010, approximately 12,000 children under the age of five died due to diarrhea in Latin America and the Caribbean.

What are Improved and Unimproved Sanitation Facilities and Drinking Water Sources?

Improved sanitation facilities are those that inhibit human contact with feces. Improved drinking water sources should provide access to safe water.

When improved water sources are damaged or improperly constructed, they can become contaminated and therefore provide unsafe water. The WHO and UNICEF provide examples of improved and unimproved drinking water sources and sanitation facilities:

Improved Drinking Water Sources

Piped water connection
Public tap or standpipe
Borehole
Protected dug well
Protected spring
Rainwater collection

Unimproved Drinking Water Sources

Unprotected dug well
Unprotected spring
Surface water
Vendor-provided water
Bottled water*
Tanker truck water

**Bottled water, although typically safe, is not reliably accessible and is therefore considered an unimproved drinking water source.*

Improved Sanitation Facilities

Pour-flush toilet or latrine
Ventilated improved pit latrine
Pit latrine with slab
Composting toilet

Unimproved Sanitation Facilities

Pit latrine without a slab or platform
Hanging latrine
Bucket latrine
Open defecation

By combining water sanitation and proper hand-washing, many water sanitation-related diseases can be prevented, saving thousands of lives each year. The most effective way to decrease an infant's risk of consuming contaminated water and contracting a diarrheal disease is exclusive breastfeeding for the first six months of life.

Improving Water Sanitation Practices in Central America

- **Sanitation Education:** Community members often lack knowledge on water sanitation practices and systems. Educating people in the community about behaviors that can lead to water

contamination and consumption, such as human or animal defecation near a water source or consuming water that hasn't been filtered and purified, might be necessary.

- **Emphasizing the Benefits of Breast Milk for Infants:** In some areas of Central America, caregivers feed infants milk other than breast milk, such as cow or goat milk and provide infants with other liquids such as formula, juice, tea, coffee and sugar water that may have been prepared with unsafe water. Health educators should communicate the WHO's recommendation of exclusive breastfeeding for the first six months and continued breastfeeding with the proper introduction of safe complementary foods and beverages up to age two or beyond to enhance infant growth and development and to reduce the risk of contracting diarrhea and other waterborne illnesses.

"Safe Water System" Initiative

The Centers for Disease Control and Prevention and the Pan American Health Organization developed the Safe Water System, an initiative which includes simple approaches to developing safe community water. The SWS includes three steps:

1. Household water treatment
2. Safe storage of treated water
3. Education to improve hygiene, sanitation and water and food handling practices

The SWS website includes detailed information on household water treatment and safe water storage methods as well as tips on starting an SWS project in a community.

The Centers for Disease Control and Prevention and Centre for Affordable Water and Sanitation Technology websites provide free, downloadable water treatment and sanitation education materials.

Additional Resources

CDC

- Diarrhea: Common Illness, Global Killer. Global Water, Sanitation, & Hygiene (WASH). Updated December 17, 2015. Accessed March 29, 2016.
- Drinking Water Safety. Healthy Homes. 2014. Accessed March 29, 2016.
- Centers for Disease Control and Prevention. Health Promotion Materials. Global Water, Sanitation, & Hygiene (WASH). 2015. Accessed May 18, 2016.
- The Safe Water System. 2014. Accessed May 18, 2016.
- Parker, A. Safe Water System & Hand Washing Guide for Health Care Workers, Edition 4. Center for Disease Control and Prevention. 2015. Accessed April 3, 2016.

UNICEF

- Pneumonia and diarrhea. 2012. Accessed May 25, 2016.
- Water, Sanitation and Hygiene. Accessed March 29, 2016.
- World Health Organization and UNICEF. Progress on Drinking Water and Sanitation. 2014. Accessed May 25, 2016.

Population Reference Bureau

- Fracas J, Martz T. The Impact of Climate Change on Water, Sanitation, and Diarrheal Disease in Latin America and the Caribbean. Population Reference Bureau. 2007. Accessed April 3, 2016.

Water and Sanitation Program

- Clean Water and Sanitation Reduce Childhood Malnutrition and Diarrhea. www.wsp.org Accessed April 3, 2016.