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Guatemala, Malnutrition

One Problem, Many Solutions: Addressing Malnutrition in Guatemala

Introduction

The Population Division of the United Nations estimated the global population in 2015 to be nearly 7.4 billion people. This number is expected to increase by 40% to just over 10.3 billion over the next 50 years (United Nations Population Division). The impacts of this population growth are significant, especially with regard to how we can meet the nutritional demands of a world both growing in affluence and number (Foley, "The Future of Food"). Maintaining food security, or the "having, at all times, both physical and economic access to sufficient food to meet dietary needs for a productive and healthy life," continues to be a challenge (Figure 1, McCarthy et al.).

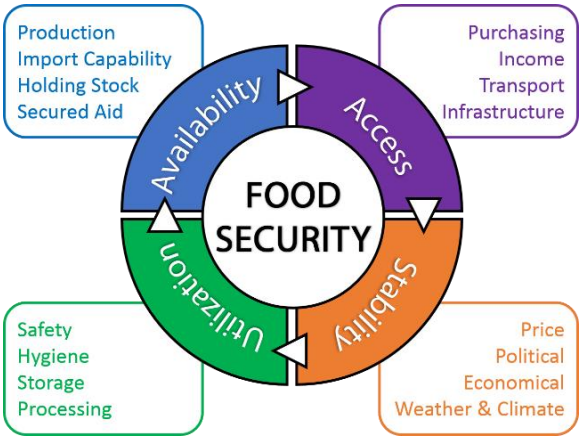

Figure 1. Conceptual diagram illustrating the main components of food security (modified from McCarthy et al., 2018).

The concepts embedded within the term food security are multiple and complex, and include issues ranging from food production and access to nutritious meals to the socioeconomic conditions in which people live (Figure 1). Food security incorporates ideas and approaches from the social, biological, and physical sciences and requires integrated solutions. The need to address current food insecurity is significant and is exacerbated by population growth. One in nine people are food insecure and malnourished globally, making food security a necessity to a successful and prosperous community ("Global Food Security – Issues, Challenges and Technological Solutions.").

The Problem: Malnutrition in Guatemala

Malnourishment is a global crisis that touches many and takes lives everywhere. However, with 54% of its population living in poverty and 13% in extreme poverty, Guatemala has the unenviable distinction of having the sixth worst rate of malnutrition in the world ("Agriculture | Guatemala, `Food Assistance Fact Sheet"). Families, particularly children, across the country are unable to consume food of sufficient quantity, quality, and diversity to lead normal, healthy, and active lives.

In addition to the quantity of food produced and consumed, another dimension to malnutrition in Guatemala is the lack of protein availability. Of the 49% of children who are malnourished, most are consuming enough calories. The diets for these children typically consist of corn tortillas and various pastas ("Guatemala," WFP). These carbohydrate-laden meals, however, lack the essential variety and protein required by the human body to grow and repair itself. This has resulted in nearly 47% of children under the age of five suffering from physical or mental developmental issues (Lesso). With food prices at or near all-time highs, the ability to purchase beans is limited and eggs or meat nearly impossible (Efe).

Many factors contribute to malnutrition in this developing Central American country, including an unbalanced national economy, lack of affordable and universal primary education, and environmental

challenges to sustainable agricultural production. Given that the concept of food security, and causes of food insecurity, are multidimensional, so too are the possible solutions. Below is a summary of activities and initiatives already underway in Guatemala to address food security in general, and malnutrition in particular, as well as a new approach to improve the quality of diets in Guatemala, with emphasis on protein intake.

Solution 1: Economics

Small, or nonexistent, household incomes play a prominent role in magnifying the malnutrition crisis in Guatemala. Two-thirds of the population lives on less than $2 US per day, which is insufficient to supply food for a typical family of five ("Guatemala," WFP). With few employment opportunities for its poor or less-educated citizens, there are no simple solutions for increasing employment or creating more jobs to raise average incomes. Guatemala has the most unequal income distribution globally, where the richest 10% own almost 50% of the national wealth and the poorest 10% of the population own less than 1%, leaving massive wage gaps between the rich and poor (Bauer).

In an attempt to alleviate the restrictions of low income in rural communities, Maria Pacheco devised a plan to employ women from rural communities in Guatemala. Her goal was to increase incomes throughout the community to help fund education in the area. Pacheco's employees weave bracelets for the brand "Wakami," which provides steady income for 450 people. In the villages that "Wakami" is based, the average weight of children has increased between 8-30% and high school attendance rates have risen to a remarkable 92%. The Wakami initiative shows how providing a steady income and the opportunity to pursue an education can lead to a more prosperous future in Guatemala (Bauer).

Solution 2: Improving Education

Despite recent tax initiatives to fund schools in the country, **"**Guatemala has the lowest rate of investment in education in all of Central America," ("Girl Rising"). Only 65% of students complete secondary school and only 18% continue in a higher education program. Education is simply too expensive for many and reflects the inability of families to afford school supplies, uniforms, and transportation for their children ("Guatemala", Global Education Fund, "Education.").

One of the United Nations' Sustainable Development Goals is to deliver a quality education to all by 2030. In Guatemala, rural areas have lower levels of secondary education enrollment for female students. Of the 2 million children not enrolled in school, the majority are indigenous girls. Less than 30% of rural and indigenous girls attend school as they are expected to take care of siblings, marry, and start families at relatively early ages ("Guatemala: First Trial for Systematic Violations of Indigenous Women").

Girl Rising is a documentary displaying the lives of nine girls who are denied their right to an education and, for some, the adversity faced by girls and their families to provide an education. The documentary sparked a movement to advocate and provide a quality education for everyone as a means to break the cycle of poverty. Organizations like *Girl Rising* promote girls' education, confidence, and well-being through community-based programming, mass media campaigns and government engagement. For girls aged 15-19, the highest cause of death is not hunger or disease, but pregnancy and childbirth ("Girl Rising"). Educating girls keeps them safer by decreasing trafficking rates, prolonging the age until marriage, and reducing family sizes ("Education." *UNICEF*).

With access to a quality education, the overall quality of life for families increases. Education opens doors to steady salaries and higher incomes that allow for quality diets that ensure healthy future

generations. Education also has a "multiplier" effect where academic success is often followed by a chain of advancement and improvements in many other areas such as disease prevention, improved diets, and enhanced agricultural production. Importantly, access to education also plays a critical role in ending cycles of poverty, sexual violence, young marriage, and detrimental pregnancies for young girls ("Goal4: Quality Education.", "Girl Rising").

Solution 3: Sustainable Agriculture

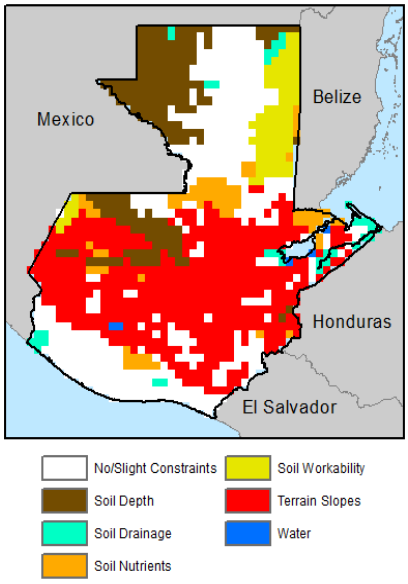

Figure 2. Soil conditions limiting agricultural productivity in Guatemala ("FAO Soils Portal").

With limited purchasing power, most Guatemalan families rely on small-scale agriculture, supported by family labor, to support their daily dietary needs. Most smallholder farmers face significant challenges with crop production. According to the United Nations (UN) Food and Agriculture Organization (FAO), 67% of the country has significant low-input farming constraints such as steep topography, shallow soils, poor soil drainage and nutrient holding capacity, and difficult workability (Figure 2). All of these negative conditions are magnified by our changing climate. Guatemala is one of the ten countries most vulnerable to natural disasters and the effects of climate change ("Guatemala," WFP). New weather patterns are leaving many subsistence farmers struggling with unusually long dry seasons and increased flooding during wet seasons. The region east of Guatemala City, the portion of the country where most non-plantation food production is centered, is expected to see an increase in temperatures and decrease in precipitation, which will further limit reliable and high crop yields (Figure 3).

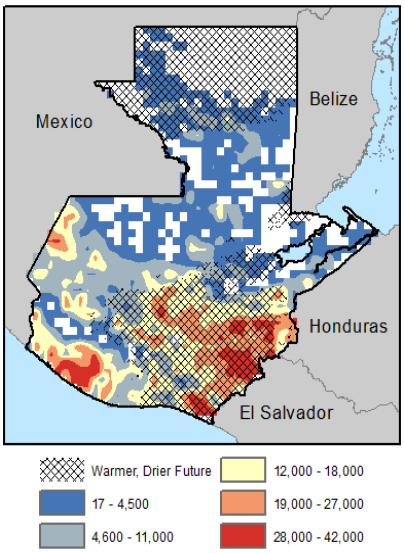

Figure 3. Food production in Guatemala (in kilocalories) with modeled future climate impacts ("Future Climate Data").

The United States Agency for International Development (USAID) works to improve farming in Guatemala. USAID works with small farmers to improve sustainable farming, manage natural resources, and optimize crop yields. As a result, larger yields generate more food and increase farming revenues. With this strategy, USAID has had good successes. In 2013, high quality coffees, handicrafts, and horticulture produced a $20.4 million profit for small farmers and supported over 8,000 full time jobs. With the USAID's Food for Peace Program, chronic malnutrition has decreased 7-9% in target communities across the region ("Feed the Future | Agriculture and Food Security.").

Solution 4: Adapting to Climate Change

Climate change has been a struggle for farmers in recent years, as each year brings longer dry seasons and more water is needed to cultivate crops. MásRiego, or "More Irrigation" in Spanish, is working to improve water supply issues by implementing drip irrigation systems across the Guatemalan highlands. They aim to install 3,000 systems and teach farm workers how to use and maintain them. María Luiz

Tiña, a local highland farmer, stated, "We all farm during the rainy season, but when the rain ends, we have no other way to get water." This is where MásRiego's efforts pay dividends by helping subsistence farmers like Maria extend their water resources in time, so they can feed themselves and sell extra food for small profits. MásRiego also works towards new sustainable methods of farming, including using goat waste as fertilizer and leaves from nearby forests to cover the garden beds to reduce water loss and increase organic matter. With climate change in mind, this project emphasizes water management and developing a better understanding of how to adapt to predicted extremes in future wet and dry seasons.

The project also has an educational component and works in schools to prepare future generations for work in the agricultural sector (Davis, et al.). So far, MásRiego has found the most success in combining drip irrigation with conservation agriculture practices. Soil moisture loss has been reduced by not tilling farmlands, providing a cover of mulch, and implementing crop rotations. This farming practice is less labor intensive and allows for more efficient water usage (Dawson).

Next steps for the MásRiego initiative include teaching women appropriate marketing strategies for their crops and creating a brand for the foods produced through their sustainable agricultural practices. MásRiego approaches these climate-driven issues holistically, applying climate-savvy farming techniques and addressing social inclusion, specifically amongst women and youth. Local awareness, agreement and understanding, adaptable models, water access, youth and women engagement, and successful credit provision are all key factors that MásRiego technicians apply when implicating the new farming strategy.

New Approach: Aquaponics

Aquaponics is a sustainable food production system that combines the concepts of hydroponics and aquaculture (Patillo, "Aquaponics."). These systems are capable of providing people with fresh vegetables and a sustainable source of protein in the form of fish. A 608 square foot system can produce as much as 115 pounds of vegetables and 5 pounds of fish per week, meeting the Mayo Clinic's recommended serving sizes for 20 children of age five ("Family Aquaponic Greenhouse," "What Nutrients Does Your Child Need Now?"). This approach to food security is self-sufficient, sustainable, and could provide poor communities with an affordable way to feed their families. Aquaponics presents a unique solution, as it requires little to no soil and uses minimal water for food production. Systems can be adapted to various terrains and climate conditions and are suitable for the mountainous regions of the country.

However, successful implementation of aquaponics systems requires planning. Poor education and a lack of understanding leads to near immediate failure when introducing foreign concepts and technologies to people of tradition. In areas surrounding Lake Atitlan, in the southwestern highlands of Guatemala, ECOSIN charcoal water filters are being used to clean household water. Woodland Public Charity is an organization helping underdeveloped countries by providing these filters for domestic use. Woodland Public Charity sees the most success in the open-minded individuals, who take this opportunity to invest time in their livelihoods ("Woodland Public Charity").

According to Faron Barr, Rotary District Governor of District 5710, about one-third of the people trust in the filters to be effective with little convincing. Another one-third are open to the filters but skeptical about their effectiveness and represent an "educational opportunity." The remaining people have no desire to try the filters. Barr believes that the first step is always to let the people decide what they need and not for outside entities to force feed possible solutions. "They tell us their babies are dying after drinking this water and we present them with the solution." With any presentation of new concepts, ideas, and technologies, a foundation of understanding and education must be built before mass implementation can have the intended success (Barr).

Another obstacle is public acceptance of a new way of growing food and, for non-coastal communities in Guatemala, introducing a new type of food altogether (Barr). Since aquaponics would demand planning for the future, prerequisites for increasing dietary levels of protein with fish include both education and community engagement. The experiences of Woodland Public Charity and Faron Barr can be a guide for working collaboratively with communities to help them produce sustainable protein and vegetables.

Conclusion

The need for sustainable, resilient food production systems that are adaptable to different climate, soil types, and topographies are needed in this country. A steady and affordable supply of food provides for basic human needs and, in turn, helps address the education and healthcare crises by improving the economy. While the projections for global population increases pose significant challenges for achieving food security, the problem is acute in Guatemala where the percentage increase in population is expected to be more than double that, or 85%, anticipated worldwide (United Nations Population Division).

Food security presents both complex and in-depth problems, yet small and simple solutions allow for immense growth economically, socially and agriculturally. Missions like that Maria Pacheco set an example for entrepreneurial small businesses that enable vast improvements within communities. Investment in a quality education is a solution that creates a ripple effect on individuals, families, and communities, improving different aspects of people's livelihoods**.** Introduction of aquaponics and drip irrigation would also foster a better future for local farmers, lowering water usage and increasing diet quality by adding more protein to meals. By presenting various solutions to similar yet varying problems, food insecurity can be tackled one business, one educated girl, and one technically advanced farming technique at a time.

Billions of dollars are spent on international aid every year, yet many broad solutions have little to no impact on affected communities (McBride). Many question how so much money can result in so little progress. The answer is simple. Critical issues demand solutions crafted for specific communities. There is not one solution that can solve world hunger. Instead, we must assess and solve problems based on local needs and expectations.

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