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Haiti, Malnutrition

### **Sustainable Agriculture: One Way We Can Combat Malnutrition**

The country of Haiti, located in the Caribbean on the island of Hispaniola along with the Dominican Republic, has a total land area of 27,560 kilometers. It is the most mountainous country in the Caribbean, making it difficult to grow crops for food consumption, however, about 66% of Haiti's land is used for agriculture. Only 970 square kilometers of the agricultural land is irrigated, which helps a small percentage of all the crops to survive the recurrent droughts and climate change. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019) Most farms in Haiti are small, subsistence farms that produce small yields of food only for themselves and their family leaving little to no extras for the local community. There are over 10 million people in Haiti and about half of the population is undernourished. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019) With climate change, recurrent natural disasters, and soil erosion, it has become more difficult to grow crops to feed the population and the burden of malnutrition continues to grow in Haiti.

A typical Haitian family has about 2-3 children. This statistic is based on the country's fertility rate measured in 2018. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019) With few cities in which to live, many people live on the rural plains with a few living on the more mountainous parts of the country. A normal Haitian house usually consists of two rooms with mud walls, dirt floors, a thatch roof, sparse furniture, and an outside kitchen over a fire. Unlike the United States, improved sanitation facilities are rare, and most have only a latrine that is dug away from the house. In the slums of Haiti, many homes are constructed very poorly with only a small amount of inexpensive materials like tin and sometimes cardboard, with no safety codes, all due to the extreme poverty. ("Haiti - Housing", 2019) Almost 60% of the population lives under the national poverty line, earning around \$2.00 per day, with some people earning only \$1.00 per day. Many people do not receive any income from a job due to 40% of the population being unemployed. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019)

Due to poverty, very few children have the opportunity to attend school. Most schools are private or church-administered institutions. Only about three-fifths of the total population is literate, leaving many without professional skills. ("Haiti - Housing", 2019) Rather than going to school, some children do various jobs to earn a scarce amount of food for survival. Haiti's health care system is largely non-existent with only very few health facilities scattered around the country. In 2013, there were only about 25 physicians and 11 nurses per 100,000 people. Consequently, Haiti suffers many regular disease outbreaks, including HIV/AIDS, Zika, Cholera, and typhoid fever.

Looking at the country as a whole, Haiti is actually the poorest country in the Western Hemisphere with a Gross Domestic Product of 8.408 billion (U.S.) Dollars, ranked 149th in the world. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019) Without financial contributions and loans from other countries and organizations, Haiti would not survive. Throughout the years, many countries have given millions & billions of dollars to Haiti through relief efforts and other donations. The United Nations has even promised to give \$13.34 billion by 2020 to help the country recover from the earthquake in 2010. (Connor, 2019) However, Haiti continues to suffer from extreme poverty.

Over the past few decades, Haiti has been prone to be hit by many natural disasters, and has not been able to fully rebuild and recover before another natural disaster occurs. In 2004, Haiti experienced extensive flooding, and then later in that same year, the city of Gonaives was hit by Hurricane Jeanne killing about

3,000 people. In 2010, Haiti crumbled due to a 7.0 earthquake that nearly destroyed the capital, Port-au-Prince, and wiped out thousands of homes and buildings all around the country. Many did not recover before a category 4 hurricane struck in 2016. Approximately 55,000 people were still living in shelters when it hit. Hurricane Matthew almost topped the devastation from the earthquake back in 2010, but worst of all, it destroyed almost all of the crops that were growing which caused more people to starve and suffer from malnutrition.

With the many natural disasters destroying much of the arable land and diminishing the already low number of domestic foods in the country, Haiti's farmland is very eroded and infertile which does not provide enough food for the country. The low yields have made it difficult for the farmers to earn an income and grow food to survive, which has led to more poverty and extreme hunger. Haiti has not undertaken any efforts to limit levels of deforestation, erosion, or conservation of essential natural resources of their lands. This has led to an increase in floods, droughts, mudslides, and the resulting infertile soil. The government has not been a part of any projects to grow the agricultural sector of their country or protect their already dwindling natural resources. They also have not provided any insurance to farmers that especially need support after natural disasters. This has led to the country turning to imports for sustenance. About 80 percent of all the food that Haitian people eat is imported. This makes Haiti very sensitive to any price increases and inflation. ("Haiti", 2019) Most imported food coming into Haiti consists of rice, vegetable oils, wheat, cane sugar, milk, and chicken from the Dominican Republic, United States, Netherland, Antilles, or China. These imports would not be much of an issue if Haiti was exporting just as much, but the imports coming in are costing much more than what they are earning through their exports. This past year in 2018, Haiti spent an average of 378.33 million (U.S.) Dollars on imports per month and only earned 89.2 million (U.S.) Dollars in exports per month. ("Haiti Exports | 2019 | Data | Chart | Calendar | Forecast | News", 2019) Consequently, Haiti needs to produce more of their own goods to feed their own population and sell more goods to afford the cost of importing more food from other countries.

Poverty, the lack of food, inadequate sanitation, and only a limited amount of health services, affect millions who are suffering from malnutrition. Children and women feel the highest burden in the country. Right now, about 100,000 children under 5 years old are suffering from acute malnutrition, and 1 of 14 children will die before reaching the age of 5 due to malnutrition. Also, about 30 percent of children in Haiti suffer from chronic malnutrition. ("Malnutrition Statistics", 2019) About one-half of all reproductive-aged women are anemic, and few pregnant women are getting enough nutrients for themselves and the baby. Malnutrition is deadly to a population, beginning with acute malnutrition, when the body consumes its own tissues to survive, stunting and slowing many normal bodily functions. If not treated, moderate acute malnutrition means the risk of death. The immune system is compromised due to nutrient deficiencies and a higher susceptibility to illness and serious diseases. Finally, if the individual is still alive and has not been properly treated, severe acute malnutrition takes over in either one of two ways: Marasmus or Kwashiorkor. Marasmus is when a child is so thin and weak that they look elderly, and many bodily functions have significantly slowed or even stopped, like intestinal absorption and kidney function. Kwashiorkor is when the individual's arm, leg, and face muscles are severely swollen, which is called bilateral edemas, This condition can be deceptive because the person does not look malnourished. With bilateral edemas comes excruciating muscle pain caused by cramping and the damaged internal bodily functions, ultimately leading to death. ("Types of Acute Malnutrition - Action Against Hunger", 2019)

The main reason Haitians are not getting sufficient food to sustain themselves is because the farmers are not growing enough domestic food to feed the entire population. Cassava, plantains and bananas, yams and sweet potatoes, and rice are the main foods grown in Haiti. However, most farmers only use subsistence farming which by definition, "is a form of farming in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family, leaving little, if any, surplus for

sale or trade.” (“Subsistence farming | agriculture”, 2016) This shows that Haiti is not growing enough to feed its whole population especially with more of the population moving to the cities where they cannot grow their own food. Subsistence farming severely exhausts the soil and depletes most or all of the nutrients after many years of use. (“Subsistence farming | agriculture”, 2016) Consequently, Haiti is experiencing low yields, increasing erosion, more droughts and floods, and worsening effects from natural disasters. Sustainable agriculture, however, can solve these problems! According to C.A. Edwards of the U.S. Agency for International Development, “Sustainable agriculture is a management system for renewable natural resources that provides food, income, and livelihood for present and future generations while maintaining or improving the economic productivity and ecosystem services of these resources.” (Eswaran, 2019) Consequently, if Haiti changes from subsistence farming to sustainable farming, crop yields would rise, food would become more available and cheaper, people could earn more income, and the whole country could reduce its poverty and starvation levels.

I configured several steps that would help sustainable agriculture become a true reality in Haiti. First, we must start with research: research what the soil is like around the country and what it is lacking, what crops will grow successfully in the climate and nutritiously feed the starving population, and what sustainable practices will work best with the soil and climate. We must also study the Haitian farmers and their historical practices, and discover what they are willing to change. Areas of study would include tilling practices, the use of the land, fertilizer application, and the level of food production for themselves and if they are providing any for their community. This will help us know what sustainable agriculture practices we can incorporate and which ones will be the most successful.

Secondly, education will need to be a priority. Three educational types will be necessary: education for the farmers, education for the workforce, and education for the community. Farmers will need to be educated about the consequences of their current practices, how sustainable farming practices will benefit them and the whole population, which ones they will need to implement, and the steps on how to implement them on their land. Secondly the workforce needs to be educated. Most of the population is uneducated and illiterate, which means most of the workforce cannot perform as well as they could be because they are not educated. If more people are educated to the point where they become literate, those people would be huge contributors if they later went to work with the farmers who are implementing the new sustainable farming practices. This is very necessary because right now with subsistence farming, those farmers only farm a few acres, and if our goal is to feed the entire Haitian population with domestic food crops, the farmers must farm more acreage, requiring more labor help. Thirdly, all the communities will need to be educated on sustainable agriculture and making healthy food choices when they will have the ability to choose what they are eating. Specifically, learning about the nutrients and foods they need to be healthy will connect the farming practices to the people lowering the starvation and hunger levels.

Before we actually apply sustainable agriculture, the government must be involved. Haiti has a history of difficulty with creating incentives and improving their own domestic farming, which has led them to depend on exports and trade with its neighbors. (“Haiti - Market Overview | export.gov”, 2019) If we can convince the government to commit to this project, that would give the farmers a big boost of motivation to commit to the practices of sustainable agriculture. However, this could be the weaker link of this plan because the Haitian economy is still very fragile, and the government can distrust new ideas after they have already tried to help the slowing agricultural sector. But with most of the research already done, I think the government would be more likely to agree to this project over other failed methods. (“Haiti - Market Overview | export.gov”, 2019)

To actually implement sustainable farming practices, we need to start simple. This is very important because Haiti is very poor and will not be able to afford much of the new technologies that are used in developed countries. We also have to focus specifically on the soil because that is what will help us grow healthy crops. Some practical, sustainable farming practices that could be successful in Haiti are cover

cropping, crop rotation, reduced or eliminated tillage, integrated livestock grazing, and usage of natural fertilizers.

Cover crops are very important and beneficial in many ways, replenishing the nutrients that were depleted in the past growing seasons, such as nitrogen and phosphorus but most importantly, they all add important organic matter back into the soil. (Barth, 2015) Cover crops also reduce soil erosion and compaction, improve soil structure, and suppress weeds, which would improve Haiti's current poor soil composition. The soil is not the only one getting the benefits, farmers also become more efficient and profitable with cover crops. Haitian farmers would have the opportunity to harvest two or more crops in a year, providing more food depending on what seed they plant, like barley, wheat, or oats. Some other common cover crops are radishes, clover, rye, legumes, and several types of grasses. (Byron Seed, 2018) These could feed the population and livestock also, further expanding food possibilities. Crop rotation could be another way for farmers to increase their yields and replenish and conserve nutrients. Research has shown that diverse crop rotation (rotation of three crops or more) does not require as many synthetic inputs to improve crop yields compared to less diverse systems (one to two crop rotation like soybeans and corn). (Davis, Hill, Chase, Johanns & Liebman, 2012) This would allow Haiti to grow many different foods so that the population can eat more balanced diets.

With the already existing supply of livestock, especially cattle and goats, integrating grazing livestock with the cover crops could also give Haitians more food sources and improve the soil at the same time. This would be very cost-effective and could give the livestock more land to graze before it turns back into a crop-growing field. Livestock manure is also a great fertilizer and is free, unlike the costly synthetic chemicals. They can use it on the grazing lands but also spread it onto other fields to improve the organic matter. Human manure is also a very good fertilizer. Haitians could contain their fecal matter, treat it, and then use that as fertilizer. This might sound hazardous and unappetizing, but Britain has come up with a great system that was recognized by the European Union. According to Rachel Dring of the Sustainable Food Trust, "[i]n Britain, sewage sludge goes through a tertiary anaerobic digestion process that kills off up to 99.99% of pathogens. The treated sewage sludge this produces is referred to as 'biosolids' and most commonly comes in the form of dried cake digestate." This also prevents human fecal matter from contaminating waterways and oceans. Both of these natural fertilizers are inexpensive and do not require as many protocols and practices compared to the many synthetic fertilizers used around the world today. (Dring, 2015)

Consequently, implementing sustainable agriculture correctly in Haiti could produce many benefits. It would improve the soil, the organic matter within, its structure, reduce erosion, and also reduce the effects of floods and droughts by increasing the soil's capacity to hold water. Duane Hovorka says it best, "Farmers who adopt conservation measures that build soil health, increase the organic matter content of the soil and increase the soil's water-holding capacity reduce the likelihood that they will suffer a larger crop loss in a very dry or very wet year." This approach leads to higher yields and more food. Research shows that "crop yields on farms in developing countries that used sustainable agriculture rose nearly 80 percent in four years," according to the American Chemical Society. (2006, January 24) Implementing sustainable agriculture also helps the economy, with the lower input costs for farmers, they can enjoy the benefit of the additional income that the higher yields have given to them. With better food and water security, the population will be encouraged to become better educated and qualify for better jobs, which reduces the unemployment rate. This increases Haiti's food, water, and economic stability which helps the population enjoy better and healthier lives. In addition, sustainable agriculture helps preserve the environment for the next generation to experience a better quality of life.

All this being said, some of these ideas on how to incorporate sustainable agriculture in Haiti are far-reaching goals, especially with the challenge of funding. Haiti has already been given millions to billions of dollars by many countries and organizations, but unfortunately, it has only become more and more

dependent on financial aid. Over 20% of Haiti's annual budget comes from foreign aid or direct budget support. In 2010, donor countries cancelled Haiti's external debt after the earthquake, but it has already climbed to \$2.6 billion as of December 2017. ("Central America: Haiti — The World Factbook - Central Intelligence Agency", 2019) Will supporting countries give more money to Haiti when in the past, Haiti has needed more the next time? If Haiti follows similar plans that have already been proven successful in other countries by implementing sustainable agriculture that works for the country, Haiti could show other countries and organizations they are willing change and encourage specific support and funding for sustainable agriculture projects. Bruce Campbell, the director of the Climate Change, Agriculture and Food Security research program said, "We urge countries and investors to recognize the power of financing agricultural research and development and ask them to work with farmers to find the long-term solutions." (Campbell, 2019)

In conclusion, sustainable agriculture, if incorporated correctly, could produce dramatically greater amounts of food for the starving people of Haiti. The farmers, scientists, government, and contributors must collaborate and support each other to keep the project going, but first, countries and organizations and ultimately all of us should contribute to this endeavor by donating and helping Haiti in many different ways toward the same goal: Haitian farmers will finally be able to farm good crops to feed not just themselves and their families but also the surrounding communities and the entire country. This could ultimately reduce the numbers and tragic statistics of the effects of malnutrition in Haiti that have been increasing over the years. If Haiti does not incorporate sustainable agriculture and continues their daily, historical practices, they will lose more biodiversity, arable land, natural resources, and ultimately the quality of life. With thousands of Haitian people starving, finding ways to reduce hunger can only help the country and the individuals who live there. As the Bill & Melinda Gates Foundation indicated, "Investments in agriculture are the best weapons against hunger and poverty, and they have made life better for billions of people." ("Five Inspiring Quotes on the Power of Agriculture", 2019)

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