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Haiti Factor 5: Climate Volatility

### **Haiti: A Country Full of Poverty, Food insecurity, and Weather Issues**

Haiti is located in the Caribbean bordered by the Caribbean Sea and Atlantic Ocean. It is located west of the Dominican Republic on the western third of Hispaniola. This means that Haiti is bordered by water on three out of its four sides. The terrain of Haiti is mostly mountainous. Elevation ranges from 0 meters at the Caribbean Sea to 2,680 meters at Chaine de la Selle. The land area is 27,560 square kilometers which makes Haiti slightly smaller in size than Maryland. With a population of 10,485,800 people the distribution is relatively even. However, there are higher concentrations of people located along the coastlines. (CIA, 2017)

The climate of Haiti is tropical. In the mountains where trade winds are cut off there is a semiarid climate. Natural disasters are large contribution to food insecurity in Haiti. Haiti has been hit with numerous earthquakes and hurricanes. These catastrophes lead to the death of crops that are already growing and prevent the growth of new crops for a period of time. Haiti is unable to sustain themselves on the food that they already have. When the crops are able to be grown again more food is needed to sustain the population. They need to repair from the previous disaster and also live in the present. It is a constant cycle of never having enough food and the next disaster occurring. (CIA, 2017)

Haiti is the poorest country in the western hemisphere. It also has the second highest population. The bottom forty percent have control over only six percent of the available income, while the top two percent control twenty six percent. (Food Security Portal, 2012) According to the Global Hunger Index, Haiti has a GHI score of 36.9 which is ranked as alarming. It is fourth highest ranked country in the world just behind Central African Republic, Chad, and Zambia. This score is down 14.7 points from 1992. In 1992 the score was extremely alarming at 51.6. In 2000 it was down to only being alarming at 42.8. Eight years later 2008 it was still only at an alarming rate but the score went up to 43.4. It may seem like Haiti is doing better today. However it is doing worse compared to the rest of the world. In previous years Haiti was not one of the top five hungriest countries in the world. (Global Hunger Index, 2016)

The average per capita income in Haiti is very low, however, it varies widely between rural and urban areas. It is noted by Haiti Health Ministries (2012) that the average per capita income is \$300 in urban areas and only \$100 in rural areas. This is only 1.9% of America's average per capita income. This small income results in many Haitians being unable to consume meat, fish, milk, and eggs. Their staple diet consists of corn, cassava, millet, rice, and fruit. This means that most people in Haiti do not have access to a proper diet which will lead to malnourishment and earlier deaths. Haitians only have an average lifespan of sixty-seven years. Low income does not only cause nutrition problems. It also limits education. Only 60.7% of Haitians are literate compared to America's 95.5%. There is little access to education. Most schools in Haiti are private. However even public, government run schools are still too expensive for parents to send their children. (Haiti Health Ministries, 2012)

According to the International Organization for Migration family structure has changed drastically. The average family size in 2010 was 4.3. In 2012 it was down to 3.4. A majority of households are headed by single parents - 57%. In couple headed families the average age of the head is 34.7, the average age of other individuals is 22.9, and the average age of individuals under age 15 is 1.4. In female headed families the average age of the head is 39.7, the average age of other individuals is 24.3, and the average age of individuals under age 15 is 1. In male headed families the average age of the head is 34.2, the average age

of other individuals is 26.6, and the average age of individuals under age 15 is 0.4.(International Organization for Migration, 2012)

Healthcare in Haiti is essentially non-existent. There is no structure or system. The very few healthcare facilities that are present are inadequate. There are not enough staff members, equipment, or treatments available. There are hospitals that have exceptional doctors, however, they do not have the equipment. Whatever hospitals that were able to have some functionality were destroyed in the earthquake. The earthquake also caused a cholera outbreak. There was a major epidemic and also injuries from the earthquake. However, there were no functional hospitals to treat them. (Ekine, 2013)

As of February 2016, 3.6 million Haitians were food insecure and over 1.5 million were extremely food insecure. (World Food Program, n.d.) A large majority of Haiti's economy depends on farming. According to Haiti Health Ministries (2012) sixty percent of laborers are in the farming industry. Only thirty percent of the land is suitable for farming. However fifty percent of the land is used, This reduces the amount of space available for living by twenty percent. The main cash crops are coffee, sugar, sisal, and essential oils. Approximately one third of exports come from sugar production, however, production has fallen dramatically. The sugar industry is located around Port-Au-Prince. (Haiti Health Ministries, 2012)

It is expected that the population of Haiti would not be hungry since agriculture is considered to be one of the most important aspects of their economy. However, they do not produce enough food through crops and livestock to support the population. According to the Rural Poverty Portal (n.d.) "The country has to import 60 per cent of the food it needs, including as much as 80 per cent of the rice it consumes." Eighty percent of farmers do not depend solely on farming. They often have other jobs as well exertion, crafts, and small-scale trade. A majority of agriculture in Haiti comes from small subsistence farms. Only twenty percent of these farms are able to produce enough food to feed each member of their household. (Rural Poverty Portal, n.d)

The Observatory of Economic Complexity (2014) reported that Haiti is ranked 149 out of 220 based on the size of its export economy. As of 2014 exports brought in \$1.06 billion. This means that Haiti is on the bottom half of the spectrum. It has one of the smallest export economies in the world. Haiti's largest export is textiles. Textiles bring in approximately \$930 million a year making up 87% of the export economy. Haiti is ranked 143rd out of 220 based on the size of its import economy. As of 2014 \$3.63 billion were spent on imports, \$2.57 billion more than gained through exports. Their largest import is textiles. They bring in approximately \$621 million a year, making up 0.02% of the money spent on imports. A predicament is created by spending more on imports than what is earned through exports. Haiti is spending more money than they have which is going to put them in debt. This problem is caused because Haiti can not produce more to export more. They need more resources imported than they have available to export. There is one main obstacle that is limiting the amount of resources Haiti has access to: natural disasters, (Observatory of Economic Complexity, 2014)

The Rural Poverty Portal reports that in total seventy-seven percent of Haiti's population is in poverty, eighty-eight percent of people in rural areas are poor, sixty-seven percent of the people in rural areas are extremely poor. Poverty is at the highest levels in northeast Haiti. The top five poorest groups of people are women who are the heads of their households, rural workers depending solely on wage employment, sharecroppers, fishers who do not have their own boats, and charcoal producers who do not do anything else. Poverty and food insecurity are directly linked to households being unable to adequately respond to natural disasters. If there was one aspect of nature that could be avoided altogether, Haiti would need that aspect to be natural disasters. (Rural Poverty Portal, n.d.)

The New York Times (2016) and The International Business Times (2012) reports that Haiti has been struck by disaster six times from 2004 until 2012. In May of 2004 there was heavy flooding. Within just thirty-six hours over five feet of rain had fallen and entire villages were washed away. There was a death toll of 2,400 people. Just four months later in September of 2004 Hurricane Jeanne hit Gonaives, Haiti. The city was completely demolished and there were at least 3,000 casualties. Between August and September of 2008, four tropical storms and hurricanes hit Haiti. There were 800 deaths and \$8 billion in damage. Approximately 60% of crops were destroyed and it was impossible for cities were unfit for living. About a year and a half later a magnitude 7 earthquake struck Port-au-Prince, the capital of Haiti. The death toll was over 300,000 and 314,000 were injured. The whole country was negatively impacted. Approximately nine months later there was a Cholera outbreak in Port-au-Prince. It was almost impossible to treat as one million people were displaced and the city's infrastructure was destroyed. (Kang, 2016) Two years later in March of 2012 Port-au-Prince suffered another earthquake. This one, however, was smaller at a magnitude of 4.6 and did not have as serious effects, (Alexander, 2012)

The most recent natural disaster that has added to Haiti's food insecurity is Hurricane Matthew. On October 4, 2016, a magnitude five hurricane hit Haiti. Hurricane Matthew was the worst storm to strike Haiti in fifty years and the worst natural disaster since 2010. The effects were long lasting - they are still recovering today, almost five months later. The damage was cataclysmic, The death toll was even worse exceeding 1,000 deaths. (Ahmed, 2016) Towns were under water, crops were completely destroyed, and houses were turned to rubble. There are 141,000 victims in storm shelters, and that's not all the victims. There are still thousands of people whose homes were destroyed and are not in shelters. (Miroff, 2016) Most of southern Haiti relies strictly on subsistence farming. However, all of the farms were flooded. (Ahmed, 2016) Heifer International Country director for Haiti Hervil Cherubin expressed:

“We're very worried about the country's future in terms of food security.

Most of the crops are gone. Many of the farm fields are like landfills.

They're full of trash, seawater, gravel and other debris.” (Cherubin, 2016)

Without crops Haiti is very limited in the food it's people have. Especially with a large volume of subsistence farmers. These farmers do not produce goods for money, they produce goods to feed their families. They now have no means of feeding their families.

Not only is Haiti prone to natural disaster, it also suffers substantially from climate change. It is already vulnerable to climate change due to it's geography - small, island country. Climate change can potentially increase the occurrence and severity of the major natural disasters. The food supply of Haiti is already limited. If there is more frequent and intense weather events. Haiti's food supply will be decreased even more. Erosion and poor soil health will result. This will cause decreased crop and livestock productivity. The root of Haiti's food insecurity is an unstable climate. (Rubenstein, 2012)

Flooding and other serious natural disasters are not Haiti's only climate related issue. Prior to Hurricane Matthew. Haiti was experiencing severe drought for the third year in a row. This drought was worsened by the 2015-2016 El Nino phenomenon. Compared to the five year average Haiti had seen a 50% decrease in agricultural productivity. Food and seed stocks were also depleted. Therefore, farmers were unable to farm so most food was being provided by imports. However, this is more of a problem then a solution. Due to increasing demand and decreasing supply, the price of imports has risen. Most Haitian families can not afford these prices, so food insecurity persists. (FAO, 2017)

Climate change has not only caused extreme poverty and food insecurity in Haiti. It has also caused many diseases. The most major disease outbreak was cholera - which was started due to the 2010 earthquake. Ten months after the earthquake the first confirmed case of cholera was reported, and the disease quickly spread. The Center for Disease Control and Prevention (2014) reported that there were 665,000 cases and 8,183 deaths. Aid from the CDC and Haitian Ministry of Public Health and Population helped to control

the amount of fatalities, however, Haiti's poor infrastructure prohibited the ability to end the outbreak. The cholera outbreak may be prevalent for years to come. (Cholera in Haiti, 2014)

According to the World Food Programme Haiti has a medial-high food insecurity vulnerability rating today. By 2050 that will raise 47% and have a high rating. By 2080 it will have raised 87% from today and have a very high rating. This means almost all of Haiti will susceptible to food insecurity. This is due to climate change. (Food Insecurity and Climate Change, 2017). Climate change can be improved by using less energy. Using energy emits greenhouse gasses into the atmosphere which leads to climate change. (Be Part of the Solution, 2016) It would make sense to improve climate change in Haiti by having Haitians lose less energy. However, it is more complex in Haiti. Haiti does not have a large source of energy. They have a very poor electricity system. (Energy, 2017) Haiti's climate issue is also more complex than just climate change. The country's location causes it to be prone to natural disaster. Using less energy really wouldn't have that big of an impact. (Rubenstein, 2012) Haiti would most benefit from sustainable development goal number thirteen which works towards taking action to combat climate change. One of the main ways the United Nations is achieving this goal is the Paris Agreement. The Paris Agreement was created in order to help eliminate climate change worldwide. Countries signed the treaty agreeing to work to prevent global climate change. Haiti was one of the countries to sign the agreement. (Climate Change, n.d.) Solving solely climate change is unreasonable because it is a factor that can not be easily controlled over a long period of time. There are also no methods of short or medium-term solutions. There are other ways to improve the agriculture in Haiti within the near future while working towards the goal of combatting climate change.

Haiti needs to be able to farm consistently without the crops being destroyed. In order to achieve this indoor farming should be established. Indoor farming allows farmers to go vertical farms that go grow any crop in any location or climate. (van Bijsterveldt, 2013) It is a more productive and efficient way to grow crops. Farmers are able to control all of the environmental factors that go into growing crops. Climate would no longer be an issue. Carbon dioxide, ventilation, water, and light can be determined based on the farmer's needs. Indoor farming would mean that more people could farm and production would be consistent throughout the year. (Storey, 2016)

Indoor farming would allow Haitians to farm year-round. However, that would only be true under the circumstance that there are no hurricanes or earthquakes. Based on Haiti's history, hurricanes are inevitable. The indoor farming facilities must be weatherproof. Monolithic domes meet or exceed FEMA's distinctions for having almost absolute protection- they are at the top of FEMA's list of buildings that resist extreme loads. Not only do they protect against earthquakes and hurricanes but also tornados. (Wilson, 2011) There are five parts to constructing a monolithic dome. It starts out as round concrete foundation with steel rebar. These steel bars are later attached to the steel structure. Next airfoam is placed on the base and fans inflate it. The fans run during the whole construction process. After this approximately three inches of polyurethane foam is applied to the airfoam. Steel reinforcing rebar is then attached to the foam using a layout of horizontal and vertical rebar. Finally, shotcrete is sprayed and applied to the interior surface. The steel rebar is inserted into the concrete. The dome is complete when approximately three inches of shotcrete has been applied. (Parker, 2009)

Forty plants per square foot can be grown in indoor farms. They have double the yield of normal farms using no pesticides, herbicides, or fungicides, 95% less water, and 50% less fertilizer. This is achieved through vertical farming. Crops are grown in stacks that start at the floor of the indoor farm to the ceiling. Sunlight - and often soil - are not used. Climate control, hydroponics, and artificial lighting such as LEDs are used. Indoor vertical farming has less impact on the environment than traditional farming. They promote the conservation of resources. Also since the crops are not being grown outside the soil is not being overused and destroyed.(Brennan, Gralnik, 2015)

Indoor farms, however, are expensive. First the cost of the monolithic dome must be considered. They cost sixty dollars per square foot, so a practical 2,000 square foot dome would cost \$120,000. (Smith,2013) The materials needed for the farming itself could cost up to \$80 million based on the needs of the facility. (How Much Does Vertical Farming Cost, 2016) The Haitian government would not be able to pay for this, therefore, aid from other countries is needed. According to reporters Tracy Connor, Hannah Rappleye, and Erika Angulo Haiti received \$13 billion in aid after the 2010 earthquake. It seems as this money was wrongly used. People are still in poverty, homeless, and food insecure. This money should have been used in a better manner. There should be less impoverished people Haiti then there are.(Connor, Rappleye, Angulo , 2015) Whatever is left of this money and any other aid that Haiti receives should be out towards indoor farming. Without indoor farming it is unlikely that Haiti will ever be able to achieve food security. Once it is put in place there will not only be more food, but there will also be more money and jobs circulating throughout Haiti. This process will take time, but in combination with efforts to solve climate change Haiti will be moving towards food security in a much faster manner. Efforts must be made one step at a time.

### Works Cited

- Ahmed, A. (2016, October 06). Hurricane Matthew Makes Old Problems Worse for Haitians. Retrieved February 15, 2017, from [https://www.nytimes.com/2016/10/07/world/americas/hurricane-matthew-haiti.html?\\_r=0](https://www.nytimes.com/2016/10/07/world/americas/hurricane-matthew-haiti.html?_r=0)
- Alexander, A. (2013, June 09). Haiti Earthquake 2012: 4.6 Magnitude Quake Strikes Near Port-au-Prince. Retrieved February 15, 2017, from <http://www.ibtimes.com/haiti-earthquake-2012-46-magnitude-quake-strikes-near-port-au-prince-422488>
- Be Part of the Solution! (2016, November 11). Retrieved March 01, 2017, from <https://www3.epa.gov/climatechange/kids/solutions/>
- Brennan, M., & Gralnick, J. (2015, June 25). Farming with 95% less water—in Newark, New Jersey. Retrieved March 02, 2017, from <http://www.cnbc.com/2015/06/24/vertical-farming-the-next-big-thing-for-food-and-tech.html>
- Cholera in Haiti. (2014, November 07). Retrieved March 01, 2017, from <https://www.cdc.gov/cholera/haiti/>
- Climate Change - United Nations Sustainable Development. (n.d.). Retrieved March 02, 2017, from <http://www.un.org/sustainabledevelopment/climate-change-2/>
- Connor, T., Rappleye, H., & Angulo, E. (2015, January 12). What Does Haiti Have to Show for \$13 Billion in Earthquake Aid? Retrieved March 02, 2017, from <http://www.nbcnews.com/news/investigations/what-does-haiti-have-show-13-billion-earthquake-aid-n281661>
- Ekine, S. (2013, February 25). Haiti's struggling healthcare system. Retrieved February 27, 2017, from <https://newint.org/blog/2013/02/25/haiti-healthcare/>
- Energy. (2017, February 17). Retrieved March 01, 2017, from <https://www.usaid.gov/haiti/energy>
- Food Insecurity & Climate Change – Met Office. (2017). Retrieved March 01, 2017, from <http://www.metoffice.gov.uk/food-insecurity-index/>
- Global Hunger Index. (2016). Retrieved February 10, 2017, from <http://ghi.ifpri.org/countries/HTI/>
- Haiti. (2017). Retrieved February 27, 2017, from

<http://www.fao.org/emergencies/countries/detail/en/c/161491/>  
Haiti | Food Security Portal. (n.d.). Retrieved February 9, 2017, from  
<http://www.foodsecurityportal.org/haiti>

Haiti Health Ministries. (2012). Haiti At A Glance:. Retrieved February 14, 2017, from  
<http://www.haitihealthministries.org/haiti/>

How Much Does Vertical Farming Cost - Prices. (2016, May 02). Retrieved March 02, 2017,  
from <http://www.whatitcosts.com/vertical-farming-cost-prices/>

IDP Registration in Haiti Update and Analysis of the population remaining in IDP sites (p. 3,  
Rep.). (2012). International Organization for Migration.

Kang, I. (2016, October 04). A List of Previous Disasters in Haiti, a Land All Too Familiar With  
Hardship. Retrieved February 15, 2017.

Miroff, N. (2016, November 03). A month after Hurricane Matthew, 800,000 Haitians urgently  
Need Food. Retrieved February 15, 2017, from  
[https://www.washingtonpost.com/world/the\\_americas/a-month-after-hurricane-matthew-800000-haitians-urgently-need-food/2016/11/03/382cb2a6-9f74-11e6-8864-6f892cad0865\\_story.html?utm\\_term=.3033f18dd2d1](https://www.washingtonpost.com/world/the_americas/a-month-after-hurricane-matthew-800000-haitians-urgently-need-food/2016/11/03/382cb2a6-9f74-11e6-8864-6f892cad0865_story.html?utm_term=.3033f18dd2d1)

Parker, F. (2009, April 17). How to Build a Monolithic Dome. Retrieved March 02, 2017, from  
<http://www.monolithic.org/how-to/how-to-build-a-monolithic-dome>

Rubenstein, M. (2012, February 1). Climate Change in Haiti. Retrieved February 23, 2017, from  
<http://blogs.ei.columbia.edu/2012/02/01/climate-change-in-haiti/>

Smith, M. (2013, March 20). How much does a Monolithic Dome home cost? Retrieved March  
02, 2017, from  
<http://www.monolithic.org/homes/home/how-much-does-a-monolithic-dome-home-cost>

Storey, A. (2016, October 07). The Beginner's Guide to the Indoor Farming Industry. Retrieved  
March 02, 2017, from  
<https://university.upstartfarmers.com/blog/the-beginners-guide-to-the-indoor-farming-industry>

The Observatory of Economic Complexity: Haiti. (2014). Retrieved February 13, 2017, from  
<http://atlas.media.mit.edu/en/profile/country/hti/>

The World Factbook: HAITI. (2017, January 12). Retrieved February 9, 2017, from  
<https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html>

World Food Program. (n.d.). Haiti. Retrieved February 24, 2017, from  
<https://www.wfpusa.org/countries/haiti/>

van Bijsterveldt, T. (2013). Indoor Farming. Retrieved March 02, 2017, from  
<http://www.shift-au.com/projects/high-tech-indoor-farming/>