WATER SECURITY IN HAITI: DO NATIONAL STAKEHOLDERS CONSIDER WATER AND SANITATION AS A PRIORITY IN DEVELOPMENT

by

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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 no statistical relationships between the chosen dependent (Water and Sanitation Priority, Health Priority, Poverty Reduction Priority, and Government Coordination) and the independent variables. Therefore, this translates that 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, intervein, and implement policy to address these issues in Haiti.

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BLUE	Best Linear Unbiased Estimator
DINEPA	Directorate of Potable Water and Sanitation
GP	Government Priority
HP	Health Priority
HWISE	Household Water Insecurity
NGO	Non-Governmental Organization
OLS	Ordinary Least Square
PP	Poverty Priority
SDG	Sustainable Development Goal
WASH	Water Sanitation, and Hygiene
WBG	World Bank Group
WSP	Water and Sanitation Priority

CHAPTER 1: INTRODUCTION

1.1 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 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, Grabinsky and Kløve 2022).

Water security is an individual's capacity to access sufficient and safe water (Miller, Vonk, Staddon 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 and 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 and Miles 2006). Anticipating the notion of stakeholders, C. Wright Mills (1956) viewed the "power elite" as the set of individual actors within the associational and institutional roles that comprise the acting portion of the state and broader economy of the U.S., particularly economic, political, and military sectors (MacDonald 1956). (Zweigenhaft and Domhoff 2006) subsequently addressed power structures and the continuing influence of an American power elite.

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, Bai, Zhang et al. 2015).

1.1 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 and Iskandarani 1998). The UN Security Council anticipates that increased water insecurity may lead to social conflict and unrest (Cashman 2014). (Webb and Iskandarani 1998) assert that water insecurity is an urgent issue that needs to be addressed.

Water insecurity affects mental health by increasing anxiety and stress over the process of obtaining water and doubts over its safety (Brewis, Choudhary and Wutich 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, Stoler and Adams 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 heterogenous 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.

1.2. 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, Weppelmann, Alam 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, Bliss, Patrick 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, Steenland, Dismer 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, Jain, Bowen et al. 2007). Many substantial health issues stem from the lack of potable water and sanitation (Tappero and 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, Jean-Baptiste and Miner 2016a). 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, Achore, Bisung and Kuusaana 2020). (Martinez 2019) suggests that conflicting institutional roles and policies foster inadequate management of water resources. 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.

1.3. Problem Statement

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, Gruber, Kamgno 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 and Grindle 1990). According to Naomi (2011), national leaders in most developing countries are not fully supportive of anti-poverty policies. 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, Syed, Qowamuna 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.

1.4. Research Questions:

- *Do stakeholders view water and sanitation as an important issue facing Haiti?*
- *Are water and sanitation considered related to poverty in Haiti?*
- *What personal characteristics and sectoral locations shape stakeholders' water insecurity perceptions?*

1.5. Research Objectives

The overall objective of the research is to analyze how stakeholders perceive water insecurity in Haïti 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.*

1.6. Justification:

Water insecurity is associated with a lack of governance or weak institutional practices in water management. Governance and policy failures play a crucial role in household water insecurity in developing countries (Miller et al. 2020), (Pacheco-Vega 2019), (Bakker and Morinville 2013). This study endeavors to examine, from a national stakeholder perspective, the connection between governance and stakeholders as a fundamental means for improving Haitian water security.

CHAPTER 2: CONCEPTUAL FRAMEWORK

This chapter establishes a conceptual framework for understanding Haitian stakeholder perceptions of water insecurity. First, the nature and origins of the concept of stakeholder are reviewed in the concept of water supply and distribution management. Second, three key dimensions of concern about the process of alleviating water insecurity are identified. Finally, hypotheses linking stakeholder characteristics and sectoral location are presented.

2.1. Stakeholders

The concept of "stakeholders" was originally related to organizations and management. It referred to groups who are assuring the survival and success of a public or private organization (Friedman and Miles 2006). This definition implies joint relationships between all groups while the organization emphasizes on their interests, needs, and viewpoints (Friedman and Miles 2006). Theoretically, the concept falls under two perspectives. Normative stakeholder theory, which refers to top-down where the manager of the organization assures its success. The descriptive stakeholder theory concerns how mangers and stakeholders collaborate and view their actions and roles (Friedman and Miles 2006).

The stakeholder concept has burgeoned and is subject to myriad of definitions. These definitions, as mentioned above, are mostly related to the managers and groups within organizations. For instance, the Stanford Research Institute (1963) suggests that without outside group support, the organization would fail to exist. On the other hand, Gray, Owen, and Adams (1996) refer to any human group involved in the organization activities and functioning. The second definition proposes a social implication of agency for the betterment of the organization environment. This brings to the fact that the popularity of the stakeholder concept and its use by

policymakers, regulators, and non-governmental organization (NGO) such as the World Bank Group.

Political institutions and agencies are addressed by the World Bank through the concept of stakeholders who represent and cooperate to address basic societal concerns such as water insecurity (Felzer 2018). National leaders in political and administrative positions directly shape and implement policy (Grindle 2017). Occupants of these positions play central role in the national governance process. They shape social and economic decisions as employees of state agencies, members of the office of the president, legislators, prominent professionals, nongovernmental organizations (NGOs), media, and trade unions (Cassivi, Guilherme, Bain et al. 2019, Felzer 2018).

Accountable development outcomes are achieved when national leaders perceive development as a priority (Hossain and Moore 2002). In Haiti for instance, leaders often highlight societal problems to attract resources from external donors (Development 2010). As consequence, national leaders tend to perversely govern and use institutions for personal interests. Even when donors are willing to help, political and institutional leaders' perceptions matter substantially (Hossain and Moore 2002). National leaders, through adaptive policies and governance, can lead institutions to high performance in tackling social issues using internal and external resources (Development 2010). Therefore, understanding the relationship between intuitional governance and national stakeholders' perceptions is central to an understanding of social issues like water insecurity in Haiti.

Water and sanitation issues in Haiti, as a developing country, require a sociological perspective embedding institutional dynamics and policies (Araral and Wang 2013). Such a perspective should consider the perception of national leaders based on how they use institutions

to create and expand policies to achieve sustainable outcomes through fair governance. For instance, (Jérôme, Emmanuel, Bodson et al. 2017) strongly emphasize governance and its role in resolving water insecurity. Governance refers to decisions and choices that Haitian political and institutional leaders make. In turn, they implement decisions based on their perceptions of water and sanitation as a priority of development (Stoa 2017).

2.2.1. Stakeholder Perceptions

In developing countries, national leaders often adopt helpful policies that may advance their nation but also serve the interests of the governing segment (Hossain and Moore 2002). According to (Hossain and Moore 2002), their narrow interests often interfere with ameliorating social issues. Therefore, various rationales may explain the national leader's attitudes toward addressing problems within their community. DFID (2010) suggests that incentives offered by the global environment may incline national leaders to neglect the poor. Accordingly, the broad political situation, an unwillingness to redistribute resources, and ongoing socioeconomic conditions make elites slow to adopt policies that diffusely benefit the broader population over time. Rather, short-term rewards to narrow interest groups dominate their focus (Hossain and Moore 2002). From these two perspectives, it is important national leader perceptions are crucial to fashioning adequate policies and using adaptive governance to implement them.

2.2.2. Water and Sanitation Institutions

The water sector in Haiti is fortunate to be assisted by a myriad of agencies that seek to guide and augment water services through technical assistance and funding (Waite Roebuck, Markley, Knowles et al. 1999). However, the population still suffers from water insecurity. The Haitian Water and Sanitation Department known as Department National d'Eau Potable et d'Assainnissement (DINEPA) is an agency that is empowered to regulate public water supplies

nationwide Gordon, Plumblee and Vaughn (2017). Due to lack of investment, lack of qualified professionals, lack of program monitoring, and high centralization of resources in Port-au-Prince the agency is often ineffective (Gordon et al. 2017).

Accordingly, the supply and maintenance of water infrastructure is implemented largely by Nongovernmental Organizations (NGOs), under DINEPA's guidance, working to bolster access to potable water. Among the NGOs doing this work, only 23 were registered with DINEPA in 2013 (Gordon et al. 2017). DINEPA is partly financed by USAID's, Water, Sanitation and Hygiene Program (WASH), the World Bank, the Inter-American Development Bank, the Spanish Cooperation, and other international institutions (Gelting et al. 2013). Multiple international donors often fund different aspects of water insecurity with sometimes contradictory and overlapping agendas. DINEPA must realize the opportunities that donors present, while addressing the actuality of water problems in the Haitian context.

2.2.3. Policies Regarding Water and Sanitation

It is crucial to overview previous work, even though there are few studies, on policies already done to understand how national leaders view water and sanitation from policies perspective. The first study that points out the urgent role of institutional stakeholders in the drinking water supply led by Emmanuel and Jean Dubus (1998) suggest that educational institutions, administrative agencies, and NGOs should work through partnerships and on a specific aspect of the water system (Stoa 2017).

The second study was conducted by the Center for Human Rights and Global Justice at the New York University (NYU) School of Law in 2008. The cornerstone of this study was oriented toward human rights issues. They blame state institutions in Haiti for violating Haitian rights to get access to sufficient and good quality water (Stoa 2017). A report was released in

2009 by USAID “Watershed Management in Haiti: Recommended Revisions to National Policy.” The agency suggests a productive collaboration between the Ministry of Agriculture and the Ministry of the Environment to enhance local government management of water resources (Stoa 2017). These studies suggest a drinking water strategy that considers laws that secure Haitian rights to get access to potable water despite the current problems and dysfunctional institutions.

2.3. Water Insecurity in Haïti

Water from its crucial function in human health, also can be a vector of diseases and can create domestic unrest (Venkataramanan, Collins, Clark et al. 2020). In Haïti, domestic issues and diseases related to water consumption are common and current. Of 13 Haitian children born, 1 is dead before one year old, diarrhea is often one of the causes (Colindres et al. 2007). Additionally, numerous households use home-treated water which is sometimes risky with an inappropriate dosage or product. That places the country as having some of the poorest water and sanitation systems in the western hemisphere (Gelting et al. 2013). Previous research has considered multiple dimensions of water insecurity (Young, Miller, Frongillo et al. 2021).

The Households Water InSecurity Experiences Scale (HWISE) was implemented to measure water insecurity across cultures and demographics and uses four tools for this purpose: availability, access, use, and reliability (Young et al. 2021). On the other hand, Cashman (2014) refers to adequacy, accessibility, assurance, and affordability to evaluate and portray a water insecurity description in the Caribbean. In regard to this research, a mix of these concepts is used to put Haitian water insecurity into context.

2.3.1 Water Availability in Haïti

Haiti overall water availability includes groundwater, rivers, and other sources. According to (Adamson, Jean-Baptiste, Miner et al. 2016b), Haïti has sufficient groundwater to supply its population. However, these resources are not equally distributed over regions and are unsustainably exploited in some regions (Stoa 2017). Additionally, poor or no infrastructure also hinders access groundwater (Adamson et al. 2016b). Natural disasters and climate change exacerbate water availability and increase the risks to water supply (Stoa 2017). Moreover, changing watersheds and catchments can immediately affect surface water resources but also groundwater supplies in the longer term (Cashman 2014).

2.3.2 Water Accessibility in Haïti

Water accessibility is directly associated with water availability since it implies simultaneously quantity and quality (Cassivi et al. 2019). In Haïti, despite assertions of sufficient groundwater availability, most Haitian face issues in accessing water either for drinking or for domestic usage. Particularly in rural areas, access to improved water sources is limited (Gordon et al. 2017). High water use rate, demographic trends, poor infrastructure are the main limited factors (Jérôme et al. 2017, Ogisma, Li, Xiao et al. 2021). Inhabitants have access to water in various ways: rivers and springs mostly in rural areas, public tap stands, domestic pipes and wells, and kiosks. Accordingly, public tap stands are constructed mostly in schools, churches and public places (Gelting et al. 2013). Such infrastructure is often financed by nongovernmental organizations with governmental institutions' collaboration.

Donor efforts often fund improvements but the enduring need to manage and maintain the water system is often problematic. Due to a lack of resources and monitoring, rural water systems often are left behind with unmaintained facilities (Gordon et al. 2017). In urban areas,

the scenario is slightly different with no rivers or springs, people have access to public tap stands in some places, kiosks, and pipe water in their houses. The water companies that manage these facilities are quite uneven in their approach. Few Haitian houses are directly connected to public water and those ties are old and unmaintained for decades (Varma, Satterthwaite, Klasing et al. 2008). Moreover, the distance between houses, water sources, and public tap stands plays an important role in water insecurity in rural areas (Lungová 2015). According to (Lungová 2015, Ogisma et al. 2021), transportation (either high price, long-distance or unpaved road) is also an important concern for most rural areas that prevent inhabitants from reaching the water testing service nearby.

2.3.3 Drinking Water Quality

From rivers, wells, kiosks, and public tap stand to piped water in houses, the quality of water is often unknown coupled with low access to quantity (Patrick et al. 2017). Particularly, the proliferation of kiosks in both urban and rural areas does not help in knowing water quality even if they were an improvement on other water sources (Patrick et al. 2017). Water testing services are hard to find in the Northern Department of the country (Ogisma et al. 2021). Therefore, public health is vulnerable since unmonitored water supplies can spread disease, as with the cholera pandemic, and increase child morbidity (Colindres et al. 2007, Ogisma et al. 2021).

The level of water contamination differs from one type of source or/and place to another (Lungová 2015). Moreover, drinking water generally is unsafe based on the World Health Organization drinking water standard (Wampler and Sisson 2011). Further, in most cases, this water is contaminated by fecal coliform bacteria in both rural and urban areas (Wampler and Sisson 2011). In most rural areas, households boil and use chlorination with powdered (Clorox),

solid (Aquatab), or liquid (Dlonet) hypochlorite, flocculation with “raket” (a local cactus), or sand gravel filtration to purify their water. However, the water quality after such treatments may be unknown (Colindres et al. 2007).

2.3.4 Water Affordability

(Young et al. 2021) maintain that affordability refers to economic instruments, financing, and tariffs that sustain water management and supply. In Haïti, despite governmental agencies involve in supplying water, its provision is often limited. Above all, the Haitian private sector is the main water supplier (Jérôme et al. 2017). They sell water by the gallon, in small plastic packages, or from kiosks. Since water insecurity is closely associated with poverty, it becomes a burden for Haitian households to afford price of the gallon. No specific regulations are set up to require a common price nationwide. As a result, the water market is changing depending on the place, as demand and price fluctuate situationally. For instance, in Canaan a remote area close to the Capital lacks of public water supply and sanitation, (Jérôme et al. 2017) state that inhabitants suffer from discrimination regarding access to low priced water.

2.4. Understanding Stakeholder Priorities for Drinking Water

2.4.1. Water Insecurity

As mentioned in the first chapter, this study examines whether Haiti’s widespread water insecurity translates into water as a priority of development for Haitian Stakeholders. Previous sections summarize the general issue of water and sanitation and the need to design and implement policies. The relevance of this study stems from the gap in the literature regarding Haitian stakeholders’ role in ameliorating water and sanitation issues.

Data from a World Bank Group survey is considered to address the research question. The focal concepts are: Water and Sanitation Priority, Health Priority, Poverty Reduction

Priority, and Government Coordination. These concepts encompass key dimensions of drinking water development in Haiti as perceived by a national sample of stakeholders.

Water and Sanitation Priority: Water and Sanitation comprises a broad of process of assuring clean drinking water and the hygiene disposal of the products of human consumption of that water. It refers to the emphasis placed on drinking water by stakeholders in resource-poor countries over other issues. From a socioeconomic perspective, it may reflect the perceived cost-effectiveness of this choice and the willingness to adopt policies in this regard (Hutton 2001). For instance, when the government of Nepal chose to consider water and sanitation as a priority of development, the percentage of sanitation coverage rose to around 97 in the country (Budhathoki 2019).

A dysfunctional system that provides unclean water can significantly affect population health by increasing diseases such as diarrhea, intestinal helminths, guinea worm, and skin diseases (Billig, Bendahmane and Swindale 1999). In Haiti, the Water and Sanitation situation is chronically problematic. In 2010, bad water and sanitation conditions caused more than thousand deaths (Dowell and Braden 2011).

Health Priority: Health Priority refers to the emphasis stakeholders place on human well-being as a target of development (Vearey, Luginaah, Magitta et al. 2019). In the context of Haiti, health is often integrally connected to water and sanitation (Billig et al. 1999). For instance, (Williams, Gaines, Patrick et al. 2015) mentioned that poor water and sanitation infrastructure exacerbated the spread of cholera in the 2010 outbreak. Therefore, Health is a significant variable closely linked to water and sanitation in a country like Haiti where they should work together. Thus, perceiving this variable as a priority of development may arguably lead to water and sanitation improvement (Billig et al. 1999).

Poverty Reduction Priority: This concept refers to the emphasis that stakeholders place on income inequality in a given country (Cammack 2004). This process of poverty reduction involves government and development partners through participatory approaches (WorldBank 2011). Poverty reduction is a priority of development link to issues such as water and sanitation. Accordingly, (Williams et al. 2015) state that poverty impedes water and sanitation improvement because impoverished households have difficulty paying for services. Since Haiti is the poorest country in the Western Hemisphere, it is understandable that its population faces this water insecurity challenge. Perceiving Poverty Reduction as a priority of development by national leaders, likely to Health priority, is arguably a complementary objective to assuring the good provision of clean and safe water.

Government Coordination: Government Coordination refers to how well different agencies and offices are perceived to be interwoven to implement projects while addressing social issues (Khan 2006). The World Bank (2011) emphasizes the centrality of government connectedness in designing suitable policies for development. For instance, in Indonesia, despite the involvement of NGOs, government coordination was crucial in addressing water and sanitation issues (Susilo, Vidyattama and Wishanti 2020). When ministries and agencies communicate and mutually adjust their actions, progress can be made on national problems. Thus, government coordination is required to implement priorities of development in Haiti.

2.4.2. Stakeholders Characteristics

The independent variables are Age, Position, Work Specialization, Geographic Location, and Gender. These respondent characteristics are selected for their relevance in validating priorities of development in Haiti. To understand national leaders' decisions, they are

hypothesized as determinants of the dependent variables. For instance, (Spisak, Grabo, Arvey et al. 2014) maintain that the age of leaders affects their leadership type.

Age: Formally, age refers to the time since birth, period refers to the calendar date at which an outcome is observed, and cohort refers to the time when an individual was born (Fosse and Winship 2019). The chronological life duration of an individual is a central feature of social location. Age will allow the explanation based on experiences, social goals, and professionalism. (Nath, Schmidt and Gunel 2006), suggest that competence or skill varies with age. Therefore, being older may refer to having enough awareness with regard to issues that need to be addressed. On the other hand, (Spisak et al. 2014) state that age can play crucial role in orienting leaders either towards keeping the status quo or exploratory change.

The age of Haitian national leaders may provide an insight regarding their willingness to ameliorate public services in Haiti, willingness to change Water and Sanitation issues, or to address other conditions first.

Hypothesis 1: Age is related to Water and Sanitation as a priority of development.

Hypothesis 2: Age is related to Poor Government Coordination as an impediment to reform.

Hypothesis 3: Age is related to Poverty Reduction as a priority of development.

Hypothesis 4: Age is related to Health as a priority of development.

Public Position: Public Position refers to the employment type of the respondents in government or otherwise. Accordingly, this variable is relevant in the fact that the Haitian national background matters in being aware of social and economic issues in Haiti. According to DFID (2010), leader perceptions are important in resolving social issues. Meaning that the

position of a national leader provides him/her with enough insight to tackle social issues that they perceive. In Haiti, stakeholders of the World Bank Group are national leaders who have leadership and power to influence change. From that point, I hypothesize that:

Hypothesis 5: Public Position is related to Water and Sanitation as a priority of development.

Hypothesis 6: Public Position is related to Poor Government Coordination as an impediment to reform.

Hypothesis 7: Public Position is related to Poverty Reduction as a priority of development.

Hypothesis 8: Public Position is related to Health as a priority of development.

Work Specialization: Work Specialization refers to substantive sector of employment of an individual. It differs from the Public Position since it does not include respondent in the government and clearly specifies the sector of activity in which the job is. They can play a similar role in giving an understanding of issues that national leaders, based on their work of specialization, consider as a priority of development. Social issues in Haiti should be, I assume, the priority of all sectors.

Even if, each occupant of a sector of work may see priorities of development from their own distinct perspective. (Estvan 1958) states that people perceive things differently based on their experience. This refers to the blind men and the elephant metaphor in which each man describes the elephant depending on which part they touch. For example, a national leader who work in transportation may choose priorities related to the transportation sector. Choose the dependent variables as priorities means that they are relevant as social issues. Thus, I hypothesize that:

Hypothesis 9: Work Specialization is related to Water and Sanitation as a priority of development.

Hypothesis 10: Work Specialization is related to Poor Government Coordination as an impediment to reform.

Hypothesis 11: Work Specialization is related to Poverty Reduction as a priority of development.

Hypothesis 12: Work Specialization is related to Health as a priority of development.

Gender: Gender refers to the femininity or masculinity of a human being and is a signal dimension of concern in development (Momsen 2009). In research regarding gender and social movements, (Taylor 1999) suggests that gender can be an explanatory factor in determining, emerging, and planning social movements. Meaning that gender plays an important role in tackling social issues. In the Haitian context, gender relations are critical whereas women are marginalized[1]. However, they are emerging and getting involved in different arenas in the country even if some institutions are occupied mostly by men. Deducing from that, the variable gender is expected to affect the dependent variables of the study. Thus, I hypothesize that:

Hypothesis 13: Gender is related to Water and Sanitation as a priority of development

Hypothesis 14: Gender is related to Poor Government Coordination as an impediment to reform.

Hypothesis 15: Gender is related to Poverty Reduction as a priority of development.

Hypothesis 16: Gender is related to Health as a priority of development.

[1] https://genderinhaiti.wordpress.com/ruralwomen/

Geographic Location: Geographic location refers to the individual's spatial position in the country. Social challenges may not the same in every location. However, Water and Sanitation issue is a national one in Haiti whereas rural areas are more impacted than the capital (Gelting et al. 2013). The rational is that rural areas have less access to improved water sources (Mukherjee, Bartelli, Patra et al. 2016). Geographic Location reflects a possible urban bias in the selection of priorities of development and impediments to reform in Haiti.

Hypothesis 17: Geographic Location is related to Water and Sanitation as a priority of development.

Hypothesis 18: Geographic Location is related to perceptions of Poor Government Coordination as an impediment to reforms.

Hypothesis 19: Geographic Location is related to Poverty Reduction as a priority of development.

Hypothesis 20: Geographic location is related to Health as a priority of development.

Aggregate Impact

Hypothesis 21: The independent variables together predict the dependent variables.

Chapter 3 describes the methods used to measure the concepts and the analytic approach used to test the hypotheses.

CHAPTER 3: METHODS

3.1. Description of the 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.

3.2. Description of 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*

Besides this general framework, the survey specifically focused on:

- *General Issues Facing Haiti*
- *Overall Attitudes toward the World Bank Group*
- *World Bank Group's Effectiveness and Results*
- *The World Bank Group's Knowledge Work and Activities*
- *Working with the World Bank Group*
- *The Future Role of the World Bank Group in Haiti*
- *Communication and Information Sharing*
- *Background Information*

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).

3.2.1 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.

3.3. 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 devolvement. 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 sec*ond 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 and 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 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

3.3. 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

3.4. Model Specification

Three different statistical models are described to select the approach that is more appropriate to the data structure and test the hypotheses developed in Chapter 2; OLS, logit, and Probit.

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, Apata and Alaba 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:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \ldots X_n)$

The explicit form of the model is represented thus;

$Yi = \beta_0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \ldots + \beta nXn + et$

Where;

β1- βn = estimated parameters

β0 = constant term

et = error term

Thus, the regression model is given as;

Water and Sanitation Priority (Y1) = β0 + β1Location + β2Age + β3Public Position + β4Gender + β5Water + β6Environment and natural resources + β7Health and education + β8Energy and extractives + β9Transport + β10Governance + β11Generalist + β12 Position …… (i)

Health Priority (Y2) = β0 + β1Location + β2Age + β3 Position + β4Gender + β5Water + β6Environment and natural resources + β7Health and education + β8Energy and extractives + β9Transport + β10Governance + β11Generalist + β12 Position ……(ii)

Poverty Reduction Priority (Y3) = β0 + β1Location + β2Age + β3 Position + β4Gender + β5Water + β6Environment and natural resources + β7Health and education + β8Energy and extractives + β9Transport + β10Governance + β11Generalist + β12 Position …… (iii)

Government Coordination (Y4) = β0 + β1Location + β2Age + β3 Position + β4Gender + β5Water + β6Environment and natural resources + β7Health and education + β8Energy and extractives + β9Transport + β10Governance + β11Generalist + β12 Position

……(iv)

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, Lee and Ingersoll 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: Probability of outcome (Y) = $\frac{e^{x\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \ldots + \beta nXn}}{1 + e^{x\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \ldots + \beta nXn}}$

Y_n : The estimated probability of one binary outcome versus the other

$e^{x\beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \ldots + \beta nXn}$: 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:

$$Pr(Y = 1|X) = \Phi(b0 + b1X1 + b2X2 + ….. + bnXn)$$

Where:

Y: represent the dependent variable

Φ: represents the cumulative standard normal distribution function

b0: the constant term

b1X1 + b2X2 + …... + bnXn : 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. Thus, the null hypothesis statements are:

***H_{01}**: There is no significant effect of respondents' characteristics, public position, and sector of specialization on Water and Sanitation Priority.*

***H_{02}**: There is no significant effect of respondents' characteristics, public position, and sector of specialization on Health Priority.*

***H_{03}**: There is no significant effect of respondents' characteristics, public position, and sector of specialization on Poverty Reduction Priority.*

***H_{04}**: There is no significant effect of respondents' characteristics, public position, and sector of specialization on Government Coordination.*

Therefore, no effect of predictors on dependent variables stipulates that all variances are equal to zero, thus:

$H0: \beta1 = \beta2 = \beta3 = \beta4 = \beta5 = \beta6 = \beta7 = \beta8 = \beta9 = \beta10 = 0$

The next chapter follows the above procedures to test the hypotheses developed in Chapter II.

CHAPTER 4: RESULTS

This chapter test hypothesis developed in chapter II. First, descriptive statistics are performed; frequencies, mean, and range. Second, a section clarifies the derived dummy variables. To evaluate the strength of the association between the dependent variables and predictors, non-parametric coefficient (τ) is reviewed. Last, logistic regression models examine the contribution of the dependent variables in predicting the dependent variables.

4.1. Descriptive Analysis

Table 2 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 simple, 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
Dependent						
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
Independent						
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
Work sector						
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

4.2. Work Sector Categories

Table 3 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, 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 4. Mean Score of Dependent Variables by Work Sector Category, WBG Stakeholders Survey 2018

	Mean Score			
Work Sector	**WSP**	**HP**	**PP**	**GC**
Water	0.14	0.29	0.14	0.14
Environment and natural resources	0.22	0.00	0.00	0.50
Health, nutrition, population, and Education	0.00	0.15	0.08	0.42
Energy and extractives	0.00	0.00	0.00	0.33
Transport	0.00	0.10	0.10	0.64
Governance	0.00	0.00	0.13	0.38
Generalist (specialized in multiple sectors)	0.05	0.05	0.05	0.24
Number	127	127	127	127

4.3. 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	1.00														
2. Health priority	0.11	1.00													
3. Poverty Reduction priority	-0.14	-0.13	1.00												
4. Government coordination	-0.04	-0.05	**.18***	1.00											
5. Age	-0.10	0.00	-0.08	-0.16	1.00										
6. Gender	0.08	-0.01	0.03	0.02	**-.21***	1.00									
7. Water sector	**.51****	**.20***	0.01	-0.09	**-.16***	**.21***	1.00								
8. Environment and natural resources	0.13	-0.08	-0.08	0.12	-0.12	-0.11	-0.07	1.00							
9. Health, nutrition, population, and education	-0.16	0.11	-0.06	0.07	0.01	-0.01	-0.08	-0.09	1.00						
10. Energy and extractives	-0.03	-0.07	0.03	0.01	-0.07	0.01	-0.06	-0.07	-0.08	1.00					
11. Transport	-0.13	0.03	0.09	**.21***	0.09	-0.07	-0.08	-0.09	-0.10	-0.07	1.00				
12. Governance	-0.04	-0.07	0.07	0.03	0.14	-0.03	-0.07	-0.08	-0.09	-0.06	-0.08	1.00			
13. Generalists	-0.11	-0.07	-0.03	**-.20***	0.04	0.02	**-.28****	**-.32****	**-.37****	**-.26****	**-.35****	**-.30****	1.00		
14. Position	0.12	-0.07	-0.05	-0.17	0.04	-0.03	0.15	0.10	-0.07	-0.10	-0.11	**.19***	-0.07	1.00	
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	1.00

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

4.4. 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.

4.4.1 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.

4.4.2 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 chance 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.

4.4.3 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 explains that 1-point increase in Age would increase by decrease by 0.86 point the chance 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.

4.4.4 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 6. 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
R^2								
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.

CHAPTER 5: CONCLUSION

This section of the study summarizes the findings about the perceptions of Haitian stakeholders. The analysis addressed determinants of water insecurity, health, and poverty reduction as a priority of development, and government coordination as an impediment to development.

5.1 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 considered as the Haitian community (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.

5.2 Empirical Findings

This section presents empirical findings from the logistic model in the study. This multivariate statistical model was used to test hypotheses for each of the dependent variables.

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.

5.3 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 and 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, as suggested by (DFID 2011). 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 and Grindle 1990) who provide examples of policies in resolving water issues after Indian government decided 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, (Williams et al. 2015) pointed out that poverty may aggravate water issues. Their findings align with this study since water issues and poverty were not among perceived as priority of development.

5.4 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 regards 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.

5.5 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 (De Leeuw, Hox and Dillman 2012) .

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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