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Clean Water in Haiti

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Hannah McHugh

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2012 Award for Excellence in Student Research and Creativity Submission

Clean Water in Haiti, By Hanna McHugh

This submission is the second chapter of my undergraduate thesis discussing clean water in Haiti. I have been a part of EIU's Haiti Connection since the spring semester of 2009 when I was a freshman. When I first joined, I was immediately inspired to become active in the group in a variety of its sub-committees and to travel to Haiti. In my final semester on campus as a senior now, I have made seven attempts to travel to Haiti but am finally getting the opportunity to make the trip. Ever since my freshman year I have had a strong drive to go, but writing this chapter and doing the research for it helped me to be more determined than ever to make the trip happen, no matter what may get in the way. As I write this, I am currently preparing for a procedure that takes place three hours from now. This is just one of the three health concerns and one of six obstacles that I have come upon which attempt to thwart my plans to travel. This time, however, I am determined to go and am just a few steps away from solidifying all plans.

Knowing that this is one of the last chances I have to go to Haiti has been a big motivator for me to actually go, but even more so because of the extensive research that I did for this chapter. The more I researched about the country and its people, the stronger my desire to visit the country and to do what I am able to change as many lives as I can through my actions while having my eyes opened and gaining an incredible experience. While writing this chapter, my laptop was not reliable so I relied heavily on the many resources of Booth Library including the article printing, use of a computer for Internet research and writing, use of a printer, inter-library loans, text references, and the help of many librarians. This chapter was assigned for my Health Studies Research Methods I 2800 class and the library and all its resources previously listed helped me to write this chapter in a timely fashion and achieve a perfect grade from my professor

and praise from other professors, public speakers, and an anthropologist and physician, Dr. Paul Farmer and his research assistant, Jon Weigel.

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A.D.A.M. Medical Encyclopedia. (2010, November 23). *Hepatitis a*. Retrieved on November 19, 2011 from <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001323/>

This source was used to help describe Hepatitis A, a waterborne illness, to help emphasize the importance of having access to clean water.

Arthur, C. (2007). *Haiti in focus: a guide to the people, politics, and culture*. Northampton, MA: Interlink Books.

This source was used to describe a large portion of the history of Haiti and general information about the country.

Beard, J. R. (2004). *Outline map of colonial Hayti or St. Domingo*. Retrieved on November 22, 2011 from <http://docsouth.unc.edu/neh/beard63/beard12a.jpg>

This image provides a map of the country during colonial times and gave visual references for many of the events that were mentioned in the chapter.

Belizaire, T. (2011). *Haiti one year later*. Retrieved on November 22, 2011 from http://www.boston.com/bigpicture/2011/01/haiti_one_year_later.html#photo3

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Bureau of Western Hemisphere Affairs. (2011, August 10). *Background note: Haiti*. Retrieved on October 10, 2011 from <http://www.state.gov/r/pa/ei/bgn/1982.htm>

This source provided a large amount of background and demographic information on Haiti.

CBS News. (2010, March 9) *Massive death toll feared in Haiti quake*. Retrieved on November 20, 2011 from http://www.cbsnews.com/8301-202_162-6092456.html

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Centers for Disease Control and Prevention. (2011a, January 7). Post-earthquake injuries treated at a field hospital — Haiti, 2010. *Morbidity and Mortality Weekly Report*. 59(51&52) Retrieved on October 21, 2011 from <http://www.cdc.gov/mmwr/pdf/wk/mm5951.pdf>

This source was used to discuss the effects of the 2010 earthquake a year later and to display the massive effect that the earthquake had on the country.

Centers for Disease Control and Prevention, (2011b, September 22). *Water-related diseases, contaminants, and injuries*. Retrieved on October 21, 2011 from <http://www.cdc.gov/healthywater/disease/>

This source was used to help describe a variety of waterborne illnesses and their effect on the body to help emphasize the importance of having access to clean water.

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This source was used for the epidemiology of the cholera epidemic during 2010

The Central Intelligence Agency. (2011, September 27). Haiti. *The World Factbook*. Retrieved
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geos/ha.html](https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html)

This source was used for general information about Haiti, including the geography, climate, population, religion, socioeconomic status, etc.

Deep Springs International. (2011 a). *Field updates*. Retrieved on October 5, 2011 from
<http://deepspringsinternational.org/wp-content/uploads/2010/08/DSC08779-300x200.jpg>

This image was used to show a large container holding the Gadyen Dlo solution.

Deep Springs International. (2011 b). *An integrated solution to unemployment and unsafe water*.
Retrieved on October 5, 2011 from <http://deepspringsinternational.org/>

This source explained one of the solutions to help increase access to clean water and some of the financial situations for a few people in Haiti.

Deep Springs International. (2011c). *Strategy*. Retrieved on October 5, 2011 from

<http://deepspringsinternational.org/>

This source gave a detailed description for the program what was discussed in the previous source.

Deep Springs International. (2011d). *Education*. Retrieved on October 5, 2011 from

<http://deepspringsinternational.org/programs/>

This source explained the importance of education and described a program that provides that education.

Deep Springs International. (2011e). *Expansion strategies*. Retrieved on October 5, 2011 from

<http://deepspringsinternational.org/programs/>

This source also discussed some solutions for increased access to clean water that Deep Springs International has put together.

Deep Springs International. (2011f). *Aid to independence*. Retrieved on October 5, 2011 from

<http://deepspringsinternational.org/programs/>

This source from Deep Springs International discussed the purpose of their program and the progression of the people who are a part of the program. The goal is that by the end of their program, the participants will be independent and will not rely on the program but can support themselves.

Deep Springs International. (2011g). *Haitian enterprises*. Retrieved on October 5, 2011 from

<http://deepspringsinternational.org/programs/>

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Dictionary.com, LLC. (2011a). *Chlorine*. Retrieved on November 29, 2011 from

<http://dictionary.reference.com/browse/chlorine>

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Dictionary.com, LLC. (2011b). *Fecal matter*. Retrieved on November 29, 2011 from

<http://dictionary.reference.com/browse/fecal+matter>

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<http://dictionary.reference.com/browse/jaundice?fromAsk=true&o=100074>

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<http://dictionary.reference.com/browse/literate>

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Dictionary.com, LLC. (2011h). *Milieu*. Retrieved on November 29, 2011 from

<http://dictionary.reference.com/browse/milieu>

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Dictionary.com, LLC. (2011i). *Napoleon Bonaparte*. Retrieved on November 29, 2011 from

<http://dictionary.reference.com/browse/napoleon+bonaparte>

This source was used to explain who Napoleon Bonaparte was to help make the chapter more readable.

Dictionary.com, LLC. (2011j). *Nausea*. Retrieved on November 29, 2011 from

<http://dictionary.reference.com/browse/nausea>

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Dictionary.com, LLC. (2011k). *Pathophysiology*. Retrieved on November 29, 2011 from
<http://dictionary.reference.com/browse/pathophysiology>

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Eagle Spring. (2007). *Mission filter cutaway view*. Retrieved on November 26, 2011 from
http://www.eaglespring.com/gallery/albums/missionfilter/BlackandWhiteCutaway2_001.jpg

This image was used to show one way to filter water and make it clean and safe enough to drink.

Eagle Spring. (2010). *9555- emergency/Mission filter*. Retrieved on November 26, 2011 from
http://eaglespring.com/store/index.php?main_page=product_info&products_id=12

This image was used to show one way to filter water and make it clean and safe enough to drink.

Earthquake Hazards Program. (2011, July 14). *Earthquake summary*. Retrieved on October 28, 2011 from <http://earthquake.usgs.gov/earthquakes/eqinthenews/2010/us2010rja6/#summary>

This source was used to discuss the damage done by the 2010 earthquake after a year and a half and to display the lack of progress that has been made since the earthquake.

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Environmental Health at USAID. (2008). *USAID sponsored programs*. Retrieved on November 26, 2011 from <http://www.ehproject.org/PDF/ehkm/filtration-chlorination2009.pdf>

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Haiti Connection. (2011). EIU Newman Catholic Center. (Group meeting).

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Index Mundi (2011, October 14). *Haiti major infectious diseases*. Retrieved on November 21, 2011 from http://www.indexmundi.com/haiti/major_infectious_diseases.html

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Just Water. (2010a). *Just water products*. Retrieved on November 27, 2011 from <http://www.justwater.me/products.html>

This image was used to show one way to filter water and make it clean and safe enough to drink.

Just Water. (2010b). *4"x4" ceramic filter*. Retrieved on November 26, 2011 from http://www.justwater.me/_images/ceramic_07.jpg

This image was used to show one way to filter water and make it clean and safe enough to drink.

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Just Water. (2010d). *BugOut water bottle*. Retrieved on November 26, 2011 from

http://www.justwater.me/_images/bugout_bottle_01_1.jpg

This image was used to show one way to filter water and make it clean and safe enough to drink.

Just Water. (2010e). *BugOut water filter*. Retrieved on November 26, 2011 from

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Lever, D. S. & Soffer, E. (2011). *Acute diarrhea*. Retrieved on October 27, 2011 from

<http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/gastroenterology/acute-diarrhea/>

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http://www.mapofhaiti.com/spa/_files/spa_album/pic_1.jpg

This image was used to show the location of the major cities discussed in Haiti.

One Laptop Per Child. (2011) *OLPC's mission is to empower the world's poorest children through education*. Retrieved on November 28, 2011 from

<http://one.laptop.org/about/mission>

This source emphasizes the importance of education and its effect in other aspects of life, like access to clean water and understanding the importance of having access and using clean water for all water needs and not just for drinking.

Partners In Health. (2011a). *Cholera*. Retrieved on November 22, 2011 from

<http://www.pih.org/pages/cholera/>

This source was used to help describe Cholera, a waterborne illness that is currently an epidemic in Haiti, to help emphasize the importance of having access to clean water.

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http://act.pih.org/page/s/cholera?source=BSDAds&subsource=Google_GoogleSearch_October_Cholera%20Join_Cholera%20in%20haiti

This source gave up-to-date statistics of the spread of the cholera epidemic due to unclean water.

Partners In Health. (2011c). *Partners In Health history*. Retrieved on November 22, 2011 from

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This source discussed the new teaching hospital in Mirebalais and the benefits that it will provide to the communities in the area.

The place of voodoo in the social structure of Haiti. (1973). *Caribbean Quarterly*, 19(3), 36-50.

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Ritter, M. (2011, February 18). *Water guardian*. Retrieved on November 28, 2011 from http://www.scientificamerican.com/media/inline/haiti-cholera-clean-water-chlorine_1.jpg

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This source discussed the living conditions in Haiti, defined poverty and extreme poverty, and gave statistics on the number of Haitians who fell under each category.

United Nations Development Programme. (2006, February 25). *Haiti: poverty profile*. Retrieved on October 28, 2011 from www.haitianconnection.org/haitiPovertyProfile.doc

This source also discussed the number of Haitians that fell under the two categories, poor and extremely poor, along with the correlation between education level and financial levels. Also discussed was access to sanitation.

Vorvick, L. J. (2010, May 05). *Cholera*. Retrieved on September 19, 2011 from <http://www.nlm.nih.gov/medlineplus/ency/article/000303.htm>

This source was used to help describe Cholera, a waterborne illness that is currently an epidemic in Haiti, to help emphasize the importance of having access to clean water.

Vorvick, L. J. (2009, August 08). *Dehydration*. Retrieved on September 19, 2011 from <http://www.nlm.nih.gov/medlineplus/ency/article/000982.htm>

This source was used to help describe the effects of dehydration on the human body in order to emphasize the importance of having access to clean water.

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This source was used to help describe Typhoid Fever, a waterborne illness, to help emphasize the importance of having access to clean water.

World Weather Post. (2010, January 29). *Worst natural disasters in Haiti*. Retrieved on October 20, 2011 from <http://www.worldweatherpost.com/2010/01/29/worst-natural-disasters-in-haiti/>

This source discussed the worst natural disasters in Haiti which have assisted in leading to the current condition of the country.

Clean Water in Haiti

HST 2800 Research Methods I

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30 November 2011

Clean Water in Haiti

In the past few years, Haiti has been a topic that has been in the news here in the United States for many reasons. These reports typically show the faces of hundreds of starving and injured Haitians who live in turmoil and they discuss the disasters that have befallen the country. While these reports do not usually show the more pleasant aspects, they are relatively accurate in showing the state of the majority of the country. A major impact on a country that is in such a dire state is the presence and availability of clean water. But to understand Haiti's current problem, it is important to be aware of their past and of facts about the country as they all have played a role for the country and its people. The Republic of Haiti is a small country to the west of the Dominican Republic and is surrounded on the remaining sides by the North Atlantic Ocean and the Caribbean Sea. The country makes up a third of Hispaniola, the island that is comprised of Haiti and the Dominican Republic. (U.S. Department of State, 2011)

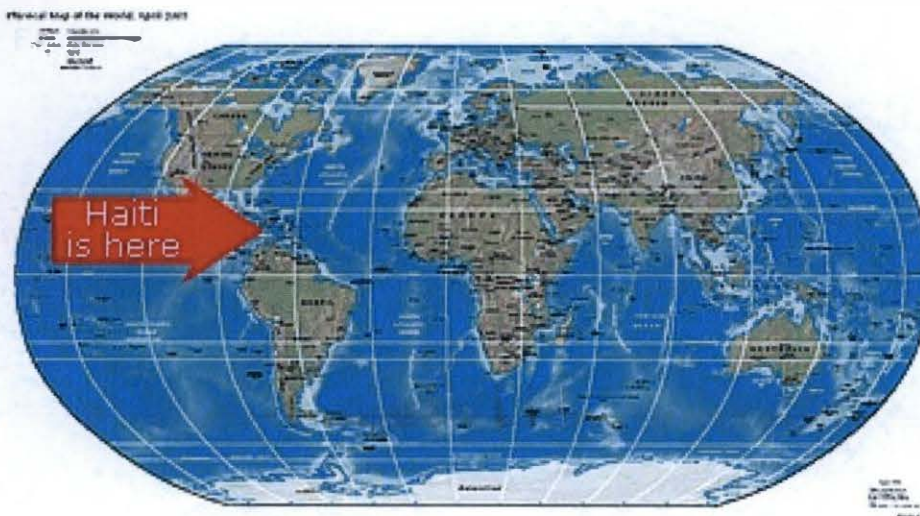


Figure 1: World Map (Source: mapofhaiti.com, 2011a)



Figure 2: Current Major Cities in Haiti (Source: mapofhaiti.com, 2011b)

As stated in *Haiti in Focus* (2007), Haiti's climate is tropical and relatively static. During July, their hottest month of the year, the temperatures average between 73 and 93 degrees Fahrenheit and during January, their coldest month, the temperatures range between 68 and 88 degrees Fahrenheit. The rainy season for the country is typically in April and May, but because the country is going through severe deforestation, the rainy seasons are not as predictable anymore. The amount of rain depends on the area of the country: on the Northwest area, the average annual rainfall is 16 inches, but in the highest mountains the average is 160 inches per year. Hispaniola is located in the middle of a hurricane belt and the island is frequently hit by tropical storms, hurricanes, and flooding, especially during the hurricane season: September through November. As well, the island is located on a fault line and is prone to earthquake activity. (Arthur, 2007)

On the U.S. Department of State's (2011) website, background information on Haiti is given. This includes but is not limited to information on the geography, government, economy, the people, and the history of the country. Haiti is slightly smaller than the state of Maryland. Haiti's estimated population in April 2010 was 9,900,000 and grows at a rate of 1.66 percent. Its capital, Port-au-Prince, has an estimated population of 2.35 million people prior to the earthquake from January 2010. Another major city is Cap-Haïtien, formerly Cap-Français, whose population is around 250,000 people. The country has an elevated plateau in the east-central region and rugged mountains with small coastal plains and river valleys. (Bureau of Western Hemisphere Affairs [WHA], 2011)

Also from the U. S. Department of State (2011), the origin of 95 percent of the population is of African descent, and the remaining five percent is a combination of African and European descent, also known as mulatto. The primary religion is Roman Catholicism, but due to the influence of missionaries, Protestantism is becoming more prominent in the country. As well as these two main religions, many Haitians practice voodoo. While this practice is not a part of either Catholicism or Protestantism and not all practice them concurrently, many Haitians practice both voodoo and one of the other religions as a part of their spiritual and health habits together. There are two official languages of the country: French and Creole, which is based off of the French language. (WHA, 2011)

History of Haiti

While all the current information about Haiti is important to know, it is also important to understand how they got to where they are now. The history of Haiti has had several major impacts on the country and why it is in its current state. *Haiti in Focus* (2007) discusses the

main parts of Haiti's history, economy, and politics, which begins in the late fifteenth century. When Christopher Columbus, under Spanish commission, first colonized the Caribbean islands, the original inhabitants of La Isla Española, translated to "The Spanish Island", were Tainos. Due to the introduction of European illnesses along with the mistreatment of the Tainos, within five decades the entire population, having started anywhere from 400,000 to one million people, was eliminated. Having destroyed the Taino population, the European settlers shipped more slaves from Africa into the Caribbean. While La Isla Española had a low population, it grew considerably in the eighteenth century when the French invaded and imported large amounts of African slaves into the western third of the island, currently Haiti, to work on plantations. This western portion of La Isla Española was renamed to Saint Domingue while the eastern two thirds were called Santo Domingo. Saint Domingue flourished economically while Santo Domingo struggled in comparison. In Saint Domingue, it was this dense mixture of French colonists and African slaves that led to the roots of the Haitian culture. (Arthur, 2007)

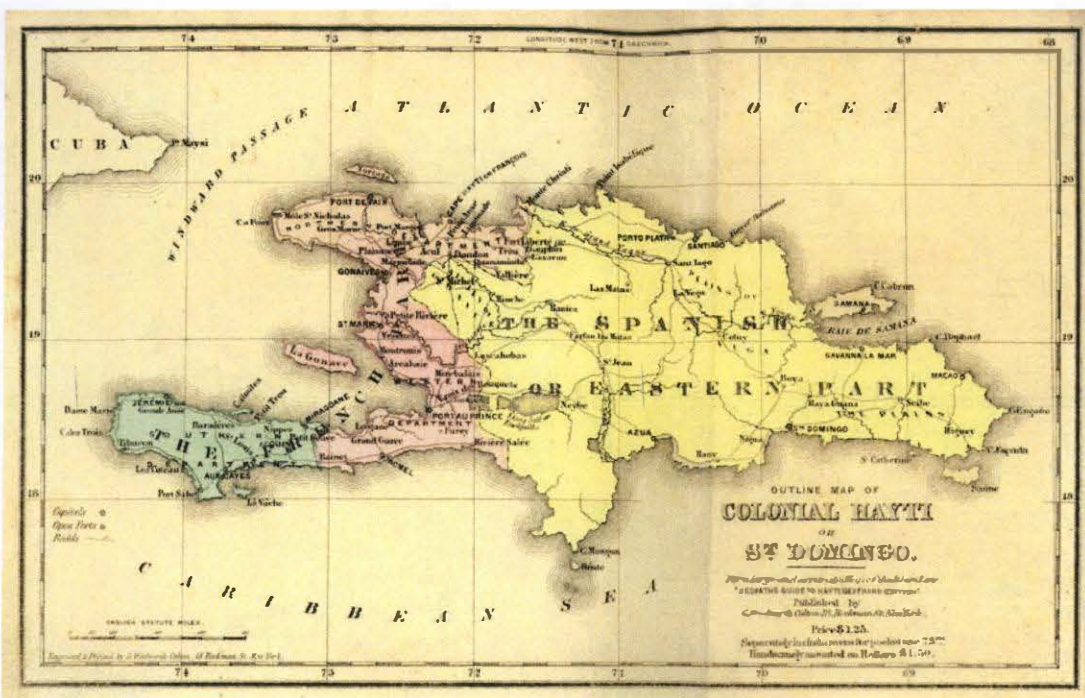


Figure 3: Colonial Map of Hispaniola (Source: Beard, 2004)

Arthur (2007) continues by telling the reader that the most defining moment of early Haitian history was in 1791: the beginning of their revolution to overthrow slavery. At the beginning of the revolution, there were 40,000 white colonists and half a million slaves, approximately two thirds of which were born in Africa. During the twelve years of the revolution, the slaves adopted a new language, which helped to unite them. As well, they were not prejudiced but invited the mulattoes, 27,000, and the Polish mercenaries, 2,570, who had a change of heart back on their side in the fight against the slave owners. At the end of the revolution, the slaves won; this makes the Haitian slave uprising the only successful slave revolt in the world to this day. (Arthur, 2007)

While there were many supporting factors and people that lead to the overthrow of the French's regime, there are two people in particular who had a major impact on the revolt. Toussaint L'Ouverture was the leader of the black army in the fight for freedom. He understood the disputes that occurred between the Spanish, French, and British colonists who were in Saint Domingue and was able to set them all against each other. Having been taught how to read and write, Toussaint L'Ouverture was able to move up in rank amongst his people. He had an understanding of guerrilla warfare and organized the men who were willing to fight into an efficient and effective fighting force. Earning their loyalty and respect, L'Ouverture became the leader of the black resistance and made alliances with the Spanish who lived in Santo Domingo. After the Spanish helped to abolish slavery, Toussaint L'Ouverture then led his people to defeat the Spanish. In 1802, Toussaint L'Ouverture became the governor of Hispaniola when he and his armies had taken over the entire island. By the next year, the French leader, Napoleon Bonaparte, sent over 20,000 men to take back the colony and captured L'Ouverture. He was

brought to France and imprisoned which lead to his untimely death ten months later due to starvation and neglect. (Arthur, 2007)

The second person who had a major impact on Haiti during this time was Jean-Jacques Dessalines. He is considered the founding father of the independent Republic of Haiti. He was an officer in L'Ouverture's army and lead the troops after L'Ouverture had been taken prisoner. As well, Dessalines was the creator of the Haitian flag, which is a modification of the French flag. After Dessalines and his troops allied with the mulatto troops, they fought the French and captured the capital, Port-au-Prince. A month later, the French were, again, defeated just outside Cap-Français. Following the battle, the French retreated from the colony. "... On January 1, 1804, Dessalines read the Proclamation of Independence, swearing 'to renounce France forever and to die rather than live under domination.'" (Arthur, 2007, p 20-21). Jean-Jacques Dessalines continued to lead the Haitian people with a decisive, strong, and frequently ruthless leadership, until his assassination, that is still respected by Haitian nationalists. (Arthur, 2007)

Political Influences

Following the next several decades after their newly gained independence, there have been many affecting factors that have influenced Haiti's status over time and made great impacts on everything that has led up to their current state. Some important factors include the U.S. occupation of Haiti and other political influences. The United States of America did not fully recognize Haiti's independence until it was necessary for the northern states to obtain cotton in 1862 during the Civil War. At the beginning of the twentieth century, private U.S. businesses took interest in Haiti and formed investments in tropical fruit, transportation, sugar, and banking. When a small German community developed in Haiti during World War I, "... the U.S. moved

to secure its strategic and business interests in Haiti.” (Arthur, 2007, p. 24). And in 1915, the Haitian president, President Sam, was overthrown and murdered, which led to a 2,000 U.S. Marine invasion. These Marines forced Haitians to form labor gangs to complete public works, like the building of roads. This led to a strong opposition towards the U.S. involvement. The Haitians attempted to retaliate, but were unsuccessful for many years, but it led to a growth of Haitian nationalism. While the U.S. occupation continued for nineteen years, ending in 1934, it made a lasting impact on the nation’s development socially and politically. (Arthur, 2007)

On the U.S. Department of State (2011) website, more history is discussed covering the dictatorship of the Duvalier family. François Duvalier’s presidency lasted from 1957 until 1971 when he died. In 1964, François Duvalier, “Papa Doc”, declared himself president-for-life. Arthur (2007) states that during his presidency, François Duvalier proposed an alliance between the black middle class and the black mass community. While this was a positive effect of his reign, he led the military to oppose violence of all sorts by using brutality:

All major institutions in civil society, including political parties, workers’ unions, peasant cooperatives, and student association were crushed or infiltrated and as many as 30,000 of his opponents were killed.... “If you had talent or ambition, and wanted to stay in Haiti, you had two alternatives: You could let yourself be totally corrupted, or you could be killed. That was it.” Not surprisingly, tens of thousands of educated Haitians choose to go into exile. (p. 23).

Due to François Duvalier’s actions, this exile of educated and ambitious Haitians limited the country’s ability and availability for progress and development. (Arthur, 2007)

When François Duvalier died in 1971, his son, Jean-Claude “Baby Doc” Duvalier, continued the dictatorship. Arthur (2007) continues his summary by writing that Jean-Claude, too, drove Haiti’s economy into further turmoil, placed a heavy tax on the poor, and appropriated foreign aid. As supported and encouraged by the Catholic Church in Haiti, the poverty-stricken Haitians began to oppose the dictatorship through organized protests as the food shortages in the country grew. When the U.S. decided revolution was too near, they, and the Haitian military, cut off their support for Duvalier. With this lack of support, Jean-Claude Duvalier fled for France on February 7, 1986. Following his exile, there were more pulls for political gain and dominance and more bloodshed until the elections in 1990. (Arthur, 2007)

Due to the massacre of voters during the 1987 election, the United Nations oversaw the elections that were held in 1990. The favored candidate, Marc Bazin, was unexpectedly defeated by a radical Catholic priest, Jean-Bertrand Aristide, who won with a shocking 67 percent lead. Aristide’s campaign was called Lavalas, which means avalanche or flood in Creole, with the promise to clean Haiti of the Duvalierist regime, to have governmental accountability, justice, and the promise to allow Haitians to help make decisions for their future and the future of their country. While Aristide’s vision was noble and honest, he was overthrown by the Haitian military and the elite, which was fronted by Raoul Cédras, the Army chief that Aristide originally promoted, in less than eight months after he was elected into office. (Arthur, 2007)

During the three years that followed Aristide’s exile, the army and police force implemented their campaign of repression with the intent to dismantle the popular organizations in the communities and to force the people to stay uninvolved in the political proceeding of the country.

For three years, summary executions, arbitrary searches and arrests, disappearances, beatings, torture, and extortion were systematic and commonplace. An estimated 5,000 people were killed, some 400,000 were internally displaced, and tens of thousands attempted to escape the country by boat. (Arthur, 2007, p. 25)

For the next three years, Haiti was under the control of the military and Raoul Cédras until they were confronted by the United Nations and the U.S., who intervened with military force. In October 1994, Aristide was returned to power. During and after his presidency, two political parties were formed: Organization of People in Struggle (OPL) and Lavalas Party (LP). Later, in 2000, Aristide was reelected into office with a landslide victory, as he remained over the years the most popular politician in Haiti. (Arthur, 2007)

History of Natural Disasters

While those are some key factors in their political history, it is not the only part that has influenced their current status. While the following are not a full compilation of the natural disasters, they are an overview of the worst. On January 29, 2010, worldweatherpost.com reported a variety of natural disasters in Haiti from 1770 to 2010. Hurricanes in Haiti occur frequently since Haiti is located in the middle of a hurricane belt in the Caribbean Sea: an unnamed hurricane in 1935 killing over 2,000; Hurricane Hazel in 1954 killing hundreds; in 1963, Hurricane Flora kills over 6,000 in Haiti and Cuba; Hurricane Gordon in 1994 kills hundreds; Hurricane Georges in 1998 kills over 400 and destroys 80 percent of crops in Haiti; three days of heavy rains in May 2004 caused floods that killed more than 2,600; Tropical Storm Jeanne causes floods and landslides in September 2004, killing 1,900 and leaving 200,000 homeless in Haiti's third-largest city, Gonaives; in October 2007, Tropical Storm Noel created

floods and mudslides killing at least 57; in August and September 2008, three hurricanes and one tropical storm killed 800, destroyed crops, and caused one billion dollars in damages. (World Weather Post, 2010)

As well as water-related natural disasters, earthquakes have been just as devastating, largely due to the large fault line that Haiti sits on. As displayed on worldweatherpost.com, in 1770, an earthquake destroys Port-au-Prince when it was a French colony; in 1842, an earthquake demolished Cap-Haïtien, northern Haiti, and northern Dominican Republic; an earthquake of 8.1 magnitude in 1946 strikes the Dominican Republic and Haiti, which created a tsunami and killed 1,790 people (World Weather Post, 2010). On January 12, 2010, a 7.0 magnitude earthquake leveled buildings in Port-au-Prince killing approximately 222,570, injuring 300,000, and leaving 1.5 million homeless (Centers for Disease Control and Prevention [CDC], 2011a). Following the earthquake, there were 59 aftershocks measuring 4.5 or higher. Of those 59, sixteen measured 5.0 or higher. Two of the largest aftershocks were 5.9 and 6.0. The magnitude 6.0 aftershock happened within seven minutes after the initial earthquake occurred (Earthquake Hazards Program, 2011). Currently, the country is still suffering from the effects of the earthquake from January 2010. Haitians are still living in the tent cities that were put into place due to the amount of people who lost homes and who needed medical attention and accessibility to clean water is still very limited. The following image, Figure 4, shows the severity of the earthquake and the range of the shaking felt throughout the country. The key on the right shows the colors that distinguish the severity levels of the shaking. The key on the left lists the surrounding cities and the amount of damage that was done to each.

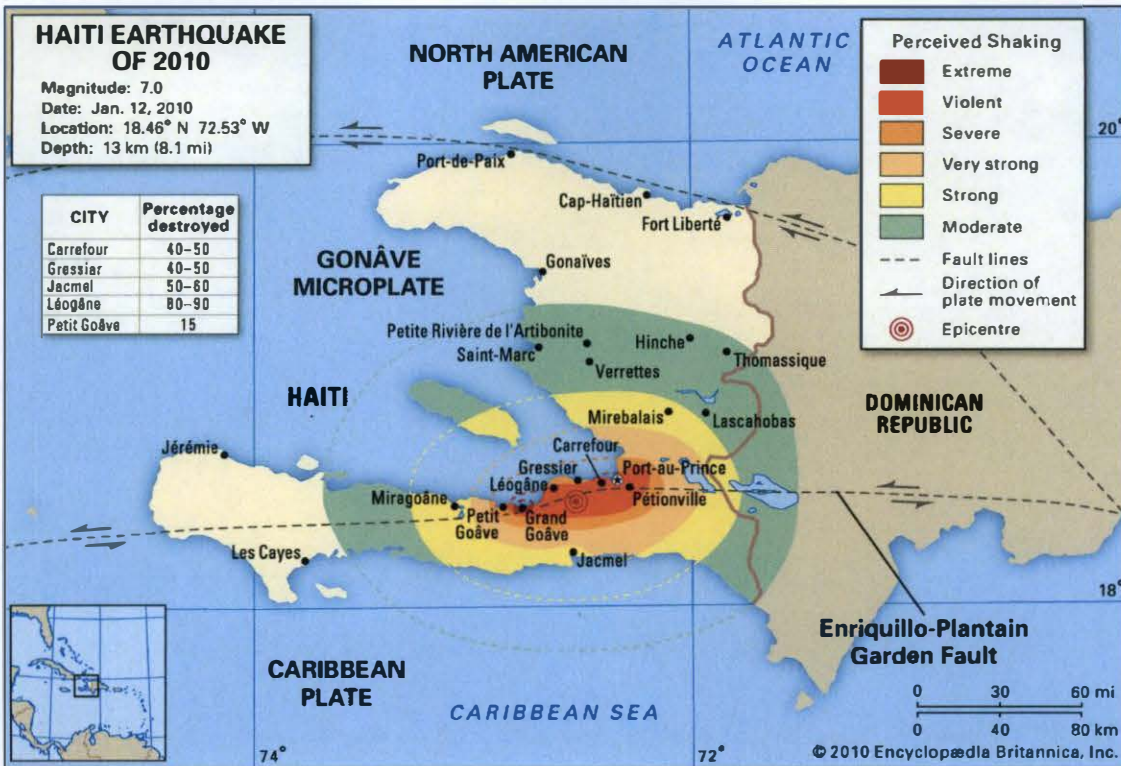


Figure 4: Haiti Earthquake 2010 (Source: Encyclopædia Britannica, Inc., 2011)

Causes of the Problems

Environment

The next topic that is important to analyze is the causes of the problems in the country, why there is a necessity for clean water, and why Haiti is unable to access clean water. This includes the environmental conditions, religious practices, and exploring the effects that natural disasters have laid on the country. Haiti is the poorest country in the Western hemisphere and the third poorest country in the world (The Central Intelligence Agency, 2011). According to the United Nations Development Programme (2006), three fourths of the population in Haiti is considered poor and over half are extremely poor. Poor means to live on less than two U.S. dollars per day per person where extremely poor means to live on less than one U.S. dollar per

day per person. This information was provided from the Haiti Living Conditions Survey in 2001 by L'Institut Haïtien de Statistique et d'Informatique (IHSI). There is a direct correlation between the level of education and the risk and severity of being poor. (United Nations Development Programme [UNDP], 2006)

Arthur (2007) states that 13 percent of children die before reaching the age of five, and over one quarter of Haitians die before they reach 40. The UNDP (2006) states on their Poverty Profile on Haiti that only 34 percent of the population has access to adequate sanitation. Additionally, only 51.9 percent are literate. Haiti's Gross National Income in U.S. dollars is 400.0 and the country is ranked 153 out of 177 countries for achievements in life expectancy, adjusted real income, and educational attainment. Sources of income for Haitian households are self-employment, transfers, wage income, and self-consumption at 37 percent, 25 percent, 20 percent, and 11 percent respectively. As mentioned previously, the level of education has a major and direct impact on the risk of being poor. In Haiti, 53 percent of the work force never completed a basic education. This percentage does not include those who are not working. (UNDP, 2006)

The United Nations Children's Fund (UNICEF) (2008) discusses the living conditions in Haiti. Four in ten children in Haiti live in homes that have dirt/mud floors or in extremely overcrowded conditions. Extremely overcrowded conditions would be five people living in each room of the house. As discussed earlier, there is a rainy season in Haiti. When this time of year comes or when there is a water-related natural disaster, the majority of dirt floors in homes become mud floors. This does not typically change until after the rainy season is over or until the land has recovered from the water-related natural disaster. A nicer home in Haiti would have

stone walls and a corrugated tin roof and might have more than one room and some decorations. (UNICEF, 2008)

Religion

There are three main religions in Haiti: Roman Catholicism, Voodoo, and Protestantism. Arthur (2007) writes that the Catholic Church is one of the most prominent and influential institutions in Haiti. The Church plays an important role in other aspects of their culture such as health care, human rights, and community development. Protestantism was introduced to the country during the nineteenth century with five major groups: Methodist, Baptist, Anglican, Pentecostal, and Episcopalian. From these groups came the establishment of orphanages, schools, and clinics. (Arthur, 2007)

Another important factor for Haiti is Voodoo. As stated in *The Place of Voodoo in the Societal Structure of Haiti* (1973), "Since Voodoo is not a rigid religion, it adapted itself to the sociological conditions of its milieu and borrowed features continually from the formally organized religions of Haiti, Protestantism and Catholicism." (p. 36) Voodoo is based off of oral tradition and the basic elements have not been transcribed, but the practices are based around communication with hundreds of different spirits who are mediums between mortals and the all-powerful-God. These spirits, or Iwa, are potentially the protectors of tribes and families in Africa. The practice of Voodoo also provides the community with counselors in the form of Voodoo priests. The priests are trusted members of the community and many people turn to them for guidance. While Voodoo is its own separate religion and way of life, it can be adapted into the lives and the religious practices of the Haitians who choose to practice Voodoo

alongside another religion: the all-powerful-God in Voodoo would be interpreted as the Christian God while the spirits as the saints or the Holy Spirit. (Arthur, 2007)

Natural Disasters

All natural disasters in Haiti have caused major problems for the country. As listed earlier, there have been numerous devastating catastrophes that have struck Haiti, costing the country billions of dollars in damage and have made a large impact on the environment, economy, and health status of the people. When discussing the earthquake of January 12, 2010, severe damage was done in Port-au-Prince, Leogane, Jacmel, and the surrounding communities (WHA, 2011). A report done by CBS News (2010) discusses the travesty that occurred in Port-au-Prince:

"Parliament has collapsed. The tax office has collapsed. Schools have collapsed. Hospitals have collapsed," [President Rene] Preval told the Miami Herald. "There are a lot of schools that have a lot of dead people in them." All three hospitals operated by Doctors Without Borders have collapsed or had to be abandoned, reports CBS Evening News anchor Katie Couric from Haiti. Many of its doctors are missing. (para. 4-5)

Due to the lack of hospitals and the massive amounts of destroyed buildings and homes, tent cities were created to house and treat people. The massive amount of damages to the infrastructure, restoration of the city is difficult and progress is minimal. Below, Figure 5 shows one of many tent cities that were created. This image is on the one year anniversary of the earthquake. These tent cities were put up after the earthquake in January 2010 and there is little progress in their removal and the restoration of the city. Due the the massive amount of damage that was done to Port-au-Prince, recovering from the earthquake will take a long time.

Reconstruction of buildings can only take place after the city has been cleared of the rubble that clutters the streets. Tent cities like the one shown below in Figure 5 will be in place for a long time before the buildings and homes are back to a condition that is satisfactory enough for living and working in.



Figure 5: Tent City in Port-au-Prince (Source: Belizaire, 2011)

Waterborne Illnesses

Due to the extreme conditions in Haiti and the lack of resources to attain clean water, waterborne illnesses are a major concern and occur frequently. With the most recent earthquake in Haiti, 1.5 million people were left homeless and moved into the country-side or into tent cities. In the country-side, homes are inadequate and crowded; in the tent cities, people live in extremely crowded and unsanitary conditions. In both situations, clean water is

scarce, yet necessary. With living in close quarters and in conditions that are extremely bad, the spread of communicable and waterborne diseases occurs rapidly. The CDC (2011b) posted an article discussing water-related diseases contaminants and injuries:

Waterborne diseases are caused by organisms that are directly spread through water.

Water-related illnesses can be acquired due to a lack of water for good hygiene, lack of sanitation, or increasing insect populations that breed in water and then spread disease.

(Para. 1)

A major condition that is related to many of the following waterborne diseases is dehydration. Dehydration is caused by loss of excessive amounts of fluid and, if left untreated, can lead to death, brain damage, or seizures. (Vorvick, 2009)

Hepatitis A and Hepatitis E are viruses that can be spread by ingesting water that is contaminated with fecal matter. This virus interferes with liver function and causes fever, jaundice, and diarrhea. Symptoms can last for over nine months but typically only last three months. These symptoms can consist of dark urine, fatigue, itching, loss of appetite, nausea/vomiting, and pale or clay-colored stools. (A.D.A.M. Medical Encyclopedia, 2010; Index Mundi, 2011)

Typhoid fever is a bacterial disease spread through food or water that is contaminated by fecal matter or sewage. The bacteria enter the bloodstream through the small intestine and move to the gallbladder, lymph nodes, liver, and spleen. Symptoms of Typhoid include sustained high fevers, abdominal pain, and a general ill-feeling. If Typhoid is untreated, severe diarrhea is common and there is a 20 percent chance that the infection will become fatal. If treated, symptoms typically last no longer than four weeks. (Index Mundi, 2011; Vorvick, 2011)

Acute Watery Diarrhea is the increase in number of stools that have a more fluid consistency that lasts less than 14 days. Causes of acute diarrhea are infectious agents, such as viruses, bacteria, or parasites. They do not require any medication unless the patient's immune system has been compromised. Examples of a compromised immune system are testing positive for Human Immunodeficiency Virus (HIV), having cancer, a heart disease, or any other chronic illness. Medication would be required because the patient's immune system is unable to effectively fight the infectious agent that causes the diarrhea. Acute diarrhea is more common in developing countries, like Haiti, that do not have access to clean water, but can be contracted by people who travel to these under-developed countries. After the earthquake in Pakistan, over 20,000 cases of acute watery diarrhea were reported in 2005. (CDC, 2010; Lever & Soffer, 2011)

To better understand the severity of diarrhea in a person who does not have access to clean water, it is important to understand the pathophysiology of the infection. Lever & Soffer (2011) discuss in extensive detail exactly what occurs when infected. In summary, with a properly functioning digestive system, the majority of liquids that enter the small intestine get absorbed there. The remaining fluids leave the small intestine and enter the large intestine where the majority is absorbed. The remainder leaves the body with the stool. Different types of infections causing diarrhea create different responses in the gastrointestinal tract. Some organisms may impair the small intestine and colon from absorbing the fluid where other organisms may secrete a toxin that causes the cells in the colon to secrete fluids and electrolytes instead of absorbing them. This makes the individual dehydrated; if left untreated, the dehydration could cause other problems for the individual and has the potential to be fatal. (Lever & Soffer, 2011) Clinician training on hydration management and hydration supplies

should be in place before an outbreak occurs because death caused by dehydration due to acute watery diarrhea could occur within hours. Prevention is the most important and effective means to treat an outbreak. (CDC, 2010)

Cholera is an infectious bacterial disease that affects that small intestine and causes excessive amounts of diarrhea. The bacteria releases a toxin that makes the intestines excrete higher amounts of fluid than are normal, causing severe diarrhea. Cholera is most common in areas of poor sanitation, war, famine, and crowding. The bacteria is spread through the consumption of contaminated food or water. Symptoms of cholera, aside from severe diarrhea, include abdominal cramping, dry mucus membranes or mouth, dry skin, excessive thirst, lack of tears, sunken or glassy eyes, lethargy, nausea, vomiting, low urine output, rapid heart rate, rapid dehydration, and fontanelles, or soft spots, in infants. While there are vaccinations available for cholera, they are not as effective when attempting to manage outbreaks. The most effective measure would be to establish clean water, food, and sanitation. (Vorvick, 2010)

Following the 2010 earthquake in Haiti, an investigation was done on October 21 through 23 and the cholera outbreak was confirmed (CDC, 2011c). With the destruction of major cities including the capital, Port-au-Prince, living conditions and sanitation were dire. Access to clean water became necessary yet minimal. Housing became incredibly crowded and the tent cities were put upon the rubble of the earthquake. Once cholera broke out, it spread throughout the country. According to Partners In Health [PIH] (2011a), 15,000 patients were being treated in their cholera facilities in June 2011 and 2,500 patients in October 2011. PIH cholera facilities have seen 75,000 people and approximately 485,000 people have been seen at cholera facilities within the first year of the epidemic in Haiti. (PIH, 2011a)

For a better perspective, the 2010 cholera epidemic is the worst in recent history and hit its peak in spring 2011. During its highest point, cholera spread on average at one newly infected person per minute and every two hours, a person infected with cholera died. (PIH, 2011b) Partners In Health is an international organization that is dedicated to providing a preferential health option to the poor and working in solidarity. Their services are currently offered in twelve countries, but they were founded in Boston, Massachusetts to support Haiti by Dr. Paul Farmer, Ophelia Dahl, Dr. Jim Yong Kim, Thomas J. White, and Todd McCormack in 1987. (PIH, 2011c)

Solutions

The lack of clean water causes many problems, especially in underdeveloped areas. There are ways to correct this problem, though, and they are all easily managed. One of the most effective ways to address the lack of clean water is through a water filtration system. The most well known type of filtration system in Haiti is the bucket system, of which there are many variations. However, it is not just the distribution of these buckets that will fix the problem: the people need to be instructed on how to use the systems, on how to replace or use the sanitizing agent, and on how to fix the system when it breaks down. Additional factors include hired workers who go location to location, fixing or replacing systems and distributing the sanitizing agent to families who run out. Without these key factors, these systems lose effectiveness and clean water is no longer available.

While permanent and advanced water and sewage treatment facilities are imperative, these water bucket systems are one of the best ways to provide a family with clean water. Until these more advanced facilities are in place, the bucket systems will work well and serve their

purpose. As well as a change in the way clean water is accessed, other changes need to happen too. As mentioned previously, Haiti's political history is full of corruption and upheaval. A steady and trustworthy government needs to be in place and put the needs of the Haitian people ahead of their own personal desires. This will allow their country to prosper and flourish on their own resources and they will be able to work in solidarity. When the government is stable and productive, the rest of the economy will likely follow, their budget will be better proportioned, and health care needs have a greater chance of being met. Along with proper funding for their health care system, they need proper facilities in which to provide health care. PIH is currently building a teaching hospital in Mirebalais. This facility will allow more health care providers and students to be educated on proper health in Haiti while providing services to those in need. As well, having this hospital will create jobs for Haitians who are helping to build the facility and will create permanent jobs for those Haitians who will be working in the hospital. (PIH, 2011d). While this is just one hospital being built, more are needed, especially after the destruction of those in the 2010 earthquake.

Along with the building of health care facilities, a major factor for prevention of diseases in Haiti would be the use of vaccinations. With the current cholera epidemic, PIH (2011a) is moving to bring an oral vaccine to Haiti in January 2012. They will purchase 200,000 doses of the vaccine, which will be administered through a method called "herd immunity" for prevention and treatment. Each patient will receive two doses, two weeks apart; 100,000 people in Haiti will receive treatment. Being administered as a herd immunity means that the majority of a population will be vaccinated. While not everyone will be vaccinated, those who are will be preventing the spread of cholera. "It is estimated that 10 percent coverage would avert 63,000 cases and 900 deaths in Haiti, while 30 percent coverage would lead to a 55 percent reduction in

cases, potentially saving thousands of lives.” (PHI, 2011a, para. 9). However, this vaccination is 70 percent effective and only lasts for 36 months. With not vaccinating the entire population and with the vaccination not being a permanent fix, cholera will still be a concern without access to clean water. (PIH, 2011a)

Along with permanent water and sewage treatment facilities, the wells and pumps in Haiti need to be properly maintained. Water is collected from many communal water sources, such as a well or stream, and if the source is contaminated, then the community will become infected. Making sure that the water source remains sanitary is vital for prevention and for discontinuing the spread of disease. Hiring Haitians to go around testing the water at these communal sources and correcting the sources that need repaired or sanitized will create more jobs and will promote the health of the communities. As well, the homes and buildings in the major cities and in the countryside need to be reconstructed. They need to be more capable of withstanding some effects of a natural disaster- flood, rain, and earthquake, and provide adequate shelter for those inside. Previously discussed, many of the homes in Haiti have dirt floors and during the rainy season, the homes get flooded and the floors turn to mud. These are opportune places for bacteria to thrive and the chance of infection increases. As well, many of the homes in Haiti have corrugated tin roofs because the tin is cheap and waterproof if it is solid. (UNICEF, 2008) These homes need to be made of more substantial material and must have a better foundation laid. These tin roofs and dirt/mud floors will not help the Haitian people to treat and prevent any diseases or infections.

While all of these factors would benefit the overall wellness of the country, the most important to incorporate into the lives of all Haitians is education. According to One Laptop Per Child [OLPC] (2011), you do not stop education until all other challenges, such as food, water,

shelter, are solved, but you do them concurrently: education is the foundation of the other solutions. This education should be focused around literacy and honing their skills in the manner that is in more developed countries, as well as focused on educating them about safe, health promoting practices: both are important and they influence each other. (OLPC, 2011) The more educated they are, the more of an understanding they will have on the importance of clean water and the required measures that are taken to achieve clean water.

Current Preventions

There are many different kinds of bucket systems being used in Haiti, but they all have the same goal: to supply clean water. There are many types of filtration and sanitizing agents, including sand, solar power, disinfecting powder, and ceramic filtration, that are used to make the water clean. The following systems are just a few examples of the variety of systems that are available. From Just Water (2010a) comes a two bucket system with an inserted filter that connects the two buckets. Something that is beneficial with this type of system is its versatility. Just Water (2010a) advertises that their filter will work with any containers as long as both are made of plastic and are the same size. Water goes into the top bucket, travels through the ceramic filter, and into the bottom bucket, free of harmful microbes.



Figure 6: Ceramic Two Bucket Water Filter (Source: Just Water, 2010b)

These ceramic filters can be used in multiple types of systems. The featured types of systems that Just Water (2010a) supplies are their two bucket systems, their pressurized two bucket system, which can filter up to 70 gallons of water in one day with the four inch by four inch filter, and their individual water bottles. The following two images, Figures 7 and 8, are of the pressurized water buckets and a personal water bottle. The third image, Figure 9, is of their filter attached to a straw of the water bottles and lasts for around 200 bottles worth. With the bottle, water is put inside the bottle and the lid is tightly shut. When the built-in straw is sucked on, water goes through filter, and comes out clean through the straw . (Just Water, 2010a)



Figure 7: Pressurized Two Bucket System (Source: Just Water, 2010c)



Figure 8: BugOut Water Bottle (Source: Just Water, 2010d)



Figure 9: BugOut Water Bottle Filter (Source: Just Water, 2010e)

Another type of filtration system is a combination of filtration and chlorination. Environmental Health at USAID (2008) offers these types of systems. Being a combination of filtration and bleach solution, the system leads to higher quality of water. The systems remove both contaminants as well as debris while disinfecting the water. The Environmental Health at USAID program gets their buckets from two primary sources: Eagle Spring's Mission bucket and Gift of Water. The following image, Figure 10, is a cutaway of the Mission bucket by Eagle Spring. This type of system is very similar to the type of bucket designed by Gift of Water as they both filter and disinfect the water. This type of system requires two buckets and has four steps in the sanitation process. The water first gets bleached in the top bucket or in a separate bucket, depending on the type of filter. After an hour, the water is added to the top bucket where it gets filtered through a one micron sediment string filter and is pulled by gravity into the second bucket through the inline carbon filter in the bottom bucket. After it leaves this filter, it is ready for use through the spigot at the bottom of the lower bucket. (Environmental Health at USAID, 2008; Eagle Spring, 2010)

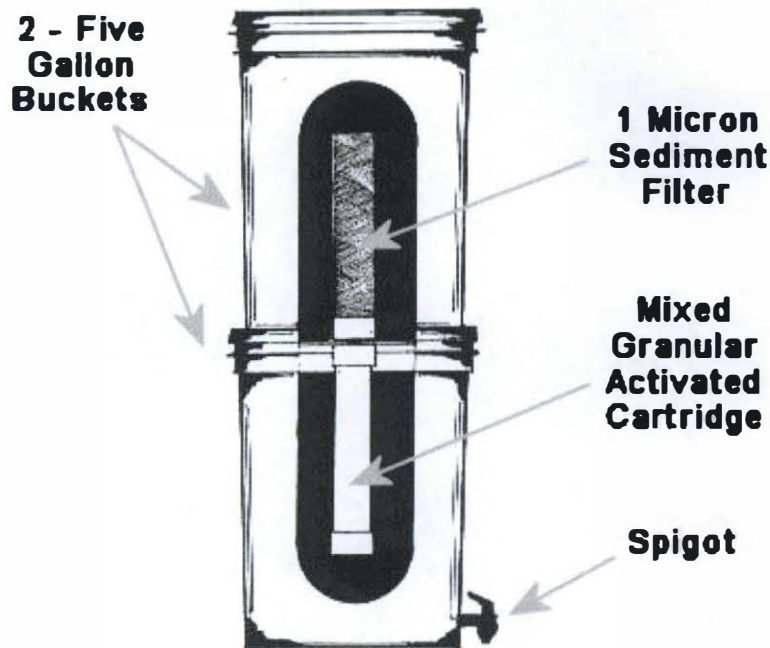


Figure 10: Mission Bucket Cutaway (Source: Eagle Spring, 2007)

Some systems, instead of filtering the water, sanitize the water through an added solution. An example of this type of system is Gadyen Dlo, translated to “water guardian” in Creole. Gadyen Dlo is a chlorine solution that is added to the water bucket to sanitize the water: one cap full of the solution per five gallons and a 30 minute wait leaves the water safe to drink, cook with, and bathe in. These bucket systems have been distributed throughout Haiti and are very effective. A major benefit of this system is that it is a one bucket system. With only one bucket needed, more families receive buckets and have access to clean water. The following image, Figure 11, is of a Gayden Dlo bucket and the solution next to it. The second picture, Figure 12, is of 225 gallons of the Gayden Dlo solution, which is manufactured in Haiti and ready to be distributed to those who have the Gayden Dlo bucket.



Figure 11: Gadyen Dlo System and Solution (Source: Ritter, 2011)



Figure 12: 225 Gallons of Gadyen Dlo (Source: Deep Springs International [DSI], 2011a)

Additionally, these systems are relatively inexpensive at 10 dollars per bucket. A group that utilizes the efforts of Gadyen Dlo is Deep Springs International [DSI]. This group understands another benefit of this type of system: the required maintenance and replenishing of supplies. This constant need supplies local people with lasting jobs and creates an amount of solidarity.

The Haitian people are helping each other to prevent the spread of disease through this on-going system. DSI has a program that consists of several stages that support this process. (DSI, 2011b; DSI, 2011c)

The first step of this program is education. As mentioned earlier, education is the most important and influential factor. Without an educated group of people, the program fails. (DSI, 2011d) The second step is based off of DSI's Gadyen Dlo business model and is titled expansion strategies, which is broken down further into three different methods: positive deviance, non-governmental organization (NGO) partnering, and relief aid. Positive deviance is based off of the idea that the community has the solution to their problems, that they are the best people to solve their problems, and through a structured organization and collaborative thinking, the people of the community can create social or behavior change to improve the community and maintain that change. NGO partnering is centered around using pre-established health related organizations and incorporating DSI's Gadyen Dlo model of locally-produced water purification systems into the programs. Relief aid is the collective focus of attention on the areas of tragedy and need during a time of disaster and putting DSI's resources towards that great need. An example of this would be the 2010 earthquake and the desperate need for clean water for drinking purposes as well as medical purposes. (DSI, 2011e)

The third stage is transitioning from aid to independence. Since Gadyen Dlo is produced locally, DSI ensures the communities to receive the largest amount of potential health and economic impact created by the safe water through the access to clean water and the establishment of some employment opportunities in the community through the technicians' positions. The idea behind this stage is for the community to function with the Gadyen Dlo systems in place with little control by DSI. At this stage, the community is self-sustaining while

DSI monitors from a distance and provides advice when needed to make sure the model continues to work for the community. If a problem arises, DSI comes back in at a previous stage of the model. (DSI, 2011f) The fourth stage is sustainable enterprise. This, being the final stage, is the ultimate goal of the entire program. The ideal objective is for the community to thrive in the model and to independently manage and operate the systems throughout the countryside of Haiti. This ensures self-sustainability and solidarity within the newly empowered community. (DSI, 2011g)

Haiti Connection at EIU Newman Catholic Center

There are many different programs and organizations created to help provide assistance to the poor and those in need; some are designed to help one location in particular, like Haiti. Some of these larger organizations include Partners In Health, Deep Springs International, and Yele Haiti; however, there are many small programs that can do a phenomenal amount of work with a place in need, like the Haiti Connection at the Newman Catholic Center at Eastern Illinois University. The Haiti Connection at Eastern has been directly involved in a few rural communities in Haiti for twenty years. The organization has a variety of subcommittees that deal directly in Haiti: a school sponsorship program; reforestation program; Fonkoze program dealing with micro-credit and literacy; the Espwa pou Demen, which translates to “Hope for Tomorrow”, program working with individual families through a plan that incorporates all programs offered by the Haiti Connection; and a clean water program. (Haiti Connection, 2011)

With the clean water program, the Haiti Connection originally supplied Haitians with two bucket systems through Gift of Water, but in fall 2009, moved for a contract with Deep Springs International, who supply one bucket systems. The Haiti Connection purchases the buckets and

distributes them in areas that the group has direct contact with. The main location of the Haiti Connection's correspondence and efforts is in Barassa, in the South East corner of the country near the boarder between Haiti and the Dominican Republic but also includes Gwo Mon. Since the start of the cholera outbreak, there have not any confirmed cases of cholera in any of the areas that the Haiti Connection works with. Along with the 1,585 buckets previously purchased by the Haiti Connection, the CDC became aware of the efforts of the Haiti Connection and their effectiveness and in September 2011, the CDC donated 1,039 buckets for further distribution to ensure that more people have access to clean water. (Haiti Connection, 2011)

The reasons for the effectiveness of the Haiti Connection's efforts towards clean water are due to the education provided to the communities on how to use and care for the systems and due to the continual maintenance by hired technicians of all the systems purchased. To purchase the DSI bucket systems and to make their use effective, the employment of technicians are required as based off of the first option of the second step of DSI's model: positive deviance. Currently, the Haiti Connection pays the salary of four technicians who have been hired to travel from location to location, fixing systems and replacing needed supplies. Eight years ago in 2003, three technicians were originally hired. Since then, one technician had died of old age in his 40's and two years ago in 2009, two additional technicians were hired. Every three months, 900 dollars per technician are sent to Haiti for the four technicians' salaries. (Haiti Connection, 2011)

Since having started the program, the Haiti Connection has paid 49,200 U.S. dollars towards the technicians' training fees and monthly pay of 100 dollars per month per technician for the past 10 years. The amount spent on the original two bucket systems was 20,000 dollars while the total amount spent on the one bucket filtration systems was 15,000 dollars. Each one

bucket system costs 10 U.S. dollars to purchase. Start-up costs added up to 8,600 dollars, which consisted of the fee to Gift of Water at 5,000 dollars and the fee to Gayden Dlo at 3,600 dollars. The Haiti Connection has put a total of 92,000 dollars towards providing access to clean water in Haiti and providing jobs for the technicians. (Haiti Connection, 2011)

Summary

Access to clean water is necessary, yet is lacking in some areas of the world, like Haiti. Being in a location that makes the country prone to multiple natural disasters and having a large history of tragic disasters occur, clean water is imperative. Due to this lack of clean water in Haiti, infectious diseases and other illnesses are prone to become widespread and have the potential to become epidemics, like the current cholera epidemic. While permanent and advanced water and sewage treatment facilities are necessary, there are many immediate ways to combat this problem: water purification systems. There are many different types of systems that make water safe to use for everyday purposes. The use of these systems also creates jobs for the community and allows Haitians to work in solidarity. Having access to clean water is the most important factor that will contribute to the overall health for the individual as well as for the community. Clean water is a necessary preventative measure against the spread of disease as well as against the onset of disease. Access to clean water is the simplest, yet most lifesaving thing a person can have and it is something that everyone deserves.

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Definitions

Chlorine- halogen element used for water purification (Dictionary.com, LLC., 2011a)

Fontanelle- one of the spaces which is covered by membrane, between the bones in the skull of a fetus or young child (Dictionary.com, LLC., 2011b)

François Duvalier- Haitian president from 1957 until 1971 and father to Jean-Claude Duvalier (Arthur, 2007)

Fecal Matter- a solid excretory product evacuated from the large intestine (Dictionary.com, LLC., 2011c)

Gastrointestinal Tract- the section of the digestive system consisting of the stomach, small intestine, and large intestine (Dictionary.com, LLC., 2011d)

Hispaniola- island in the Caribbean Sea and Atlantic Ocean that is made up of Haiti on the west and the Dominican Republic on the east (Arthur, 2007)

Jaundice- yellow discoloration of the skin and whites of the eyes due to an increase of bile pigments in the blood (Dictionary.com, LLC., 2011e)

Jean-Bertand Aristide- Haitian Catholic priest and president from February 7 until September 29, 1991, October 12, 1994 until February 7, 1996, and February 7, 2001 until February 29, 2004 (Arthur, 2007)

Jean-Claude Duvalier- Haitian president from 1971 until 1986 and son of François Duvalier (Arthur, 2007)

Jean-Jacques Dessalines- founding father of independent Republic of Haiti who led the Haitian people until his assassination (Arthur, 2007)

La Isla Española- the island claimed by Christopher Columbus for Spain- translated to “The Spanish Island”. Currently known as Hispaniola (Arthur, 2007)

Lavalas- “flood” or “avalanche” in Creole; name of the Aristide campaign, and political parties: Lavalas Party and Lavalas Family (Arthur, 2007)

Literate- possessing the ability to read and write (Dictionary.com, LLC., 2011f)

Mercenary- person who works for money or a reward (Dictionary.com, LLC., 2011g)

Milieu- social and cultural surroundings (Dictionary.com, LLC., 2011h)

Mulatto- term referring to a person of both African and European descent- term has never been regarded as offensive in Haiti (Arthur, 2007)

Napoleon Bonaparte- French emperor and tyrant who attempted to take control of the world (Dictionary.com, LLC., 2011i)

Nausea- an ill feeling related to the stomach accompanied by the impulsive urge to vomit (Dictionary.com, LLC., 2011j)

Pathophysiology- the study of changes to the functioning of a body due to disease or injury (Dictionary.com, LLC., 2011k)

Saint Domingue- western portion of La Isla Española that was claimed and renamed by the French. Currently known as The Republic of Haiti (Arthur, 2007)

Santo Domingo- eastern portion of La Isla Española that was claimed by the Spanish. Currently known as The Dominican Republic (Arthur, 2007)

Tainos- original inhabitants of La Isla Española (Arthur, 2007)

Toussaint L'Ouverture- leader of the back army who led the slaves to victory against the Spanish and later became governor of Hispaniola but was captured, imprisoned, and starved until his death (Arthur, 2007)

Voodoo- Haitian religious system based off of various African religious beliefs and influenced by Roman Catholicism (Arthur, 2007)