

Water Security in Haiti: Do National Stakeholders Consider Water and Sanitation as a Priority in Development?

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ABSTRACT

National Stakeholders play an important role in ameliorating social issues within a given community. Their perception may determine whether a specific issue will be addressed. Therefore, this study aimed to assess the consideration that national stakeholders have towards water insecurity in Haiti. The data was drawn from a survey carried out by the World Bank Group in Haiti in 2018. This survey was part of their Country Survey Opinion Program (WBG 2018) in which they measure and trace stakeholders, partners, and clients' perceptions of countries where the World Bank supports development activities. A sample of 134 statistical units were selected across the country. Descriptive and inferential statistics were used to analyze data. Findings show little statistical relationship between the chosen dependent (Water and Sanitation Priority, Health Priority, Poverty Reduction Priority, and Government Coordination) and the independent variables. Most respondents do not consider water and sanitation, health, and poverty issues as priorities in development. Also, most respondents consider the lack of government coordination as an impediment to development. The stakeholder theory supports the fact that Haitian National Stakeholders should consider, intervene in, and implement policy to address these issues in Haiti. Although donors continue to operate and government ministries continue to function, security issues constrain policy implementation and the improvement of drinking water in Haiti.

Keywords: water security, stakeholder priorities.

INTRODUCTION

Background

United Nations Resolution 64/292 recognized access to safe and clean drinking water and sanitation (WASH) as a human right in 2003. The human right to water entitles everyone to

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sufficient, safe, acceptable, physically accessible, and affordable water for personal and domestic use. The human-rights-based approach guides development actors and governments on how to direct their operations to implement human-rights standards and principles (Borja-Vega et al., 2022).

Water security is an individual's capacity to access sufficient and safe water (Miller et al., 2020). Conversely, water insecurity refers to uncertainty about the quantity or quality of water available for human consumption. Secure and reliable water supplies should contribute to a healthy and productive life (Webb & Iskandarani, 1998). Water and sanitation are closely related, but this study focuses on water supply and distribution as a focal human need. National leaders or stakeholders are the segment of the society who must initiate and sustain the infrastructure, human resources, and process that ensure water security for the community (Friedman & Miles, 2006).

The notion of stakeholders is a milder conception that addresses the network of civilian administrators, managers, and other who shape policy and programs in a society, illustrated most directly in Haiti. The broad role of national stakeholders in alleviating water insecurity is a central concern.

Water security is comparable to other integral human rights, such as the right to life, education, health, and housing (Gleick, 1998). Accordingly, the requirements of adequacy, accessibility, assurance, and affordability should be met for a population to be water-secure (Cashman, 2014). Adequacy refers to efficient water availability governance that provides sufficient safe water to households and communities. Accessibility implies the wide availability of water without any limitation. Assurance refers to the resilience of water infrastructure against natural disasters and contamination. Lastly, affordability addresses economic barriers preventing households from paying water service fees (Cashman, 2014). These criteria are expected to be met when stakeholders or national leaders perceive water and sanitation as important issues (Chen et al., 2015).

Water as a Foundational Aspect of Community Life

Water is consistently used for daily activities. Because of the increasing population around the world, high withdrawal for industrial and agricultural activities, and urban expansion, water availability and accessibility are becoming major concerns (Webb & Iskandarani, 1998). The UN Security Council anticipates that increased water insecurity may lead to social conflict and unrest (Cashman, 2014). Water insecurity is an urgent issue that needs to be addressed (Webb & Iskandarani, 1998).

Water insecurity affects mental health by increasing anxiety and stress over the process of obtaining water and doubts over its safety (Brewis et al., 2019). Also, water insecurity increases disease risks such as cholera and mosquito borne. Cholera is caused by the ingestion of water or food contaminated with a bacterium called *Vibrio cholerae* that contaminates drinking water due to poor sanitation. On the other hand, mosquito-borne diseases occur due to proliferation of mosquitos from water storage for domestic use or in small waterbodies for agricultural purposes, especially in developing countries (Adams et al., 2020).

Water insecurity in the Caribbean Region is not always due to insufficient water resources. Groundwater is plentiful in most countries, most of the time. When there are shortages or quality problems, they are due to institutional and management failures (Cashman, 2014). Even though these issues are not the same in all countries, they often stem from weak policies that regulate water provision. Supply and quality are often compromised without a body of enforced laws and followed policies that encompass water management (Akhmouch, 2012).

In most Caribbean countries, institutions with responsibilities for making policies and managing water systems are weak and often inconsistent (Jha, 2005). High and heterogeneous costs are another burden that exacerbates water accessibility. It is the responsibility of politicians and elites, law, legislation, and, policies, to ensure the performance of public and private water providers (Jha, 2005).

Secondly, weak institutions affect the management of water provision and quality. Insufficient staff, and inattentive leadership cause water systems to underperform and fail. In that sense, demand and supply are largely compromised due to deficient management. Also, poorly-trained staff often compromise water operations due to lax maintenance or poor technical decisions (Cashman, 2014). Power disruptions reduce water pressure and otherwise contribute to irregular and sometimes unsafe water delivery to households.

Lastly, a lack of investments to extend and improve aging infrastructure, and update technology often fuels water insecurity (Biswas, 2008). As a consequence, limited sanitation infrastructure and long distances to water sources represent major obstacles that exacerbate water insecurity (Martinez, 2019). Haiti is an extreme example of these critical situations.

Haitian Water Situation

Borja-Vega, Grabinsky, and Kløve (2022:9) examine Haiti as a case study of water service failure. The National Directorate for Drinking Water and Sanitation (Direction Nationale de l'Eau Potable et de l'Assainissement, DINEPA) is Haiti's central governance body. It leads policy formulation, sector coordination, and the regulation of the country's agenda. The four regional agencies of DINEPA, are called regional bureaus of water and sanitation (offices region aux de l'eau potable et de l'assainissement (OREPA). The four OREPA support local water committees (CAEPA), which in turn support rural systems through rural-development units (URD), one per province, and two community water and sanitation technicians (TEPAC) per commune (Borja-Vega et al., 2022). Commune is the third-level divisions in Haiti and there are 145 communes. Haiti has experienced a series of failures in its water service delivery. Access to improved drinking-water sources decreased by 4 percent between 1990 and 2015. This situation is aggravated after the earthquake that affect water systems and sanitations in 2010 (Widmer et al., 2014). Moreover, water utilities are struggling to manage urban-population growth, and households distrust the quality of public water (Borja-Vega et al., 2022).

For example, in 2012 around 55 percent of the Port-au-Prince metropolitan population had access to a public water network, but just 28 percent used it as their main drinking source. Furthermore, many water systems are managed by a poorly performing water provider, and a substantial portion of them are non-operational and lack chlorination services (Borja-Vega et

al., 2022). Moreover, only 28 percent of households in the country have access to improved sanitation, and almost all households in Port-au-Prince rely on non-network sanitation (Borja-Vega et al., 2022).

Haitians access drinking water in myriad ways, as municipal water systems often do not exist or function to meet the needs of the human population. Despite its many obstacles, alleviation of water insecurity is a clear path to improved health and well-being. In 2010, 85% of the urban population had access to an improved water source, but only 51% of the rural population had access to an improved water source (Gelting et al., 2013). The stark disparity in terms of access to improved water sources between rural and urban areas also applies to sanitation. Only 24 % of the urban population and 10 % of the rural population had such access (Gelting et al., 2013).

Table 1: Five service dimensions necessary to guarantee that water and sanitation are delivered and preserved as a human right (Borja-Vega et al. 2022).

Dimension	Definition
Availability	The supply of water shall be sufficient and continuous for personal and domestic uses, including quality, adequacy for drinking and food preparation, personal hygiene, washing of clothes, cleaning and other aspects of domestic hygiene
Accessibility	Water and sanitation facilities must be located or constructed such as that they are accessible to everyone at all times. Accessibility to sanitation entails facilities that reduce safety risks for all users, especially women and girls.
Quality and safety	Water delivered shall meet quality standards for human consumption and for personal and domestic hygiene. This implies that water must be free from microorganisms, chemical substances and radiological hazards that constitute a threat to a person's health over a lifetime of consumption. Sanitation facilities shall also be safe to use and prevent contact between people and human excreta.
Acceptability	Water and sanitation facilities must meet social or cultural norms from a user's perspective, for example, regarding the odor or color of drinking water, or the privacy of sanitation facilities. In most cultures, gender-specific sanitation facilities will be required in public spaces and institutions
Affordability	Individual and household expenditure on water and sanitation services, as well as associated hygiene, must be affordable for people without forcing them to resort to other unsafe alternatives and/or limiting their capacity to acquire other basic goods and services (such as food, housing, or education) guaranteed by other human rights.

From 2008 to 2010, the disparities in Haitian water and sanitation between rural and urban areas increased considerably (Gelting et al., 2013). To cope with this situation, there is a substantial proliferation of kiosks (small neighborhood water vendors) that the private sector in Haiti developed after the 2010 earthquake and the subsequent outbreak of cholera (Patrick et al., 2017).

Kiosks typically use reverse osmosis method and sell treated water in one- or five-gallon volumes (Patrick et al., 2017). Some kiosks treat water onsite, others dispense water delivered in bulk from central treatment sites. However, the quality of the water (Lungová, 2015), and

the number of kiosks are unknown (Patrick et al., 2017). Drinking water from kiosks is one way to access potable water with some confidence over water from other sources. Haitians also use public taps, bottled water, captured rainfall, wells, natural springs, and rivers (Colindres et al., 2007). Many substantial health issues stem from the lack of potable water and sanitation (Tappero & Tauxe, 2011).

Considering the groundwater situation in Haiti, the problem of water availability is underappreciated. Haiti's groundwater resource renewal is greater than 2 billion cubic meters per year and has 56 billion cubic meters of reserves (Adamson et al., 2016). The last mile of the water supply is often the most underdeveloped and uncertain.

Haiti's water management and supply agencies are underfunded and weakly managed (Stoa, 2017). That limits water security for vulnerable households. Water insecurity in households reflects a lack of governance in the country as reflected in often weak and always underfunded institutions (Miller et al., 2020). Conflicting institutional roles and policies foster inadequate management of water resources (Martinez, 2019). Haiti has numerous institutions with water management in their mandate, either for agriculture, industry, or domestic consumption (Stoa, 2017), but their efforts often overlap and conflict. However, water problems persist in the face of unwillingness and lack of priority to address the many needs. Efforts to alleviate water insecurity should first, address policies and institutional issues that stakeholders can address to alleviate water insecurity.

Importance of Stakeholder Perceptions

In terms of water management and access to good quality and affordably priced water, Haitians are the most underserved population in the Western Hemisphere (Gelting et al., 2013). Since water insecurity and poverty are positively related (Nounkeu et al., 2021), the Haitian population is at high risk.

Without a shared perception by national stakeholders that water issues are a priority of development, the situation will persist in Haiti. Downstream users in Haiti have little recourse to influence national policies. Even if donors, such as the World Bank, are implementing projects to ameliorate water issues in Haiti, national leader engagement is the key that leads to effective results.

For example, in the early 1980s in India, policies regarding charging water users were not put into effect because officials of the Indian Government did not perceive them as a priority of development, despite the World Bank's wish to support them (Thomas & Grindle, 1990). National leaders in most developing countries are not fully supportive of anti-poverty policies (Hossain & Moore, 2002). From this statement, it becomes evident that national leader perceptions and priorities matter in ameliorating water issues. Therefore, alleviating of water insecurity in Haiti might be first a matter of how national leaders perceive it. This study seeks to explore and clarify Haitian national leaders' perceptions and priorities concerning household drinking water.

In this study, data from the World Bank Group survey is used to answer the research questions, the survey collected data regarding how national leaders, called Stakeholders perceive development issues in Haiti. Stakeholders include the multiple institutional partners who work with the World Bank Group to plan, fund, and sustain the provision of good services to their communities (Felzer, 2018). Multi-stakeholder engagement is critical for making progress towards Sustainable Development Goals (SDG). Ensure access to water and sanitation for all, which is currently off track to be achieved by 2030 (Dickin et al., 2022). In countries with active multi-stakeholder platforms, these have enabled coordination, and the development of networks among stakeholders and have influenced policy-making and implementation. Thus, the perceptions and priorities of water stakeholders are key aspects of achieving sustainable development goals.

Research Objectives

The objective of the study is to analyze how stakeholders perceive water insecurity in Haiti and the priority they ascribe to the water and sanitation sector.

The specific objectives are:

1. Identify household water insecurity as an often-neglected aspect of development.
2. Develop a conceptual framework regarding household water insecurity, governance, and drinking water management.
3. Measure the importance that Haitian stakeholders ascribe to water and sanitation issues.
4. Anticipate ways to enhance the priority Haitian national leaders pay to water insecurity.

METHOD

Study Area

The Republic of Haiti is part of Hispaniola Island, in the Caribbean region. Haiti shares this island with the Dominican Republic, which is its eastern border, on a total area of 27,750 Square Kilometers. To the north, Haiti is bordered by the Atlantic Ocean, to the west by the Windward passage, and the south by the Caribbean Sea. The Haitian population is entirely descended from African people who were brought to the Island for slavery purposes by France. In 2022, the population is estimated at 12,080,000 inhabitants that are dispersed over 10 main administrative areas called "Department": North, West, South, Center, Northeast, Northwest, Southeast, Grand'Anse, Nippes, and Artibonite. However, Port-au-Prince, the capital, is the most populated city. Since it hosts all Ministries. Governance strategies and major economic and political decisions are designed and taken from there.

In terms of governance, Haiti is characterized by excessive political instability, environmental issues, poverty, and food and water insecurity over the centuries. Besides the tragic earthquake that killed thousands of people in Port-au-Prince in 2010, Haiti is beset by hurricanes that cause flooding, agricultural loss, and human loss. NGOs and international institutions like the World Bank often support and invest in humanitarian projects after natural disasters. Therefore, the Haitian Government has a long history of collaborating with NGOs and international institutions. They work closely to help improve social and economic resiliency in Haiti.

Data

The World Bank Group conducted a survey in Haïti as part of their Country Survey Opinion Program (WBG 2018). The survey program aims to systematically measure and trace stakeholders, partners, and clients' perceptions of countries where the World Bank supports development activities. In 2018, this survey was conducted in 42 countries including Haïti. The effort aims to gather perceptions and feedback regarding World Bank Group activities in each country. Officials and managers in government ministries, multilateral/bilateral agencies, media, academia, the private sector, and civil society in Haiti are asked to provide systematic answers on:

- Viewpoints about the general environment of the country
- Positions towards the world bank group in Haïti
- Perceptions regarding the effectiveness of the World Bank
- Anticipated ideas regarding the World Bank's future programs in Haïti

As part of this study, the section regarding general issues that Haïti faces aligns with the goals of the study. This is subdivided into different questions related to Haiti's fragility and sectors considered as a priority of development with variables such as water and sanitation, public services, local governance and institutions, food security, policy inconsistency, weak institutional capacity, and levels of corruption. The overall survey contains 447 variables and 134 cases. Depending on the type of question, answers are coded into binary variables (0, 1).

Sample Characteristics

The sample of 478 positional leaders was contacted in multiple ways over a 4-month period, from April to July 2018. They purposively selected sample included members of the Office of the President, Prime Minister; office of a Minister; office of a Parliamentarian; ministries/ministerial departments/implementation agencies; Project Management Units (PMUs) overseeing the implementation of WBG projects; consultants/ contractors working on WBG-supported projects/programs; local governments; bilateral and multilateral agencies; private sector organizations; private foundations; the financial sector/ private banks; local NGOs and community-based organizations; international NGOs; the media; independent government institutions; Trade Unions; faith-based groups; youth groups; academia/research institutes/think tanks; the judiciary branch; and other organizations (Felzer, 2018).

The data collection process contacted individuals via post, face-to-face interview, and online Qualtrics. The resulting N of 134 represents a response rate of 28% from the 473 contacted stakeholders. About 87% are from Port-au-Prince, 5 % are from Cap-Haitian, and 9% are from other localities.

About 18% of respondents were employees of a Ministry or Governmental Agency; less than 1 % were from a Private Bank, local NGO, youth group, or Trade Union. The data represent a cross-section of positional leaders across sectors of society, government, and the economy. The results examine the perceptions and sentiments toward drinking water in Haiti.

Measures

Four dependent variables assess the centrality of various aspects of water for human consumption among Haitian development stakeholders. The sections below describe the survey questions, coding, and variables used in the analysis.

Water and Sanitation Priority:

Water and Sanitation is one sector among a list of 36 that was considered a potential priority of devolvment. In the context of the survey, respondents were asked, "Listed below are several development priorities in Haïti. Please, identify which of the following you consider the most important development priorities in Haiti". Respondents were asked to choose three from the given list. The derived variable indicates that Water and Sanitation were one of the respondent's three choices of top development priorities. It is coded 1 if the respondent listed Water and Sanitation as one top development priorities from the extensive list provided. The actual list is provided in an Appendix.

Poverty Reduction Priority:

A second indicator addresses the respondent's perception of water and sanitation's role in poverty reduction. The question was "Poverty reduction is a broad term that encompasses work in many different areas. Which three areas of development listed below do you believe would contribute most to reducing poverty in Haiti?". Respondents could select no more than one choice for this question. The response was coded 1 when a respondent chooses "Water and Sanitation", and 0 when they choose otherwise.

Health Priority:

A third indicator addresses the respondent's perception of health and its role in poverty reduction. The question was "Poverty reduction is a broad term that encompasses work in many different areas. Which three areas of development listed below do you believe would contribute most to reducing poverty in Haiti?", also was asked. Respondents could select no more than one choice for this question. The response was coded 1 when a respondent chose "Health", and 0 when they chose otherwise.

Government Coordination:

Coordination refers to the orderly arrangement of individual and group efforts to ensure unity of action in the realization of common objectives(Keast & Brown, 2002). The question asked was "When the World Bank Group assisted reform efforts to fail or are slow to take place, which of the following would you attribute this to?". Code 1 was assigned when Poor Coordination within the government was indicated as the cause; other responses were coded 0. For this and other dependent variables, missing data were treated as "No" responses.

Independent variables (5) are drawn from the 447 variables of the survey. The table below provides variables and descriptions. They are Age, Gender, Position, Location, and Work Specialization.

Table 2: Description of variables used in the study, Haitian development stakeholders, 2018

Variables	Description of variables
Dependent	
Water and Sanitation Priority	The derived variable indicates that Water and Sanitation were one of the respondent's three choices of top development priorities (1=Yes; 0=No)
Poverty Reduction Priority	Respondent selected Water and Sanitation as a means for reducing poverty (1=Yes; 0=No)
Health Priority	The derived variable indicates that health was one of the respondent's three choices of top development priorities (1=Yes; 0=No)
Government Coordination	Respondents select this reason that reform efforts fail or are slow to take place (1=Yes; 0=No)
Independent	
Location	The concept is represented by two dummy variables Port-au-Prince and Cap-Haitien, 1 = Port-au-Prince and 0=other localities.
Work Specialization <ul style="list-style-type: none"> • Water • Environment and natural resources • Health, nutrition, population, and education • Energy and extractives • Transport and ICT • Governance • Generalist (specialized in multiple sectors) 	The concept represents the substantive sector of employment through a series of dummy variables. Each subsector is coded 1 when is chosen and 0 when it is not. Respondents were allowed to select one work specialization. The different work specializations are below:
Age	Duration of life in years. This variable is coded 1 for respondents under 25 years old, 2 for respondents between 26-35, 3 for respondents between 36-45, 4 for those between 46 and 55, and 5 for those above 56.
Position	Describes the office or organization the respondent is working in. It is coded 1=Public sector and 0=other.
Gender	Respondent gender. This variable is coded 1 for males and 0 for females

Data Analysis

Descriptive statistics such as mode, range, and percentage provide an overview of the distribution of the variables. The preliminary analyses examine distribution of both dependent and independent variables. Nonparametric Kendall Tau correlations portray the relationships among the study variables. Kendall Tau is appropriate because the data structure does not meet the linearity requirement to use the Pearson's correlation. Multiple regression is employed to scrutinize direct and combined effects of the independent variables on the dependent variables.

Model Specification

Ordinary Least Squares (OLS):

OLS is one mean to assess to what degree the predictors of the study can explain the dependent variables. The OLS model is complementary to Pearson's correlation matrix in examining the association between the variables. Moreover, there are assumptions associated to this model such as: linearity of parameters, random sampling of observations, value of zero for the conditional mean, no multicollinearity, no autocorrelation, and normal distribution of error terms. These assumptions, when met together, are referred to as a Best Linear Unbiased Estimator (BLUE) (Ayinde et al., 2012). Therefore, the OLS is not an appropriate model analyze the binary data used in the study, the assumptions are not met.

The model is specified as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \dots X_n) \quad (1)$$

Logistic Regression:

The logistic regression model is used to analyze dichotomous or binary outcomes. Dependent variables may have more than two levels predicted by continuous or categorical predictors. The logistic regression bases on the odds of a 2-level outcome of interest (LaValley, 2008). Unlike the OLS, the logistic regression makes fewer measurement assumptions across the range of predictors (Peng et al., 2002), given that the data were randomly collected (Peng et al., 2002). The regression model does not require linearity and normal distribution. Additionally, the logistic regression is appropriate for the data since it can predict the likelihood of the dependent variables to be chosen. Following is the logit function:

Where:

$$\text{Probability of outcome (Y)} = \frac{e^{x\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \beta_n X_n}}{1 + e^{x\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \beta_n X_n}} \quad (3)$$

- Y_n : The estimated probability of one binary outcome versus the other
- $e^{x\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \beta_n X_n}$: the linear regression equation for independent variables expressed in the logit scale.

Probit Regression Model:

The probit and logit models are similar, except the probit determines a probability function to determine the likelihood of an event to fall into one of a range of categories by estimating the probability that observation with specific features will belong to a particular category (Kumar, 2022). The probit model is not the most appropriate since it best classify observations based on their predicted probabilities. The probit formula is:

$$\Pr(Y = 1|X) = \Phi(b_0 + b_1 X_1 + b_2 X_2 + \dots + b_n X_n) \quad (4)$$

Where:

- Y: represent the dependent variable

- Φ : represents the cumulative standard normal distribution function
- b_0 : the constant term
- $b_1X_1 + b_2X_2 + \dots + b_nX_n$: coefficients and independent variables

Hypothesis Test:

To test the null hypothesis, a confidence level is set at 95% ($p \leq 0.05$). The logistic regression model best fits the characteristics of the data and will be used to test the hypotheses.

RESULTS

Descriptive Analysis

Table 3 presents descriptive statistics for the dependent and independent variables. Water and Sanitation Priority and Poverty Priority have, each, a mean of 0.6. This translates that they have been chosen as a priority of development by 60% of the sample, each. On the other hand, Health Priority is rated by 70%. Almost a third felt that Government that Government Coordination is an impediment to development in Haiti.

The work specialization variables describe the occupational location of the respondents. The subsectors of Work Specialization yield quite different mean values. With a mean value of 0.01, the Health, Nutrition, Population, and Education variables are less represented among respondents. That means only 1% of the respondents work in this sector of activity. Energy and Extractives, Water, Governance, and Environmental and Natural Resources sectors are, respectively, represented with 0.05, 0.06, 0.07, and 0.07 as mean values. Last, the public sector has a proportion of 34% against 66% of the private sector. Meaning that most respondents are from the private sector. With a mean of 0.83, most of the respondents are from Port-au-Prince.

Table 3: Descriptive Statistics for Study Variables, WBG Stakeholder Survey, 2018

Variables	Valid	Missing	Mean	Minimum	Maximum	Response
<i>Dependent</i>						
Water and sanitation priority	127	7	0.6	0	1	1=chosen 0=not chosen
Poverty reduction priority	127	7	0.6	0	1	1=chosen 0=not chosen
Health priority	127	7	0.7	0	1	1=chosen 0=not chosen
Government coordination	122	12	0.32	0	1	1=chosen 0=not chosen
<i>Independent</i>						
Gender	124	10	0.27	0	1	1=male 0=female
Age	125	9	3.75	1	5	1=25 and under, 2=26-35, 3=36-45, 4=46-55, 5=56 and above
<i>Work sector</i>						
Water	134	0	0.06	0	1	1=Yes, 0=No
Environment and natural resources	134	0	0.07	0	1	1=Yes, 0=No
Health, nutrition, population	134	0	0.1	0	1	1=Yes, 0=No
Energy and extractives	134	0	0.05	0	1	1=Yes, 0=No
Transport and ICT	134	0	0.09	0	1	1=Yes, 0=No
Governance	134	0	0.07	0	1	1=Yes, 0=No
Generalist	134	0	0.56	0	1	1=Yes, 0=No

Location	134	0	0.83	0	1	1=Port-au-Prince, 0=Other Localities
Position	134	0	0.34	0	1	1=Public Sector, 0=Other Sectors

Work Sector Categories

Table 4 shows the mean priority assigned to the development issues by participants in each of the work sectors. It shows that choices are quite different and diversified. Some sectors give zero priority to some of the development issues.

According to the table 4, few respondents in work categories pinpointed priorities they think should be considered in a potential economic development plan in Haiti. For instance, Water and Sanitation Priority (WSP) is chosen by solely respondents in 3 work sectors. Health Priority, is not a priority for Energy and Extractives sector participants, nor for respondents in the Governance. Energy and Extractives sector participants give no priority to Poverty Reduction. The Transport sector highly consider that Government Coordination (GC) is an impediment to development, while the Water sector is the lowest.

Table 3: Mean Score of Dependent Variables by Work Sector Category, WBG Stakeholders Survey 2018

Work Sector	Mean Score			
	WSP	HP	PP	GC
Water	0.14	0.29	0.14	0.14
Environment and natural resources	0.22	0	0	0.5
Health, nutrition, population, and Education	0	0.15	0.08	0.42
Energy and extractives	0	0	0	0.33
Transport	0	0.1	0.1	0.64
Governance	0	0	0.13	0.38
Generalist (specialized in multiple sectors)	0.05	0.05	0.05	0.24
Number	127	127	127	127

Correlation Matrix

The correlation matrix examines the strength of association between variables and the direction of this relationship. Kendall Tau correlation is used in the matrix to examine the strength and direction of the relationship between variables in the bottom lower of the triangular matrix.

Based on table 4, few relationships between dependent variables and predictors are identified using Kendall Tau correlation. Considering work categories, positive, negative, and low relationships are yielded. Water sector has a positive correlation with Water Priority and Health Priority of, respectively 0.51 and 0.20 with a significant level at 0.001 (1%) and 0.05 (5%). A positive relationship is also identified between the Environment sector and Water and Sanitation Priority at a 0.05 significant level. Moreover, the Kendall correlation shows low and negative relationship between Generalists and Government Coordination, which is -0.20 at a

significant level 0.05 (5%), whereas it exists low and positive correlation between Transport and Government Coordination.

On the other hand, the correlation matrix yields few relationships between some independent variables. This translates possible multicollinearity between Generalist and Water sector, Environment, Health, Energy, Transport and Governance. These numbers show how the majority of hypothesis of the study are not met.

Table 5: Kendall Tau correlations between Dependent and Independent variables, WBG Stakeholders Survey 2018

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Water and sanitation priority	1														
2. Health priority	0.11	1													
3. Poverty Reduction priority	-0.14	-0.13	1												
4. Government coordination	-0.04	-0.05	.18*	1											
5. Age	-0.1	0	-0.08	-0.16	1										
6. Gender	0.08	-0.01	0.03	0.02	-.21*	1									
7. Water sector	.51**	.20*	0.01	-0.09	-.16*	.21*	1								
8. Environment and natural resources	0.13	-0.08	-0.08	0.12	-0.12	-0.11	-0.07	1							
9. Health, nutrition, population, and education	-0.16	0.11	-0.06	0.07	0.01	-0.01	-0.08	-0.09	1						
10. Energy and extractives	-0.03	-0.07	0.03	0.01	-0.07	0.01	-0.06	-0.07	-0.08	1					
11. Transport	-0.13	0.03	0.09	.21*	0.09	-0.07	-0.08	-0.09	-0.1	-0.07	1				
12. Governance	-0.04	-0.07	0.07	0.03	0.14	-0.03	-0.07	-0.08	-0.09	-0.06	-0.08	1			
13. Generalists	-0.11	-0.07	-0.03	-.20*	0.04	0.02	-.28**	-.32**	-.37**	-.26**	-.35**	-.30**	1		
14. Position	0.12	-0.07	-0.05	-0.17	0.04	-0.03	0.15	0.1	-0.07	-0.1	-0.11	.19*	-0.07	1	
15. Location	-0.08	0.04	-0.08	0.07	-0.06	.18*	-0.05	0.05	-0.05	0.11	0.07	0.04	-0.08	-0.14	1

**, *. Correlation is significant at the 0.001 and 0.05 level (2-tailed)

Regression Analysis

This section presents the equation of the logistic regression model. They analyze the relation between dependents and independent variables. Therefore, the table 5 shows the effect of the independent variables on Water and Sanitation Priority, Health Priority, Poverty Priority, and Government Coordination, using standard errors. Standard errors measure both uncertainty of the logistic regression. Standard errors represent the average distance that the observed values fall from the regression line.

The normal procedure was used to build the regression model. Individual logistic regression models yield different statistical values with different level of significance. Findings shows few significant predictors in the model. In other words, a small number of independents variables have effect on Water and Sanitation Priority, Health Priority, Poverty Priority, and Government Coordination.

Water and Sanitation Priority

The logistic regression model does not show any statistical significance of the standard errors and coefficients. Meaning that dependent variables have no effect on Water and Sanitation Priority. Additionally, standard errors are too far away from the regression line. Therefore, no further interpretation and prediction can be made on Water and Sanitation Priority based on the dependent variables. Consequently, hypothesis formulated in chapter II regarding relation between Water and Sanitation Priority and the dependent variables are not satisfied.

Heath Priority

The logistic model does not show any effect of the independent variables have on Health Priority, except for Water Sector variable. There is no statistical significance of the standard errors and unstandardized Beta coefficients. Water Sector variable is significant at the 0.05 level. Meaning that the dependent variable Water Sector have relationship with Health Priority. The logit explains that 1-point increase of respondent in water sector would increase by 2.55 point the odd ratio to choose Health as apriority of development.

No further interpretation and prediction can be made on Health Priority based on the other dependent variables. Consequently, most hypothesis formulated in chapter II regarding relation between Health Priority and the dependent variables are not satisfied, except for Water sector variable that have relationship with the dependent variable.

Poverty Reduction Priority

The logistic model does not show any effect of the independent variables have on Poverty Reduction Priority, except for Age variable. There is no statistical significance of the unstandardized Beta coefficients. The variable Age is significant at the 0.05 level. Meaning that the dependent variable Age can predict Poverty Reduction Priority. The logit yields explain that 1-point increase in Age would increase by decrease by 0.86 point the odd ratio to choose Poverty Reduction as apriority of development.

No further interpretation and prediction can be made on Poverty Reduction based on the other dependent variables. Consequently, most hypothesis formulated in chapter II regarding relation between Poverty Reduction Priority and the dependent variables are not satisfied, except for the variable Age that have relationship with the dependent variable.

Government Coordination

The logistic model does not show any effect of the independent variables have on Government Coordination, except for Age, Transport, and Position variables. There are few statistical significances of the unstandardized Beta coefficients in the model. The variable Age, Transport, and Position are significant at the 0.05 level. Meaning that these dependent variables Age can predict Government Coordination. The model yields an Omnibus Chi-Square of 20.81, which is significant at the 0.05 level.

Most hypothesis formulated in chapter II regarding relation between Government Coordination and the dependent variables are not satisfied, except for the variable Age, Transport, and Position that have relationship with the dependent variables.

Table 4: Summary of Four Logistic Models Regressing Water and Sanitation Priority, Health Priority, Poverty Reduction Priority, and Government Coordination on independents variables, WBG Stakeholders Survey 2018

	The models							
	WSP		HP		PRP		GC	
Parameter	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error
(Intercept)	-2.63	1.9	-3.54	2.22	1.42	1.88	0.89	1.16
Age	-0.17	0.38	0.11	0.45	0.86*	0.43*	-0.49*	0.23*

Gender	0.97	1.31	-0.58	1.03	0.15	0.89	0.33	0.54
Water Sector	0.27	1.05	2.55*	1.18*	0.28	1.32	-0.76	1.18
Environment and Natural Resources	1.37	1.05	-18.16	13,259.29	-18.92	12324.7	1.33	0.79
Health, Nutrition, Population, and Education	-18.49	11,236.64	1.33	0.99	0.38	1.24	0.87	0.7
Energy and Extractives	-18.35	15,043.49	-18.28	15,133.59	-18.55	14462.8	0.23	0.99
Transport	-18.2	12,456.50	0.57	1.24	1	1.28	1.92*	0.76*
Governance	-18.78	13,799.93	-18.1	14,047.10	1.65	1.41	1.37	0.88
Generalists	----	----	----	----	----	----	----	----
Position	0.8	0.88	-0.5	0.96	-0.19	0.93	-1.23*	0.56*
Location	-0.11	1.3	0.45	1.28	-1.47	1.07	-0.08	0.8
R2								
Omnibus Chi-Square	9.97		9.38		9.08		20.81*	
Df	10		10		10		10	

**. Correlation is significant at the 0.05 level (2-tailed)

----, refers to a removed variable in the model.

CONCLUSION

Main Findings

Theory of stakeholders' main points imply that stakeholders should involve in designing and implementing policies for the betterment of the firm, which is referred to the Haitian community in this study (Buchholz and Rosenthal 2004). Haitian national leaders should also involve in providing guidance to tackle critical social issues. Findings reveal that Haitian stakeholders do not perceive water, health, and poverty reduction as priorities of development. Accordingly, some portion of the work sectors consider poor government coordination as an impediment to development. This implies that social issues might, partly, stem from lack of governance and unwillingness to tackle them. Besides the theoretical framework, these priorities were measured using data from the World Bank Group survey conducted in Haiti in 2018.

Measuring priorities is challenged by data limitations; low response rate, broad questions, and non-representativity of localities outside of Port-au-Prince. More details about data limitations are provided further. Statistical analysis and model are used, giving largely important insights of the data and the significance of independent variables.

These findings align with the current situation of the Haitian households, suffering from socioeconomic burdens such as political unrest, poverty, cholera, and water issues. These critical issues require urgent and sustainable alternative policies from stakeholders' willingness to ameliorate the situation.

Empirical Findings

The logistic model assesses the relationship between the dependent variables and stakeholders' characteristics. Across the four logit models most independent variables are not significant, except for the model of the Government Coordination as the dependent variable. Meaning that, first, the models provide limited insight into the relationship between respondents' characteristics and the dependent variables, Water and Sanitation Priority, Health Priority, and Poverty Reduction Priority.

Water Sector is a good predictor in the HP logistic model. Respondents in this sector may be more involved technically in water issues that cause health problems. The negative relationship

between Age and GC suggests that respondents who already build a career in the system are less likely to be aware that government coordination is an impediment of development. Accordingly, the negative relationship between Position and GC would translate that people in the public sector are less likely to be aware of how the lack of government do not help in addressing social issues since they are already embedded in the system. The logistic regression models align with the Kendall tau correlations, where few significant relationships occurred.

The study has shown that some results from the logistic regression model are consistent to hypotheses formulated in chapter II. Firstly, the effect of respondents' characteristics on Water and Sanitation Priority yield no statistically significant coefficients. The respondents' characteristics have no effect on Water and Sanitation Priority. Secondly, the dependent variable water sector is statistically significant in the model investigating effect of respondents' characteristics on Health Priority. Third, the dependent variable Age is statistically significant across the logit models investigating the stakeholders' characteristics on Poverty Reduction Priority and Government Coordination. Last, Transport Sector, and Position are statistically significant in the logit model investigating the stakeholders' characteristics on Government Coordination as an impediment to development in Haiti.

Theoretical Implications

Most findings of the study show that stakeholders, also considered as national leaders in this study, show little interest in perceiving water and sanitation, health, poverty, and government coordination as priority of development. These findings are in line with the descriptive stakeholder theory (Friedman & Miles, 2006), suggesting that stakeholders are engaged in designing and implementing policy for the betterment of the large whole. In the context of this study, larger whole refers to the Haitian community that needs substantial effort from stakeholders to tackle social issues (Friedman, 2006). Thus, through stakeholder theory the findings suggest direct and consistent collaboration of national leaders around priorities of development in Haiti.

The study found support from (Thomas & Grindle, 1990) who provide examples of policies in resolving water issues after Indian government decided to implement them. In addition, (Stoa, 2017) points out a lack of governance while implementation of existing policies would ameliorate the water issues in Haiti. Few studies investigate the policy aspect of water challenge in Haiti, limiting comparison with this study's findings. However, in terms of link between water and sanitation, and poverty may aggravate water issues (Williams et al., 2015). Their findings align with this study since water issues and poverty were not among perceived as priority of development.

Practical Implications

The study shows that not many stakeholders or national leaders consider water and sanitation, health, poverty, and government coordination as critical issues in Haiti. Little or no weight is assigned to the development issues by participants in each of the work sectors. This implies that these development issues are not subjects to address in a potential development strategy. Most respondents in water sector would not include water and sanitation issues as a priority

where those in environment and natural resources are more likely to do. This might be due to the possibility to pick only three priorities among many pressing others.

The reality of the Haitian situation regarding policy, water and sanitation issue is reflected in the findings of the study. Few statistically significant variables across the four logistic regression models implies that national leaders' perceptions do not emphasize the Sustainable Development goals that focus on the amelioration household socioeconomic conditions such as quality water, health, and access to a better life. For instance, (Stoa 2017) states that few policies are designed in regard to water and sanitation issues while the country has myriad of agencies and NGOs in the water sector. This reflects a lack of governance and priority. In addition, the cholera outbreak in 2010 revealed the weakness of the water sector and the lack of policy implication. Politics and gangs have been the bane of national leaders in Haiti over the last 10 years.

Future Research

This research aimed to investigate the link between stakeholders' perceptions and water insecurity. Previous studies coupled with the present data analysis provided some understanding of the water insecurity in the country. However, certain limitations narrow the scope of the study. Thus, steps to future research would consider these limitations and go from there to investigate the water and sanitation issues in depth.

The first limitation of the study is the small sample and the data collection. Therefore, large standard errors identified translate that the sample might not represent closely the population. The purposive sample of positional leaders could not be assessed for completeness and inclusion, as this information was not available from the World Bank. The respondents were recruited from organizations and programs that participated in World Bank programs; other sectors may be neglected or under-represented in the resulting pool of potential respondents. The response rate for the survey was low. Future efforts could be improved by implementing established approaches involving personalization and persistence through multiple contacts.

The sample also have limited representation of stakeholders from localities outside the capital city, Port-au-Prince. Therefore, the inference might be limited as leaders in other localities might conceive the reality from a different perspective. In addition, this study does not consider household points of view and policy preferences. The use of secondary of data collected for other purposes revealed significant limitations in the measurement of study variables. As respondents were asked about a broad set of development priorities, this study endeavored to detect and focus on water and sanitation issues in an often indirect and blunt way. Future research would use direct and simple questions about these matters using at least ordinal response frameworks.

This study examined stakeholder perceptions of water and sanitation issues. Households as customers of water systems have a distinct set of need and interests, centrally availability, quality, and price. Research about the perception of households regarding the water and sanitation issues would, first, understand this challenge from their perspectives. Second, that would provide some directions for comparing findings of this study regarding households' perception of national leaders' awareness and willingness to tackle water insecurity.

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