

INTRODUCTION

Haiti and the Dominican Republic share the island of Hispaniola, and therefore have a similar risk of experiencing natural hazards, unpredictable weather, and other phenomena increasing as a result of climate change. Yet due to sociopolitical factors, which have led the two countries to different points in terms of their development and access to resources, Haiti is at significantly higher climate risk. Few studies have compared the two countries' ability to adapt to rising temperatures and accommodate the resulting impacts, including food insecurity, increasing rate and force of natural disasters, and a higher rate of infectious diseases. This project compares the nations' ability to accommodate such impacts of climate change to contribute to our understanding of how it is not just natural forces, but also human ones, that promote either vulnerability or resilience in the face of a changing climate. Exploring the causes of these distinctions, and considering how these problems could be solved by locally-created and collaborative interventions, is essential to mitigate the disastrous effects that climate will have on Hispaniola, and particularly in Haiti.

FOOD INSECURITY

While rising global food prices and changing climatic patterns in the tropics contribute to food insecurity in Hispaniola, other factors help explain why Haiti is more at risk than the DR. Most importantly, Haiti is significantly more deforested. Deforestation and soil degradation have substantially harmed crop yields, furthering agricultural losses already impacted by unpredictable.

Deforestation on Hispaniola began with colonial plantations. Once Haiti gained independence, France demanded payment to recognize Haiti as a sovereign nation, so Haiti continued deforestation to raise funds. After paying off its debt, Haiti remained dependent on charcoal and firewood as fuel, and still largely is today. While 25% of Haiti remained forested in 1950, now the number is closer to 4%. Fewer trees causes eroded soil, which in turn is easily washed away, leading to a decline in arable land. Despite this, Haiti has shown modest improvement in agricultural, increasing its output of milk, meat, fish by over 50% since 1990. But most households cannot afford such nutrient-rich foods, leading to widespread deficiency and stunting, which is currently 21.8%.

In the DR, which did not face the same debilitating debt, deforestation was reversed in the 1980s, when forested land reached 41%. Reforestation efforts have brought tree coverage up to 41%. This investment in environmental protection has allowed for more agricultural growth: the country now has the most prosperous agricultural sector in the Caribbean. It doubled its food production in 30 years — with staples like milk and meat, as well as produce crops for exportation. Yet, the country is still heavily dependent upon imports of cereals, and has a net trade deficit of 598 USD million annually. Overall, however, it is faring better than Haiti: rates of stunting have decreased steadily in the DR, and today the prevalence is only 6.9%.

NATURAL DISASTER PREPAREDNESS & RESPONSE

As island nations in the Caribbean, Haiti and the DR regularly face extreme weather, and with a changing climate, rates are increasing. Haiti has experienced more natural disasters than the DR, and death rates astronomically higher — not because of exposure to natural events, but human impact. However, there are similarities: both countries lack adequate disaster preparedness, and their citizens rely on community solidarity during disasters, as they do not trust their government. In the DR, most children are not taught disaster preparedness in school, and a lack of state-backed disaster preparedness has led most adults to refuse cooperation if asked to evacuate. Another concern is the inadequate early warning system for hurricanes and flash floods: everyone interviewed thought early warning systems were dysfunctional.

In Haiti, Hurricane Matthew exemplified how lacking the country's existing early warning system is. Official messages only reached towns and nearby rural areas, leaving many mountainous communities with no warning. Some farmers reported they heard radio broadcasted warnings two days prior to the storm's landfall in Haiti, telling them to seek shelter for people and livestock, avoid rivers, and stockpile food — impossible tasks given their lack of time and resources.

One important difference sets Haiti further behind: urban slums in its overcrowded capital Port-au-Prince. Due to dysfunctional land tenure systems and nonexistent building codes or regulatory measures, many residents have little choice but to build their own constructed shantytowns without drainage systems. Moreover, many informal settlements have been constructed on steep hillsides with loose topsoil due to advanced soil degradation, leaving the more vulnerable to floodwaters.



SOLUTIONS

While this project was by no means an exhaustive exploration of all factors that contribute to climate change-related disparities between Haiti and the DR, the three issues studied — food security and environmental degradation, natural disaster preparedness and response, and burden of disease and health care access — were chosen as they represent major concerns for the island, and in many cases more so in Haiti. The interconnectedness of the three issues also demonstrates that, while left alone, they will exacerbate one another, they can also all be mitigated when a solution to any one problem is implemented. Considering locally-created and collaborative solutions to these problems should help both communities, as their health and resilience are inextricably linked. Moreover, such actions could not only help elevate Haiti to the level of the DR, and thus strengthen the resilience of the island as a whole (rather than expose the DR to some of the same concerns Haiti faces, such as the infectious disease burden), it could also help repair the long-broken relationship between the two countries. My hope is that this project can contribute in some way to help resolve the asymmetries between the countries' levels of preparedness to accommodate new challenges as climate change continues to endanger us all.

ACKNOWLEDGEMENTS

I am grateful to Dr. Bonnie Kaiser and my classmates for providing me with valuable input throughout the research, writing, and presenting stages of this thesis.

DISEASE BURDEN

Water- and vector-borne diseases are likely to increase as our planet warms. With water security a concern for many Caribbean nations as their rainfall patterns become unpredictable, residents have taken to storing water in large containers, ideal breeding grounds for mosquito larvae, as well as water-borne disease. Two cases illustrate how Haiti and the DR are differentially prepared to address these challenges: malaria and cholera.

Hispaniola is the only Caribbean island with endemic malaria, and Haiti has 97% of the island's cases. While transmission rates in the DR have been decreasing, in Haiti, barriers to adequate malaria treatment have prevented the same decline. One is the lack of knowledge about malaria: one study found that only one third of interviewees had heard of malaria, and most did not consider it an important health issue. Moreover, protective equipment offered is expensive and only partially effective. Overcrowded cities with poor sanitation can contribute to a high burden of water-borne diseases like cholera. Such conditions caused a cholera outbreak in 2010, introduced to Haiti by UN Peacekeepers. The Haitian community — only months following the earthquake — was ill prepared to accommodate such an outbreak, leading to the rapid spread of cholera. Within a month, 643 people had died and 10,000 had been hospitalized; as of 2018, the numbers were 9,786 and 819,000, respectively. When cholera reached the DR, existing anti-Haitian sentiments were exacerbated, as Haitians were considered dirtier and lacking proper hygiene. Public health campaigns to prevent cholera placed responsibility on the individual by encouraging hand-washing and using purified water. Haitian immigrants pointed out that they did not have access to clean water: because most Haitian immigrants were poor, they could only access canal water.

REFERENCES

Agbedahin, Komlan. "The Haiti Cholera Outbreak and Peacekeeping Paradoxes." *Peace Review* 31, no. 2 (April 3, 2019): 190-98.

Alscher, Stefan. "Environmental Degradation and Migration on Hispaniola Island: Unequal Neighbours with Similar Challenges." *International Migration* 49 (June 2011): e164-88.

Carmalt, Jean. "Prioritizing Health: A Human Rights Analysis of Disaster, Vulnerability, and Urbanization in New Orleans and Port-Au-Prince." *NUMBER*, 2014, 13.

Chadee, David D., and Raymond Martinez. "Aedes Aegypti (L.) in Latin American and Caribbean Region: With Growing Evidence for Vector Adaptation to Climate Change?" *Acta Tropica* 156 (April 2016): 137-43.

Cunze, Sarah, Judith Kochmann, Lisa K. Koch, Elisa Gentner, and Sven Klimpel. "Vector Distribution and Transmission Risk of the Zika Virus in South and Central America." *PeerJ* 7 (November 7, 2019): e7920.

Druetz, Thomas, Katherine Andriopoulos, Louis-Marie Boulos, Michaele Boulos, Gregory S. Nolan, Lucienne Desir, Jean-Franz Lemoine, and Thomas P. Eisele. "Wherever Doctors Cannot Reach, the Sunshine Can: Overcoming Potential Barriers to Malaria Elimination Interventions in Haiti." *Malaria Journal* 17, no. 1 (December 2018): 393.

Eckstein, David, Maik Winges, Vera Künzel, Laura Schäfer, and Germanwatch. *Global Climate Risk Index 2020 Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2018 and 1999 to 2018*, 2019.

Flores-Quispe, María del Pilar, María Clara Restrepo-Méndez, María Fátima S. Maia, Leonardo Z. Ferreira, and Fernando C. Wehmeister. "Trends in Socioeconomic Inequalities in Stunting Prevalence in Latin America and the Caribbean Countries: Differences between Quintiles and Deciles." *International Journal for Equity in Health* 18, no. 1 (December 2019): 156.

Herrera, Sócrates, Sergio Andrés Ochoa-Orozco, Iveth J. González, Lucrecia Peinado, Martha L. Quiñones, and Myriam Arévalo-Herrera. "Prospects for Malaria Elimination in Mesoamerica and Hispaniola." Edited by David Joseph Diemert. *PLOS Neglected Tropical Diseases* 9, no. 5 (May 14, 2015): e0003700.

Keys, Hunter M., Bonnie N. Kaiser, Jenny W. Foster, Matthew C. Freeman, Rob Stephenson, Andrea J. Lund, and Brandon A. Kohrt. "Cholera Control and Anti-Haitian Stigma in the Dominican Republic: From Migration Policy to Lived Experience." *Anthropology & Medicine* 26, no. 2 (May 4, 2019): 123-41.

Macpherson, Cheryl C., and Muge Akpinar-Elci. "Caribbean Heat Threatens Health, Well-Being and the Future of Humanity: Table 1." *Public Health Ethics* 8, no. 2 (July 2015): 196-208.

Marcellin, Louis Hens, Toni Cela, and James M. Shultz. "Haiti and the Politics of Governance and Community Responses to Hurricane Matthew." *Global Health* 3, no. 4 (October 2016): 151-61.

Mazzeo, John. "Laviche: Haiti's Vulnerability to the Global Food Crisis." *NAPA Bulletin* 32, no. 1 (December 1, 2009): 115-29.

Meyer, Carrie A. "Farming in the Spanish Caribbean: Rural Identity, Culture, and Food Production in the Dominican Republic, Haiti, and Cuba." *SSRN Electronic Journal*, 2019.

Paule, Elise, Malek Batai, Yves Phillaire, Rosanne Blanchet, and Dia Sanou. "Determinants of Diet Quality among Rural Households in an Intervention Zone of Grande Anse, Haiti." *Food Security* 8, no. 6 (December 2016): 1123-34.

Pichler, Adelheid, and Erich Striessnig. "Differential Vulnerability to Hurricanes in Cuba, Haiti, and the Dominican Republic: The Contribution of Education." *Ecology and Society* 18, no. 3 (2013): art31.

Rubin, Oliver, and Tine Rossing. "National and Local Vulnerability to Climate-Related Disasters in Latin America: The Role of Social Asset-Based Adaptation." *Bulletin of Latin American Research* 11, no. 1 (January 2012): 19-35.

Singh, Bhawati, and Marc Cohen. "Climate Change Resilience: The Case of Haiti." *Oxfam Research Reports*, March 2014.

Thomas, Alice. "Field Report: Haiti Still Reeling From Hurricane Matthew." *Refugees International: A Powerful Voice for Lifesaving Action*, April 2017.

Winchester, Lucy, and Raquel Szlachman. "The Urban Poor's Vulnerability to Climate Change in Latin America and the Caribbean." *Cities and Climate Change: Fifth Research Symposium* (2009).