

Kaci Ginn  
Anamosa High School  
Anamosa, Iowa  
Haiti, Factor 9: Water & Sanitation

### **Haiti: Healing for the Sick by the Sick**

*Dye mon, gen mon* is creole for the Haitian proverb meaning “Beyond Mountains, More Mountains.” In the case of Haiti’s proverbial mountains, that could not be more true. As one issue is addressed, another arises. Haiti as a nation is currently facing a multitude of challenges, or mountains, if you will. Concerns surrounding poverty along with political and social upheaval are just the beginning for Haiti’s people. As the great innovator Norman Borlaug once said, “Without food, man can live at most but a few weeks; without it, all other components of social justice are meaningless.” If we do not have food, politics and poverty do not matter. Although politics and poverty do play a role in food security and hunger, they are merely insignificant when we consider that about one third of Haiti’s population is estimated to be food insecure (“World Food Programme”). Haiti’s challenges cannot be improved upon unless those directly impacted by the matter take action to rise above them.

Haiti is the poorest nation in the Western Hemisphere and the second most densely populated with 10.85 million people living on just 10,714 square miles of island (“Rural Life in Haiti 1”). The challenges faced daily by the vast majority of Haitians would be considered nearly insurmountable to a citizen of a developed nation (“Rural Life in Haiti 1”). These issues have been exacerbated by a series of natural disasters over the past two decades, including severe storms, flooding, landslides, drought and a devastating earthquake that rocked the country on 12 January 2010 (“Haiti”). Poor soil conditions in Haiti have been attributed to the occurrences of soil erosion and soil overuse. The acceleration of this soil degradation is due in large part to human activity and a growing fuelwood-charcoal industry which expedites the rate of deforestation and soil loss (“Haiti Soil”). Over time, the soil conditions have greatly contributed to the issues of poverty, food insecurity, and subsequently the overall family dynamic in Haiti.

In Haiti, men are the typical holders of elite professions such as those of teachers, doctors, and politicians. Women are primarily employed as nurses and as marketers of garden produce, tobacco, and fish products. While urban upper-middle class and elite women do have an opportunity to earn an income away from the home, and are held in esteem equivalent to those in a developed nation, job scarcity for uneducated women oftentimes leads to domestic abuse and promiscuity. Rural women, on the other hand, are quite essential to the economic health and stability of the household and family. They are thought to be the owners of the harvest because of their role as marketers, which directly impacts the husband’s earnings.

Marriage is not essential for a relationship to be recognized as legitimate by community members. Oftentimes, marriage occurs later in a couple’s relationship well after their children have reached adolescence and the home has been established. Approximately 10 percent of Haitian men have more than one wife and, while not legal, it is generally accepted within most communities. A typical household consists of the nuclear family and adopted children or young family members. Elderly family members may also live with children or grandchildren.

Scattered villages comprised of small land-holdings are the basis of the Haitian rural landscape. A great majority of Haiti's agricultural production comes from small peasant farms. The produce grown on these farms is sold at markets by the woman of the family. Food crops such as citrus fruit, avocados, pineapples, watermelons, almonds, coconut, okra, peanuts, and tomatoes are grown on these farms. The profits from the sales are then used to purchase food and goods for the household.

A typical Haitian diet consists of the staples of cassava, millet, rice, and corn. The addition of beans and/or bean sauce is made when they can be afforded. Rice and beans are considered to be the national dish and are the most commonly eaten meal in urban areas of the country. Fresh fruits such as bananas and mangos, when in season, are readily available yet are still considered to be a delicacy. Leafy greens are sparse. Little animal protein is consumed due to the high cost. High food prices, as well as low food availability are also cofactors that impact food security and hunger in Haiti. Even items such as vegetable oil must be imported (Rawson).

Education is held in very high importance and with great prestige due to the cost associated with school tuition. Adult literacy is about 62% ("Haiti Overview"). If a child shows promise and the family is able to afford it, they are then sent to further their education past primary school. Higher education is not attained by many due to the costs and lack of availability.

In July of 2016 I traveled with a group of approximately 20 others from my hometown in Iowa to a school in Gonaives, Haiti. The school we visited was the Mission Starfish Haiti School, or the "Starfish School" as the locals called it. During our stay we poured concrete floors for three homes, held two community meals, distributed over 100 bags of rice, repainted the school's basketball court, and held activities for community children each afternoon.

While in Haiti I was able to briefly experience the food, the people, the culture, the day-to-day happenings, the hardships and shortcomings, and the triumphs--all of that in 10 days' time.(I know fragments are now popular, but I'd avoid it for this formal writing.) Although I left Haiti after 10 days, Haiti will never leave me. I truly will cherish the time I spent in Haiti forever. I learned many things during those 10 days, and one thing that I carry with me everyday is that a simple smile can solve a lot of problems. A smile can overcome language differences and hardship. Sharing a smile with someone, even just in passing, can truly mean the difference between a good day and a bad one. I was also very inspired, and left with the innate belief that one person cannot change the world, but that one person can change. When one person changes himself for the better, their actions can positively change the lives of those around them. That change then reflects outwards into their families, communities, countries, and world.

The Mission Starfish Haiti school is providing education to the children of Gonaives, which increases their earning potential, and thus their chances for a higher standard of living. Currently, 78% of Haitians live on less than \$2 US per day, with the richest 1% controlling almost half of the total wealth ("Haiti Overview"). The chain reaction of events that begins when one person receives an education is exactly what Haitians need to lift their entire country out of poverty and to empower all Haitians to lift each other up to a position where rural citizens have the same exact access to healthcare, education, fair pay, and other basic human rights that are afforded to citizens of developed nations. The students that attend the

Mission Starfish Haiti school are very fortunate to have the opportunity to receive a quality education. The education that current and future students will receive at the Starfish School will allow them to further improve themselves and their country.

One pressing issue, however, that I did discover while at the Starfish School and in Haiti was waste management. Human and animal waste as well as trash and refuse littered the streets of Gonaives. Nearly all of the waterways that I witnessed in Haiti were littered with garbage. In the school compound there was a pit latrine for the students and staff to use. The latrine was very sophisticated in comparison to the holes that community members would dig to relieve themselves. One challenge I did find with the latrine system was that even though there was a place for students and staff to use the restroom, a lack of toilet paper had led to the distribution of fecal matter on the walls of the latrine.

In addition to the overwhelming presence of foul odor and filth, pit latrines also pose a significant health and sanitation hazard when full, as well as during the rainy season because they often fill with water and overflow into the surrounding areas. Overflows cause contamination of area soil, individual homes, surface water, and groundwater, which all lead to an inevitable impact on human health. Fecal-oral diseases and infections caused by contact with human fecal matter include the Hepatitis A and E viruses, Rotavirus, Salmonella, *Clostridium difficile*, typhoid fever and various intestinal worms, including roundworms, tapeworms, and pinworms. Common symptoms of fecal-oral diseases include, but are not limited to, diarrhea, vomiting, abdominal pain, and fevers. Diarrheal illnesses alone were associated with 16% of mortality in children under the age of five in Haiti in 2007 (Rebmann and Volkman).

The repeated overflow creates a disease time bomb for the surrounding community and the opportunity for a fecal-oral disease outbreak (Carter). When the proverbial time bomb is detonated, cholera is the most feared diarrheal disease. One sip of water that had been contaminated by an overflow could incite a full-blown epidemic, as seen in 2016 when nearly 800 Haitians contracted cholera in the two weeks following Hurricane Matthew (“Cholera Cases Jump in Hurricane-ravaged Haiti”). In fact, about 10,000 people have died and hundreds of thousands have been sickened since cholera first appeared in late 2010 (Ahmed).

Approximately 40 percent of Haitians do not have access to clean water. In 2014, only 27.6% of the Haitian population had access to improved sanitation facilities (“Improved Sanitation Facilities (% of Population with Access)”). The UN estimates that almost one-tenth of the global disease burden could be prevented by improving water supply, sanitation, hygiene, and management of water resources (“Clean Water: A Health Essential”). In the instance of a simple bacterial infection, interventions such as proper wound care and medication are considered to be highly effective treatment options. However, when faced with the oftentimes chronic disease cholera, a diarrheal disease transmitted by the fecal-oral route, in nations such as Haiti, one could enter into a cycle of infection and treatment, followed by subsequent reinfection. Each year, 1.6 million people worldwide die from diarrheal diseases spread by unsafe drinking water and poor sanitation (“Composting Toilets Offer Solution to Water, Sanitation Problems”). Poverty and lack of sanitation, such as proper waste removal systems, create an environment that allows for the continual recontamination of water sources.

One way to prevent the overflow of pit latrines and thus break the cycle of disease is to eliminate them entirely. With no municipal wastewater service and open defecation a common practice, there are many variables that contribute to the lack of effectiveness of pit latrines (Carter). Relying on individuals that are uneducated on proper sanitary practices to effectively use and maintain pit latrines is not the best way to accommodate and provide solutions to issues involving human waste in Haiti. Traditional flush toilets, the preference by far of those living in developed nations, and their accompanying plumbing systems, do not responsibly allow sustainable water management due of the large volume of water needed for their proper function.

Dry compost toilets, on the other hand, are just that: dry. They use zero water and would allow Haitians to utilize a virtually untapped resource. The principle of all compost toilets is simple: human waste is collected in an on-site container and combined with a material containing carbon which facilitates aerobic decomposition. The aerobic, or oxygen fueled, composting process also produces CO<sub>2</sub> emissions which are a deterrent to insects. Some compost toilet systems also have an additional process to separate liquid waste from solid waste. The practice of urine diversion, or UD toilets, is based on the understanding that from a public health perspective it is most important to remove the poop from the environment, whereas urine does not pose a significant risk to humans (Kramer, Preneta, and Kilbride). With proper usage, these systems are odorless and kill any waste-borne pathogens to eventually produce a nutrient rich compost.

SOIL (Sustainable Organic Integrated Livelihoods) is a nonprofit, non-governmental organization that operates under the belief that adequate sanitation is a fundamental human right (Doucet). SOIL has pioneered a process that utilizes sugar cane bagas chips, a byproduct of Haitian rum production, to naturally compost the solid waste collected by dry compost toilets (“SOIL Haiti”). Using the bagas chips as a source of carbon to compost human waste is one way to utilize a material that would otherwise be discarded as waste. Shredded peanut husks and sawdust are also being tested for their viability as a carbon source. The aerobic decomposition process that occurs when a carbon source is combined with human fecal matter initiates a sequence of chemical reactions that produce heat. The heat produced by the decomposition process then creates an environment that is inhospitable to pathogens, primarily *Vibrio cholerae*, the bacterium responsible for Cholera. According to World Health Organization standards, fecal pathogens are killed after one week at a sustained temperature of 122 degrees Fahrenheit (“SOIL Haiti”). SOIL also utilizes IDEXX testing, a 24-hour test which can detect a single viable coliform or *E. coli* per sample and is approved by the US EPA, to ensure the compost they are producing is safe for human handling (“Colilert”). Sterilization of the compost piles is typically complete in as little as a few weeks to three and a half months. After six to nine months a substance that was once potentially toxic is transformed into fully decomposed, perfectly viable compost.

A large portion of the compost toilets that are operated by SOIL are UD toilets and have 15 gallon collection drums that are emptied by SOIL employees on a weekly basis. SOIL also provides carbon material, commonly sugarcane bagas, which is added to the collection drums as the toilet is used. In dry climates where compost toilet are utilized such as South Africa, India, and Mexico it has been proven that the fecal matter with the addition of a rich carbon source could self-compost inside the collection drums. However, Haiti’s humid, tropical climate makes it necessary to complete the composting process in a more controlled manner at separate facilities. After the drums are emptied, the compost material is

transported to one of SOIL's two composting facilities near Cap Haitien or Port au Prince to undergo a two phase composting process.

Once at the composting facilities, the collection drums are emptied into piles on covered concrete slabs. This prevents leaching and the contamination of groundwater before the compost becomes sterile. Additional carbon matter is added as the collection drums are emptied. After the piles have been created, they are covered with chicken wire or plastic sheeting and monitored closely to ensure the piles reach and maintain a minimum temperature of 122 degrees Fahrenheit for seven days. At the end of phase one of the composting process the overall volume of the pile will reduce by nearly 80% and be sterile. Phase two consists of forming windrows of the compost either manually or with the use of machinery. Drainage channels are also utilized to create a catchment which prevents the runoff of nutrients in the instance of heavy rain. The compost becomes fully decomposed during the second phase. Compost is considered ready for reuse when temperatures in the pile return to ambient levels, generally within 6 – 9 months (Kramer et al.). Final testing using IDEXX technology is performed and then the compost is bagged in 5 gallon sacks and sold for \$2.40 USD each.

Dry compost toilets would provide an opportunity for low-cost technologies that are simple, easy to replicate, sustainable, and would require minimal water to provide safe and dignified access to sanitation and help Haitians turn a potentially deadly substance into an item of great value. This compost would act to restore nutrients and organic matter to the soil which had been damaged and degraded by natural disasters, erosion, and human activity after centuries of agricultural exploitation (McClintock). Human waste compost provides a low-cost alternative to the traditional animal and chemical fertilizers. It is also renewable, biodegradable, sustainable, and environmentally friendly. Organic fertilizers, such as human waste compost, also act to improve the structure of the soil and water retention as well as provide additional nutrients and minerals. SOIL has reported their compost, *Konpòs Lakay*, can increase yields by up to 400% and boost farmers' profits by thousands of dollars per hectare ("SOIL Haiti").

With a nutrient-rich base provided by composted human waste, the soil would allow farmers to have a better yield and thus, more profit from each harvest. An increased profit per harvest would slowly increase overall wealth in the country and reduce poverty and hunger levels. The compost produced by recycling human waste would also create opportunities for Haitians to lift themselves from poverty and break the disease cycle caused by fecal-oral diseases such as cholera. SOIL is taking advantage of one of these opportunities by selling their finished compost to not only local farmers, but non-government agencies with interests in reforestation practices ("SOIL Haiti"). The purchase price of the human waste compost covers nearly 70% of the production cost, which is significantly higher than any return with traditional sanitation practices. The sale of this renewable resource will provide sustainable economic opportunities for human waste compost and will, over time, help return Haiti's soil to a favorable state where it will no longer contribute to the chronic poverty and malnutrition. As Haiti gets its soil back, Haiti will regain its ability to feed itself and boost food production. Higher food production will make the systemic issues of hunger and malnutrition in Haiti obsolete.

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