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### Food security in Haiti

Many countries struggle to ensure the wellbeing of its citizens, leaving a large part of the world's population vulnerable to poverty, and more importantly food instability. This is the case of Haiti, where more than 30% of its population is food insecure. Haiti is formed by the eastern area of the island it occupies, bordering the Dominican Republic. Its location in the Caribbean sea leaves it vulnerable to hurricanes and earthquakes and an unstable political system prevents proper development in the country which would protect people from such events. A typical family in Haiti has to face many challenges and may even struggle to feed its own children.

In order to fully understand everything Haitian families face, it is crucial to take a closer look into their lives. Most families that live in Haiti are small farm owners, most owning less than a hectare of land. These small farms produce just enough to feed their families and spare little for selling or gaining profit, causing them to have a particularly low income. Usually, a family's income is less than \$100, making Haiti the third country with less income in the world, the worst in the western hemisphere. On average, a typical family in Haiti is composed of 2 parents and 6-8 children and many are living on less than \$2 per day (Haiti Statistics). The biggest barrier of adequate nutrition in Haiti is economical, many families cannot afford a balanced diet, preferring quantity over nutrition so they can feed their children on a regular basis. Their diet consists mainly of fruits, corn, cassava, millet, and rice. Because of such a low income, foods such as meat, fish, milk and eggs are not common elements of a family's diet, which means that some children in Haiti are missing crucial elements of a balanced diet. Poverty not only affects a

family's access to a balanced meal, it also affects their access to education. Haiti's literacy rate is only 53% (Haiti Statistics), partly due to the fact that even public schools require tuition as well as for the family to buy the books and a uniform. Many families, especially in the rural sector cannot afford to send all their children to school.

Haiti's political landscape has been deeply unstable for the most part of its history. Between flawed elections and various military coups throughout the years, the people of Haiti have been suffering the consequences. Leaders such as Aristide, have left the country prone to external forces influencing its politics and the deterioration of Democracy in Haiti. Conflicting political parties often had gangs fighting for control over the government. However, there hasn't been violent acts against foreign aid, other than occasional protests and manifestations that are also aimed towards the government. The most recent general election was in 2015, yet accusations of voter fraud in the 2015 election has left the country in the hands of a transitional government from 2016, when the previous president stepped down, until February of 2017, when the new president, Jovenel Moise assumed the presidency(global security).

The political situation in Haiti has prevented the reforms and infrastructure needed to ensure all the population in Haiti can get access to healthcare. Many births are performed without doctors since 40% of the population has limited access to basic healthcare and 50% do not have access to medication (Haiti Health Ministries). People in Haiti are lacking many elements of everyday life that we take for granted, and rural families are the most affected.

As mentioned before, most of Haiti's population is located in the rural areas, where poverty is prominent, it has reached 75.2 % as of 2013 (Haiti Statistics). Therefore, the development of rural areas would mean a significant improvement in the lives of the poorest section of the population.

Haiti's agriculture depends on many small farms owned by families. Only 11% of the population has access to electricity, and 40% rely on non-protected water sources, increasing chances of spreading

disease. All these factors add up to create a life expectancy of a little over 60 years compared to the US life expectancy of 78 years. These families rely on the crops grown on their farm, therefore agricultural productivity is essential to the improvement of the situation in Haiti. However, there are still many obstacles to face. The mountainous landscape of Hispaniola, 75% of the land, has an inclination that leaves the soil prone to erosion (Agriculture and Food Security). The family's low income also keeps them from using synthetic fertilizers to replenish the land of nutrients necessary for a fertile soil such as nitrogen and phosphorus, which were also found to be the limiting nutrients in Haiti. Soil infertility in this area is also caused by the rainfall pattern in the island. In the area, there is a polarity of extreme weather, having heavy rainfall through August to mid-November and April to June. These wet seasons are followed by severe droughts, impeding year-round cultivation, especially because of scarce irrigation systems and most farmers relying on natural rainfall rather than artificial systems. Developing the infrastructure for irrigation in the island can drastically improve the situation of many farmers, by increasing produce, reducing need for foreign aid and therefore raising crop prices, raising the family's income.

Turbulent times and poverty in Haiti have prevented it from developing stable systems of irrigation and ways to distribute water during drought seasons. Most of Haitian farmers rely on rainfall agriculture, as well as those in many South American Countries. However, the sporadic pattern of natural rainfall means that the family's crops live on an unstable source of water, decreasing the amount of food they produce. Families are able to grow just enough to sustain themselves, thus barely able to make a profit out of it, causing a very low income. low income leads to families living on an unbalanced diet, missing key components necessary for adequate nutrition. Improving the system for water distribution in agriculture could improve the lives of many of its residents. The efforts to do so is measured by the investment in the infrastructure needed for a stable system of irrigation. However, there are also more innovative techniques that aim to help without the need of traditional water systems. The implementation of such in Haiti will help many farms increase their crop yield, hence a family's income, by being able to cultivate year-round,

and help the eroding soil by preventing soil crusting. Hopefully, a proper system to distribute water leads to greater access to sanitation and also less disease in Haiti.

The distribution of water is a serious problem that also helps to the soil erosion occurring in Haiti. Droughts cause soil crusting, a thin layer of tough material that forms above the soil, which, when combined with the wind during a moisture deficit period, worsen the state of the soil. Those most affected are rural families, who cannot afford their land to be compromised and who are not insured when a natural disaster destroys their crops. These, and more problems, can be solved by investing in rural infrastructure.

The implementation of irrigation systems in the rural parts of Haiti has many benefits, but also has its challenges. The first is how the water to fuel these systems would come from. Haiti, being an island, does not have that much fresh water available, however, it does have heavy rainfall in certain months.

Rainwater harvesting is common in many areas that might suffer from droughts and is an inexpensive solution, especially compared to other such as DRIP irrigation that would simply use less water. The water collected in the rain season can be collected and stored for the drought season. This would not only help build a more reliable system for farmers to increase their harvest yield but also help soil erosion in the long run by preventing soil crusting. The water could be collected in either concrete cistern or concrete septic tanks and be later distributed using normal irrigation systems. The excess water would be channeled to a nearby water outlet that would prevent the flooding of both the system and nearby farms.

The second main problem when implementing irrigation systems is the arrangement of land that exists in Haiti. As I mentioned before, Haiti's agriculture is based on many small family farms, which means that putting an irrigation system in each individual one would be costly and inefficient. However, if these farms were to join forces and create collective farms with the motivation of getting proper irrigation for their crops, then systems such as rain harvesting would be more plausible.

The last and more evident problem is the funding of this initiative. The US has already been giving

financial aid to Haiti, especially after the earthquake. More than 4.7 billion dollars have been made available for helping Haiti (US department of state) and part of that is dedicated to long-term development. The federal government is evidently interested in improving the situation in Haiti, and could consider backing the implementation of irrigation systems as a way to stabilize Haiti as well as reducing poverty in the area.

Nonetheless, the local government should also take a more active role in ensuring all residents in Haiti have access to protected water by investing in better infrastructure. This can also help Haiti when faced with natural disasters such as the earthquake in 2010 and hurricane Mathew. Organizations like the United Nations and World bank are already sending help, working towards a better future for poor families in Haiti, and should continue doing so. However, the introduction of foreign goods lowers the prices of locally grown crops, harming farmers. Hence, this practice should be done with caution. Local communities should also help those in need in their community and try to offer aid to families who need it. Being a mostly agricultural country, Haiti counts on the improvement of this sector in order to ensure a better quality of life for its residents.

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