



A Spatial Approach to Analyzing Food Insecurity in Haiti's Northwest Department

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About **Haiti**

The country of Haiti is located in the Caribbean on the western third of the island Hispaniola. It is bordered by the Dominican Republic to the east, the Caribbean Sea, and the Northern Atlantic Ocean. The Inter-American Development Bank (IDB) strategy for the country seeks to contribute to higher, inclusive and more sustainable growth that supports a reduction in poverty, inequalities, and development gaps.

About the **Inter-American Development Bank**

The IDB works to improve lives in Latin America and the Caribbean. Through financial and technical support for countries working to reduce poverty and inequality, we help improve health and education, and advance infrastructure. Its aim is to achieve development in a sustainable, climate-friendly way. With a history dating back to 1959, today we are the leading source of development financing for Latin America and the Caribbean. The organization provide loans, grants, and technical assistance, as well as the conduction of extensive research. The IDB maintains a strong commitment to achieving measurable results and the highest standards of integrity, transparency, and accountability.

About **GeoAdaptive**

GeoAdaptive is a global development planning consulting, strategy and technology firm. It specializes in solving complex economic, environmental, and social problems across a variety of industries and scales using advanced territorial intelligence analytics and technologies. By integrating locational data and analysis, spatial econometrics, design and planning, we create strategies for our clients around the world, reducing their risk and maximizing their opportunities for inclusive and sustainable growth. In Haiti, GeoAdaptive supported IDB's strategy for the country by developing a spatial approach to map and prioritize development gaps.

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Acronyms

CNSA	Coordination Nationale de la Sécurité Alimentaire
FAO	Food and Agriculture Organization
FEWS NET	Famine Early Warnings System Network
FSIN	Food Security Information Network
IDB	Inter-American Development Bank
IHSI	Institut Haïtien de Statistiques et d'Informatique
IPC	Integrated Food Security Phase Classification
MARNDR	Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural
UNDP	United Nations Development Programme
UNSCN	United Nations System Standing Committee on Nutrition
USAID	U.S. Agency for International Development



Executive Summary

This study presents an analysis of food insecurity and its underlying factors in the Northwest department in Haiti. This department is one of Haiti's departments most vulnerable to and affected by food insecurity, with 55 percent of the population in need of urgent assistance (IPC 2022). Using the Integrated Food Security Phase Classification (IPC) and the Inter-American Bank's (IDB) Food Security Framework (IDB 2018), this paper presents a geospatial analysis, complemented by a review of other socioeconomic factors, to provide insights on what is driving this trend and what are the most urgent areas to address. The results show that a decline in domestic production which has been hampered by inadequate infrastructure and financing, insecurity, and natural disasters has occurred alongside international supply chain disruptions, that have affected imports together with stalling aid receipts. Taken together, these factors are having a negative effect on the availability of food. Supply constraints, mobility restrictions, price shocks, and risks to sustained income are also having a negative impact on access to food. Challenges to access potable water and sanitation infrastructure, as well as insufficient diversity in diets, also hinder food utilization, described as the availability of quality food required to attain adequate nutritional status. Moreover, food stability is not guaranteed because of issues related to the region's natural endowments, insufficient irrigation infrastructure, vulnerability to climate shocks, price fluctuations, and insecurity. Based on these findings, this paper recommends 23 actions to expand access to basic services, promote adequate nutrition, support productive and sustainable agriculture, and increase resilience to shocks and stresses. Most importantly, rolling out these measures in an effective way will require a coordinated approach at all administrative levels of the state, from local to national, with the private sector and the donor community.

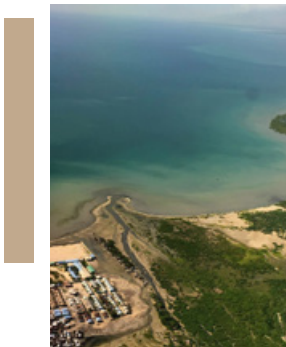
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1 Introduction

Haiti faces some of the most acute levels of food insecurity in the world. The challenge of food insecurity has recently risen to the top of the policy agenda. Soaring food prices because of the effects of the COVID-19 pandemic, insecurity, natural disasters, and the effects of the war in Ukraine have resulted in a global food crisis with devastating consequences worldwide. Indeed, the 2022 Global Food Report found the highest levels of hunger it has ever reported, with close to 193 million people acutely food insecure and in need of urgent assistance. Haiti is one of the countries most affected by hunger, alongside Sudan, Afghanistan, Democratic Republic of the Congo, and Syria (FSIN 2022). With an estimated 45 percent of the population in need of urgent assistance (IPC 2022), Haiti ranked 109th out of 116 countries on the Global Hunger Index in 2021.¹ Hunger and acute food insecurity are linked to severe development challenges both in the short and long terms. Food insecurity has direct impacts on people's health and is often linked to poverty. It has also been found to have long-term negative effects on the population, such as limited cognitive development and lower developmental outcomes, including lower school achievement. (FAO/WHO 2021).

Food insecurity is a multidimensional and complex phenomenon that often results from a combination of both supply- and demand-side factors (IDB 2018). In Haiti, agriculture plays an important role in the economy, generating around 18 percent of GDP and 50 percent of employment (Morris, Sebastian, and Perego 2020). Yet despite the importance of agriculture, its productivity is low by international standards and the sector is highly vulnerable to extreme climate events. Supply chains in Haiti are severely constrained by low-quality infrastructure, limited economies of scale (reflecting the prevalence of small-scale subsistence farming), low public financing, and production areas that need better connectivity. The country also faces severe socioeconomic and political challenges, with recurring large-scale protests and escalating insecurity. These factors hinder the institutional framework needed for a thriving agricultural sector and further hinder the adequate supply of food products. On the demand side, high levels of poverty and inequality, as well as eroding household purchasing power exacerbated by high inflation, have hindered access to food. Rising international food and fuel prices as a result of global supply chain disruptions and the war in Ukraine will also continue to contribute to food insecurity, which is expected to worsen over the next few months.

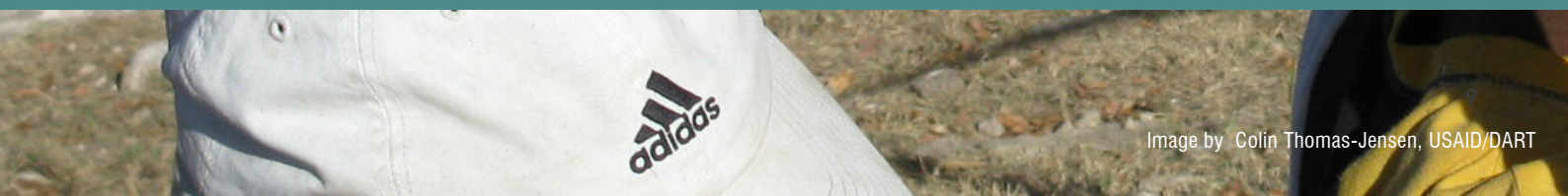
The Northwest department is one of Haiti's departments most vulnerable to and affected by food insecurity. High poverty rates, geographical isolation, and large development gaps by national standards reflect the department's severe challenges (Giles Alvarez et al. 2021). Despite having a dominant agricultural sector, the Northwest department also has some of the highest rates of food insecurity in the country, with 55 percent of the population in need of urgent assistance (IPC 2022). Six out of 10 households in the department have reported adopting "emergency" adaptation strategies to meet their food needs in recent years (CNSA 2020). The purpose of this paper is to delve into some of the factors that contribute to these high levels of food insecurity in the Northwest department and recommend measures that could be promoted to alleviate the problem going forward.

This paper is part of a series of four studies analyzing development gaps, trade, and value chains for agricultural production in Haiti. In Giles Alvarez et al. (2021), the Northwest department was highlighted as one of the most vulnerable departments in the country, with nine or more development gaps affecting one in four persons in the department. The other study in the series (Giles Alvarez et al. 2022) develops trade and value chain analyses that examine the potential to promote agricultural products for export and greater national production. This study complements the other two by analyzing food insecurity and its underlying factors. It proposes targeted investments and strategies to tackle the issues involved and ultimately improve food security. Section 2 introduces the food security situation in the Northwest department, while Section 3 presents the results of a spatial and socioeconomic analysis of factors that contribute to it. Section 4 proposes policy interventions and targeted investments to alleviate the effect of the factors that contribute to food insecurity, and Section 5 concludes.

¹ See www.globalhungerindex.org.



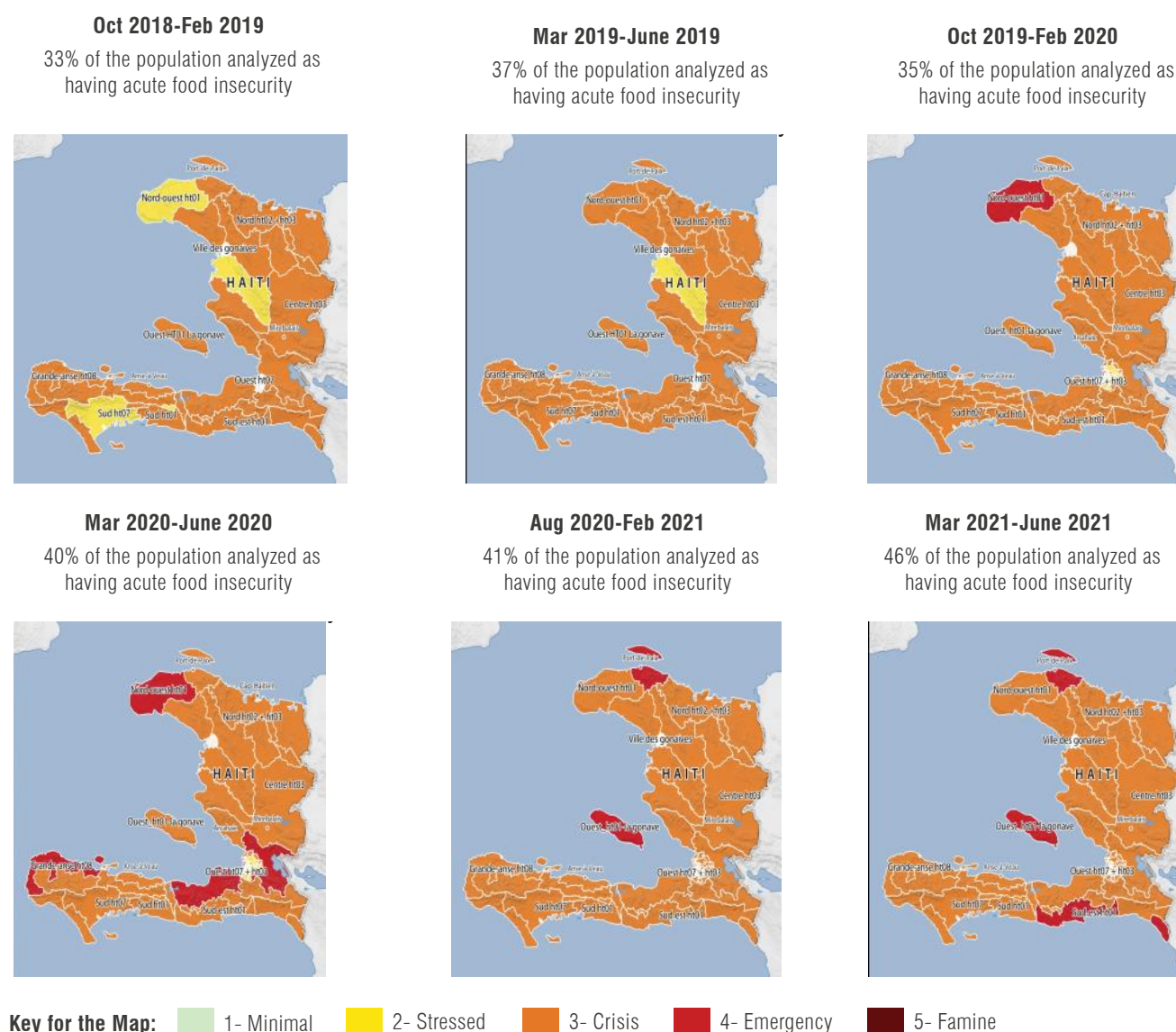
2 Food Insecurity in Haiti and the Northwest Department



Haiti is one of the most food insecure countries in the world. With almost half the population facing acute levels of food insecurity (IPC 2022), Haiti ranks 109th out of 116 countries on the Global Hunger Index (2021), making it one of the 10 most food insecure countries in the world (FSIN 2022). As seen in Figure 1, the share of Haitians facing acute food insecurity has increased substantially, from one in three persons in 2018 to almost one in two today. The reasons for

this are complex and interrelated, but mostly reflect a combination of factors including insecurity, extreme weather events, worsening macroeconomic conditions, and low agricultural productivity (IPC 2022).² In the first half of 2022, an estimated 2 out of 32 areas in the country were classified by the Integrated Food Security Phase Classification (IPC) as being in an emergency and the rest were classified as being in a crisis.³

Figure 1. The Evolution of Food Insecurity in Haiti



Source: Integrated Food Security Phase Classification, available at <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155096/> (accessed September 13, 2022).

² These factors are discussed in more detail in subsequent sections.

³ The IPC measures food insecurity at a specific point in time and analyzes its severity in terms of threatening lives, livelihoods, or both. The analysis of food insecurity combines international standards – including food consumption levels, livelihood changes, nutritional status, and mortality – and triangulates them with several contributing factors (food availability, access, utilization and stability, and vulnerability and hazards) analyzed within the local context. The IPC has a scale ranging from 1 (minimal) to 5 (catastrophe/famine). Levels 3 and above are considered acute levels of food insecurity.

Sept 2021-Feb 2022

44% of the population analyzed as having acute food insecurity

**Mar 2022-June 2022**

46% of the population analyzed as having acute food insecurity



Key for the Map: 1- Minimal (light green), 2- Stressed (yellow), 3- Crisis (orange), 4- Emergency (red), 5- Famine (dark red)

Source: Integrated Food Security Phase Classification, available at <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155096/> (accessed September 13, 2022).

The Northwest department faces some of the most acute levels of food insecurity in Haiti.

As seen in Figure 1, the department has been the department classified as being in emergency most recurrently in the past four years. In the first half of 2022, 55 percent of the population was in need of urgent assistance, above the national average of 46 percent (IPC 2022) (Figure 2). Rural areas within the Northwest department were also highlighted by the Coordination Nationale de la Sécurité Alimentaire (CNSA) as having the highest share of food insecure households in the country at 82.7 percent (CNSA 2019). Even though the fact that agriculture is the main economic activity in the department, the region's geographic isolation and infrastructure shortcomings such as limited cold chain supply and low-quality roads and port facilities have hindered the inclusion of agricultural production in export markets and limited access to distribution channels (Giles Alvarez et al. 2022b).

the highest concentration of development gaps and suffers from low levels of productivity, geographic isolation, lagging socioeconomic conditions, and poor connectivity. Inequality and poverty rates are high, particularly in rural areas: 30.7 percent of the department's mostly rural population faces very high levels of income poverty and inequality (as measured by a poverty rate above 65.4 percent and a Gini coefficient of 0.63, respectively).⁶

High food insecurity goes together with other development challenges in the Northwest department.

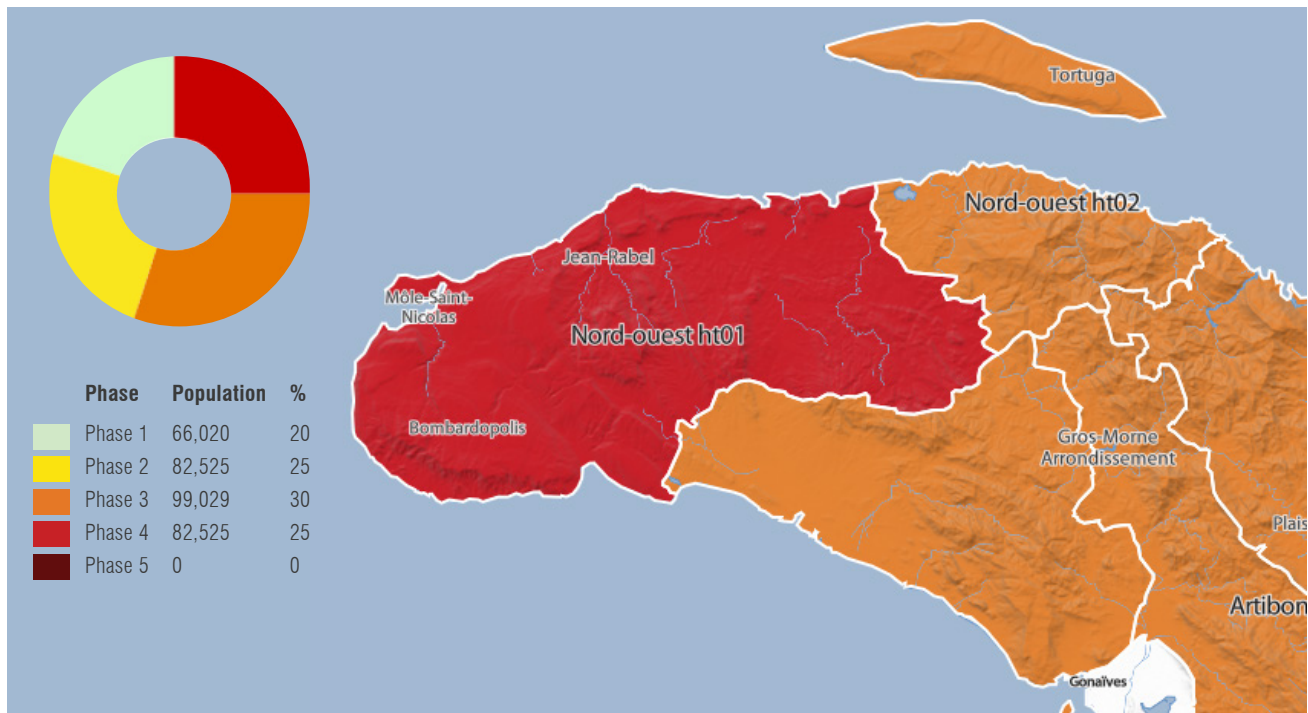
Characterized by a largely arid landscape, the department is home to 762,507 people and the second-largest city in Haiti, Port-de-Paix.^{4,5} As shown in Figure 3 and in Giles Alvarez et al. (2021), the department stands out as the department in Haiti with

⁴ Port-au-Prince, the country's capital and largest city, is home to roughly 1 million Haitians.

⁵ Fifty-seven percent of the department is classified as either dry or arid.

⁶ Estimates carried out based on Pokhriyal et al. (2019).

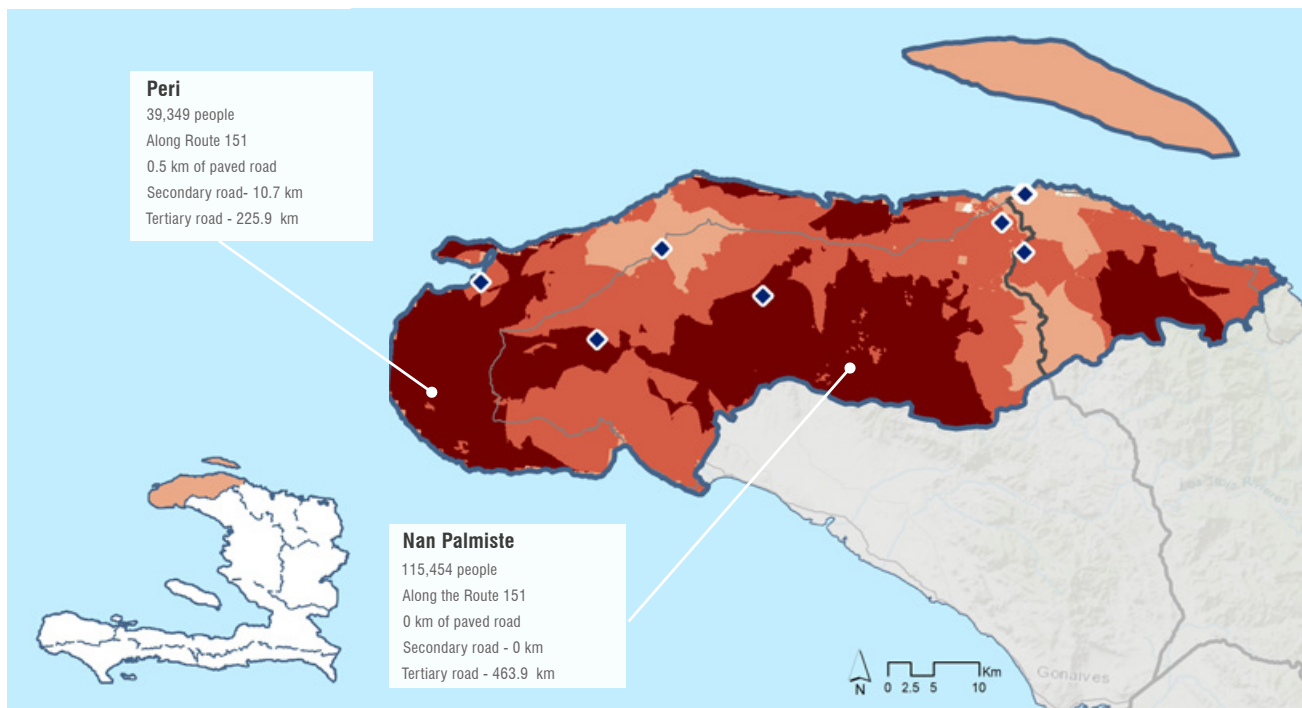
Figure 2. Integrated Food Security Phase Classification of Haiti's Northwest Department, March-June 2022



Source: IPC (2022).

Note: Each phase classifies different levels of food insecurity severity: Phase 1 is categorized as minimal, phase 2 as stressed, phase 3 as crisis, phase 4 as emergency, and phase 5 as famine. IPC: Integrated Food Security Phase Classification.

Figure 3. Development gaps in the Northwest Department



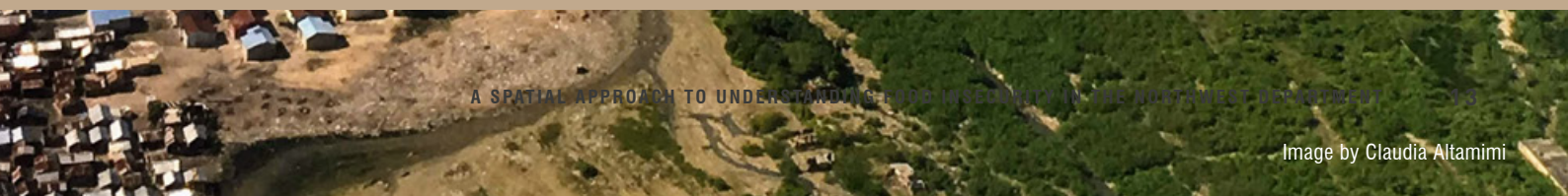
Source: Giles Alvarez et al. (2021).

NB: darker areas show a larger concentration of gaps (in 9 or more sectors), lighter areas show gaps in 4 or fewer sectors.



3

A Spatial Approach to Understanding Food Insecurity in the Northwest Department

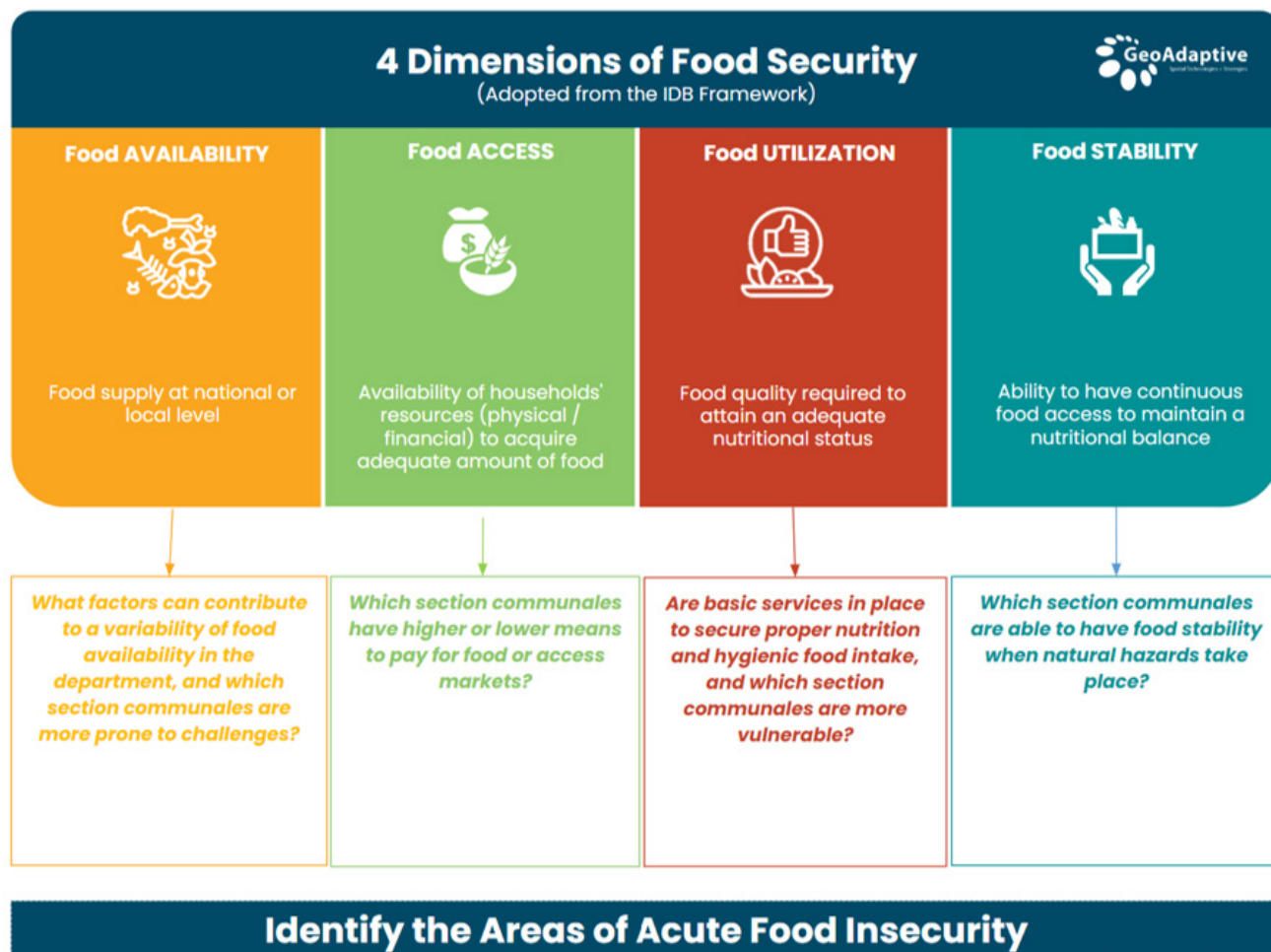


This section combines the IPC and the Inter-American Bank’s (IDB) Food Security Framework (IDB 2018) to assess factors that hinder food security in Haiti’s Northwest department. Food security is defined as the situation that exists “when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs for an active and healthy life” (FAO 2007, pg.1). In order to analyze the factors that contribute to food insecurity in the Northwest department, this paper departs from this definition, taking a food systems approach,⁷ and combines the IPC data and the IDB’s Food Security Framework in a spatial analysis to look at multiple factors that result in these high levels of food insecurity.

The IDB’s Food Security Framework divides factors that contribute to food insecurity into four dimensions. In so doing, it provides a multipronged strategy to identify both supply and demand factors that contribute to food insecurity (Figure 4):

1. **Food availability:** Factors that contribute to an increase, variation, or reduction of food availability.
2. **Food access:** Factors that determine households’ availability of resources to acquire adequate quantities of food.
3. **Food utilization:** Availability of services to secure the quality of food required to attain an adequate nutritional status.
4. **Food stability:** Factors that contribute to continuous food access to maintain a nutritional balance.

Figure 4. The Food Security Framework



Source: Prepared by the authors based on IDB (2018).

⁷ Specifically, food systems include all activities needed for planting, harvesting, processing, packing, transportation, distribution, marketing, trade, consumption, and waste removal (UNSCN 2016).

The spatial analysis selects key indicators and benchmarks, geo-references them, and classifies areas according to the severity of identified gaps. The spatial approach used in this paper takes key indicators related to the four dimensions of food security and analyses them in on their geography at a disaggregated level across the department. The spatial approach was designed to complement other assessments by capturing and representing across its dimensions desegregated and geographic specific intricacies, which can in turn, assist in the design of more targeted actions. The indicators used in each dimension can be found in Annex 1. First, specific indicators and thresholds for gaps are selected based on available data and existing literature. Second, individual indicators are overlaid to identify gaps and classify areas of the department into less severe, severe, and more severe gaps. Gaps are identified as areas that are underperforming given the selected benchmark. The data used for this analysis were obtained from the Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural (MARNDR) and international organizations, including the IDB, Food and Agriculture Organization (FAO), World Bank, and U.S. Agency for International Development, among others.⁸

The spatial analysis is then complemented by a review of other socioeconomic factors that affect the dimensions of food security. The spatial analysis provides a geo-referenced assessment of key factors that affect the four dimensions of the framework, developing recommendations for targeted investments that could have a positive effect on food security. However, these results capture spatial relationships and do not necessarily indicate correlation or have a strong statistical component. The scope for this type of analysis is also restricted by the availability of data and information. This type of analysis in the Northwest department, for example, cannot take into consideration variables such as remittances, price fluctuations, and household dietary diversity scores due to limited granular data availability. Therefore, the spatial analysis is also complemented by a review of socioeconomic conditions that affect the different dimensions of food security. Finally, even though these spatial approaches lead to the definition of key areas of investment and the design of interventions, they only provide an initial roadmap. Additional assessments, designs, and pre-feasibility studies catered to each dimension or sector are recommended in order to develop scalable policy solutions and efficient operations based on each sector's needs. The following sections present the results of the analysis.

3.1 Food Availability

Despite great potential for food production in Haiti, the availability of food has been declining over the past few years due to both domestic and international factors. The food availability dimension assesses food supply, either through domestic production through imports or aid (IDB 2018).

In Haiti, falling domestic production, which has been hampered by insufficient quality infrastructure and financing, insecurity, and natural disasters, has been accompanied by rising prices of imported goods and stalling aid to the sector. Taken together, these factors are having a negative effect on the availability of food.

3.1.1 Domestic Production

Agriculture is a key sector in the Northwest department. While agriculture is an important sector in Haiti, generating 18 percent of GDP and approximately 50 percent of employment (Morris, Sebastian, and Peregó 2020), the sector is particularly prominent in the Northwest department, which harvests a large range of crop groups including roots, tubers, starches, and cereals (MARNDR 2014). Agriculture also employs more than half the population in the department, higher than the national average of 46.1 percent (IHSI 2012).⁹ Despite the importance of agriculture in the department, however, various challenges hinder agricultural production and supply, thus reducing food availability.

Insufficient production and distribution infrastructure, including roads, irrigation, and production facilities, hinders the production, transportation, and processing of agricultural goods. Table 1 show gaps in paved roads and agricultural routes, irrigation, and processing centers in the Northwest department. Taken together, these gaps affect 16.9 percent of the population and 28 percent of the department. The communal sections of Mare Rouge, Mahotièrè, Pointe des Oiseaux, Bas de Sainte Anne, and Côtes de Fer (Môle Saint Nicolas) are particularly vulnerable to these gaps. Insufficient quality roads affect 25.1 percent of the population in the department.

⁸ Given limitations on the scale of availability of spatial data, a linear regression model did not meet analytical standards to be considered robust enough to infer, statistically, causes of food insecurity.

⁹ These data are from the 2012 Enquête sur les Conditions de Vie des Ménages Après le Séisme (IHSI 2021), which are the latest available household-level data in Haiti.

This exacerbates the department’s geographic isolation and obstructs supply chains and mobility, ultimately reducing agricultural sector output (Giles Alvarez et al. 2022b). Moreover, 22 percent of the population is in areas with insufficient irrigation. This limits production capacity, particularly given the arid nature of the soil.

In addition, 16.5 percent of the population in the Northwest department has limited access to agricultural processing centers, reducing the potential of the sector to create employment and limiting the possibility of value-added production.

Table 1. Agricultural Production and Distribution Infrastructure in Haiti’s Northwest Department

<p>A. Availability of Paved Roads and Agriculture Routes</p> <ul style="list-style-type: none"> 25.1 percent of the population has limited access to paved roads and agriculture routes. Haut des Moustiques, Mahotièrre, Mare Rouge, Pointe des Oiseaux, and Réserve ou Ti Paradis are the communal sections that have the most limited access. 	
<p>B. Availability of Irrigation</p> <ul style="list-style-type: none"> 90 percent of arable land is in drought areas that require substantial irrigation for productivity. 22 percent of the population is in areas with limited irrigated land. Dessources, Mare-Rouge, Côtes de Fer (Môle Saint Nicolas), Mare Rouge, and des Forges are the communal sections with the lowest availability of irrigation. 	
<p>C. Availability of Processing Centers</p> <ul style="list-style-type: none"> 16.5 percent of the population has limited access to agricultural processing centers. Mahotièrre, Mare Rouge, Pointe des Oiseaux, Lacoma, and Côtes de Fer (Môle Saint Nicolas) are the communal sections that have the most limited access. 	

Source: Prepared by the authors.

Socioeconomic challenges hamper productivity and transport. The institutional framework for agricultural production, distribution, and trade is hindered by limited financing, which tends to be donor-based. Despite agriculture being the main economic sector in the country, only 2.5 percent of the FY2022 state budget (0.2 percent of GDP) was allocated to the sector, much less than donor spending. Worsening security in recent years has also reduced mobility and hindered food distribution. Finally, agricultural practices with little mechanization and lacking economies of scale limit potential yields (Van Vliet et al. 2017). Farms in the Northwest department are fairly small – less than one carreau¹⁰ – and 46.3 percent of them focus on subsistence farming (MARNDR 2008). Lack of infrastructure and support for mechanization, fertilizers, and seed quality has also been identified as one of the top 10 challenges to the agricultural sector in the department.¹¹ The COVID-19 pandemic, along with recurring social protests and escalating insecurity, have further hindered domestic production, reduced farmers' access to production inputs and financing, and limited access to technical assistance and distribution due to travel and mobility restrictions.¹²

Recurrent extreme climate events hamper productivity and reduce yields. The Northwest department is vulnerable to extreme climate events, including droughts, floods, storms, and earthquakes. This hinders production capacity and crop yields. The department has endured repeated droughts and floods that have negatively affected agricultural production, resulting in the loss of crops and income. For example, the department experienced severe floods in the first quarter of 2022 that resulted in several deaths, infrastructure damage, and agricultural losses. The 2022 spring growing season was also compromised due to rainfall deficits from March to May. The department has also been hit by various tropical storms and hurricanes, including Hurricane Irma in 2017 and Tropical Storm Isaias in 2021. Earthquakes are also common: the department recorded 37 earthquakes with a magnitude of at least 1.5 on the Richter scale in just the past year alone.¹³

3.1.2 Imports and Aid

Haiti is greatly dependent on imported food products, which averaged 19.6 percent of imported goods between 2016 and 2020. During the COVID-19 pandemic, global supply chain disruptions put unprecedented stresses on food supply and helped drive up prices (FSIN 2022). Geopolitical tensions from the war in Ukraine have further disrupted global food supply globally, resulting in devastating effects on food-importing countries such as Haiti. Challenges hinder agricultural production and supply, thus reducing food availability.

Haiti is greatly reliant on aid, which reached an estimated 2.7 percent of GDP in FY2022, almost half of domestic revenue collection for that year. However, aid receipts have been falling since the 2010 earthquake, from 5.7 percent of GDP on average over FY2011–FY2012 to 1.8 percent of GDP on average in FY2021–FY2022.¹⁴ Yearly aid spending on the agricultural sector averaged 9.4 percent of total aid receipts, or 0.5 percent of GDP, between 2010 and 2020.¹⁵ This was more than double the amount allocated by the state budget in FY2022 for the sector.

3.2 Food Access

Limited access to food tends to be a result of challenges related to physical access and income. Food access entails the ability of households to physically obtain and purchase food, which is linked to both distance and supply, as well as to the availability of income (IDB 2018). In the Northwest department, supply constraints, mobility restrictions, price shocks,

and risks to sustained income hinder food access. Based on the spatial analysis presented below, 8.3 percent of the population and 12 percent of the area covered by the Northwest department have a high degree of difficulty to access food. The higher concentration of population at risk is in Côtes de Fer (Anse-à-Foleur), Bas de Sainte Anne, Lafague (Chamoise), la Pointe, and Mayance.

¹⁰ In Haiti, the carreau is a land unit measurement. One carreau of land in Haiti is equivalent to 1.29 hectares or 3.18 acres of land.

¹¹ Agricultural censuses and surveys by the Ministry of Agriculture.

¹² See IDB, "Mercredi de Réflexion," available at <https://iadb.libguides.com/MRHaiti> (accessed September 13, 2022).

¹³ See Earthquake Track at <https://earthquaketrack.com/ht-03-port-de-paix/recent> (accessed September 13, 2022).

¹⁴ Aid has increased slightly since the 2021 earthquake. Data obtained from the International Monetary Fund's World Economic Outlook database at <https://www.imf.org/en/Publications/WEO/weo-database/2022/April> (accessed September 13, 2022).

¹⁵ Data obtained from the international Data Transparency Initiative at <https://iatistandard.org/en/iatl-tools-and-resources/> using sector code 311 (accessed September 13, 2022).

3.2.1 Supply-Side Factors

Geographical isolation and poor transport infrastructure hinder food supply and thus access to food in the Northwest department. As previously discussed, the department suffers from geographic isolation and inadequate transport infrastructure, which limit food availability and access. As seen in Table 2, 40.9 percent of the population in the Northwest department has limited access to food due to long travel times to reach markets or production areas (more than 60 minutes). This is due to a combination of poor transport infrastructure and inadequate market networks to distribute production to local markets. The communal sections of Derourvay, Haut des Moustiques, des Granges, Mare Rouge, and Pointe des Oiseaux face the most serious challenges to access food.

Insecurity and vulnerability to climate shocks also hinder mobility, which, together with rising international food prices, reduces food access. As recurrently discussed in this paper, high and growing levels of insecurity reduce mobility across the department, diminishing the scope of food distribution and increasing

domestic prices. Worsening security has resulted in increasing scarcity of both domestically produced and imported food products. Nationally, 33 percent and 66 percent of the population identified armed violence and kidnappings, respectively, as the main reason impeding access to markets in 2019 (CNSA 2019). Since then, security has deteriorated further. International food prices have also risen dramatically as a result of supply chain disruptions during the COVID-19 pandemic and the effects of the war in Ukraine, which have occurred alongside a depreciation of the national currency. The annual inflation rate of imported products reached 41.7 percent in June 2022, compared to 14.2 percent in June 2021, and the annual inflation rate of food products was 30.7 percent in June 2022, compared to 15 percent in June 2021. Finally, climate shocks reduce the scope for food access due to damaged production and transport infrastructure. Given that the department is far away from the capital and that the port facilities in Port-de-Paix face severe challenges, this also contributes to delayed reconstruction and rebuilding efforts and slows any recovery in food access after these events.

Table 2. Access to Food and Income in Haiti’s Northwest Department

<p>A. Access to Food</p> <ul style="list-style-type: none"> 40.9 percent of the population has limited access to food, given the long travel time to reach markets or production areas. The communal sections of Derourvay, Haut des Moustiques, des Granges, Mare Rouge, and Pointe des Oiseaux face the most severe challenges. 	
<p>B. Access to Income</p> <ul style="list-style-type: none"> 15.6 percent of the population lives at acute levels of poverty (> 63.7 percent of income poverty).¹ The communal sections of Chansolme, Côtes de Fer (Môle Saint Nicolas), Bas des Moustiques, Côtes de Fer (Anse-à-Foleur), and Carreau Datty face the gravest challenges. <p>¹ This threshold was selected based on an analysis of the quartile distribution</p>	

Source: Prepared by the authors.

3.2.2 Demand-Side factors

High poverty levels and rising prices hinder purchasing power and thus access to food. Poverty levels in the Northwest department are higher than the national average – 63 percent compared to the national average of 58 percent.¹⁶ As seen in Table 2, 15.6 percent of the population (118,739 people) in the department lives in a high-poverty area, which can hinder the ability to acquire food. The communal sections of Chansolme, Côtes de Fer (Môle Saint Nicolas), Bas des Moustiques, Côtes de Fer (Anse-à-Foleur), and Carreau Datté face the most severe challenges. Finally, risks stemming from the sustainability of households' income sources

also compound demand-side factors and could be contributing to lower food access during economic downturns. For example, more than half the population in the department (51 percent) relies on remittances as a major source of income. The COVID-19 pandemic and the volatility of the Haitian gourde have affected the level of consumption of households directly dependent on transfers, leading to decreases in purchasing power (MARNDR 2014; CNSA 2019),¹⁷ and contributing to the deterioration of food security in the department.

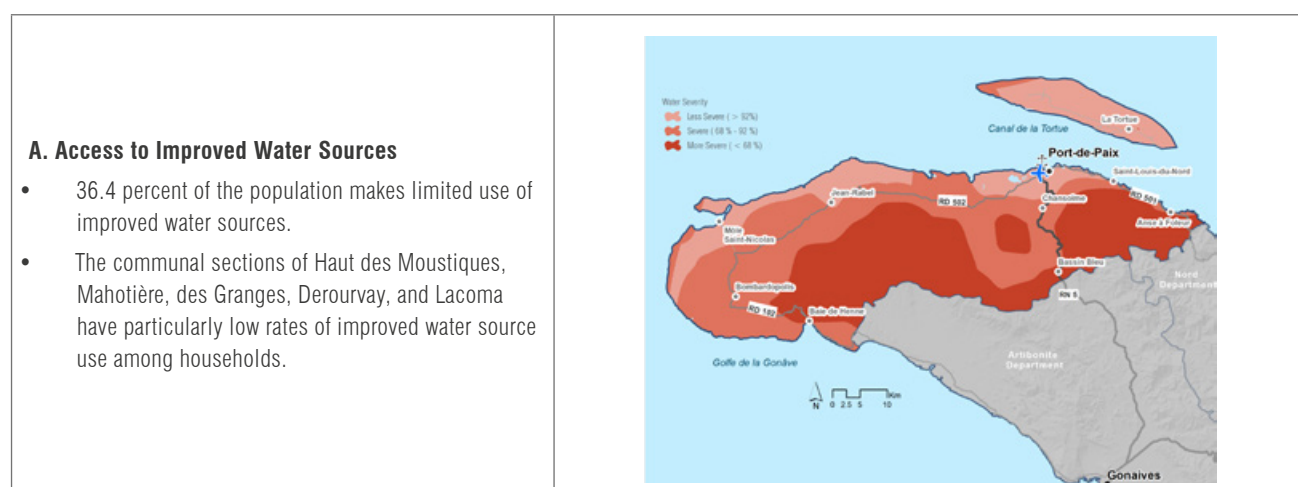
3.3 Food Utilization

Food utilization is often hampered by low access to potable water, inadequate sanitation, and poor hygiene practices. Food security not only refers to productive agricultural systems and physical access to markets. It also revolves around good utilization of food in terms of safety and nutrition. It thus refers to the ability of individuals to obtain food and maintain a quality diet to achieve positive nutritional outcomes (IDB 2018). Factors such as reduced access to potable water and adequate sanitation, or lack of diversity in diets, hinder adequate food utilization in the Northwest department.

The Northwest department has gaps in access to water and sanitation facilities, which likely hinder food safety and utilization. As seen in Table 3, 36.4 percent of the population makes limited use of improved water sources and 20.2 percent makes limited use of

proper sanitation, relying instead on open defecation. These gaps are wider in the communal sections of Citerne Rémy, Carreau Datté, Mayance, and l'Estère Déré. Rural settings are particularly prone to inadequate food utilization due to limited access to clean water and adequate sanitation. Inadequate access to water and sanitation facilities can also lead to contamination of water and transmission of diseases, with detrimental effects on the population's health. For example, the 2016/2017 Demographic Health Survey highlighted that 19.7 percent of children under 5 years of age had experienced diarrhea in the two weeks preceding the survey. The cholera epidemic that Haiti has suffered from 2010 was also partly a result of poor sanitation conditions (USAID 2021).

Table 3. Access to Water and Sanitation Facilities in Haiti's Northwest Department

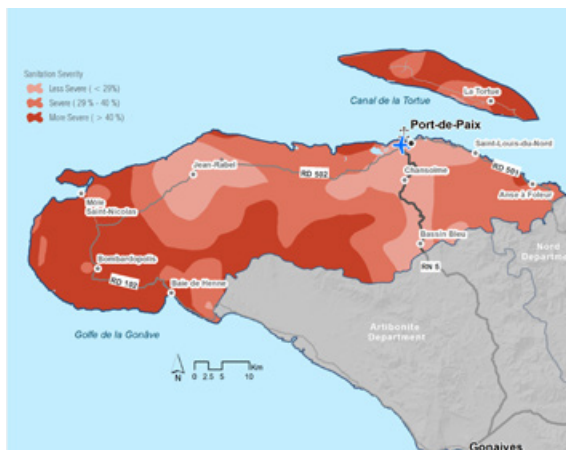


¹⁶ The latest figure is from 2012, and poverty has likely increased since then. These measures were obtained using Pokhriyal et al. (2019).

¹⁷ Sixty percent of households also noted a loss in revenue or salary during the pandemic (UNDP 2022).

B. Access to Improved Sanitation Facilities

- 20.2 percent of the population makes limited use of proper sanitation, relying instead on open defecation.
- The communal sections of Haut des Moustiques, Mahotière, Plate Forme, Mare Rouge, and des Forges face the gravest challenges regarding the use of improved sanitation facilities.



Source: Prepared by the authors.

High rates of stunting or anemia signal that the dietary diversity to ensure adequate food utilization is insufficient. Even if the population has adequate food access and availability, poor-quality diets with low dietary diversity contribute to food insecurity and result in high levels of stunting, anemia, or related health conditions. In 2019, the Northwest department was identified as one of the areas of the country with the lowest levels of dietary diversity. The department has the highest proportion of households consuming two food groups or less regularly (almost one in three households), some of the highest shares of households reporting never eating foods rich

in vitamin A (almost half), and the highest share of households reporting not consuming foods rich in iron (almost three in four) (CNSA 2019). Food insecurity can be associated with poor diets, which also have direct health consequences on the population.

According to the 2016/2017 Demographic Health Survey, in the Northwest department 20.3 percent of children under 5 are stunted, 65 percent of children under 5 and 45.9 percent of women 15-49 are anemic, and only 24.8 percent of children 6-23 months old meet the minimum dietary diversity requirement (IHE and ICF International 2018).

3.4 Food Stability

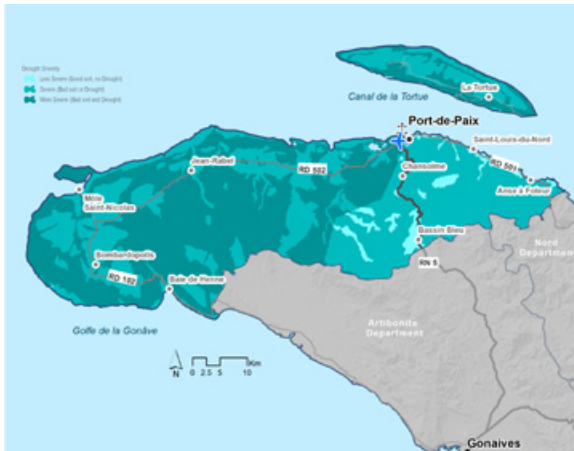
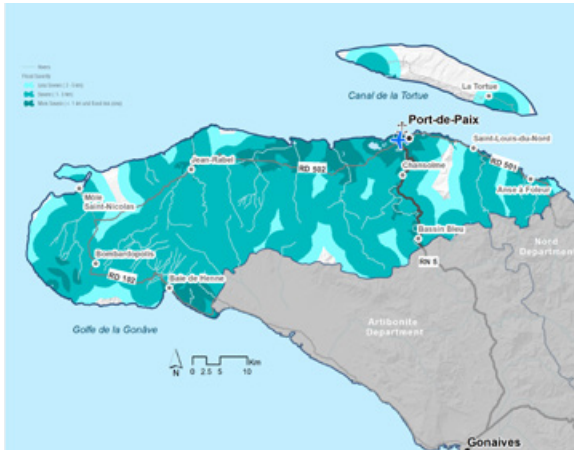
Food stability is not guaranteed. Food stability refers to the ability to maintain an adequate food supply in the face of unexpected shocks. These shocks can include natural hazards, price fluctuations, supply disruptions, or insecurity (IDB 2018). In Haiti's Northwest department, food stability is not guaranteed due to the department's natural endowment, its vulnerability to climate shocks, price fluctuations, and insecurity.

As previously discussed, dry and arid land, combined with substantial erosion, limit food stability in the Northwest department. According to a recent analysis by Haiti's University of Quisqueya, 57 percent of the land in the Northwest department is classified as arid or dry, requiring substantial irrigation

resources that are currently not available. Soil erosion also provides a challenge to food stability: 41 percent of the territory faces high risks stemming from erosion, which is highlighted as one of the gravest problems by the population.¹⁸ As pointed out in other sections of this paper, the department is also highly vulnerable to extreme climate events, including droughts and floods. Almost 27 percent of the population live in areas at risk of droughts and 23.2 percent live in areas at risk of floods, which can hinder food stability. The higher concentration of population at risk is concentrated in the communal sections of la Corne, Aubert, Lacoma, des Forges, and Bas des Moustiques.

¹⁸ <https://uniq.edu.ht/feuilles-de-route/>

Table 4. Drought and Flood Risk Zones in Haiti's Northwest Department

<p>A. Drought Risk Zones</p> <ul style="list-style-type: none"> 27 percent of the population (205,503 people) lives in drought zones. Grande Source, Lacoma, Vieille Hatté, Guinaudée, and Réserve ou Ti Paradis are the communal sections with the highest risk. 	
<p>B. Flood Risk Zones</p> <ul style="list-style-type: none"> 23.2 percent of the population (177,263 people) lives in flood zones. Aubert, Baudin, la Corne, Lacoma, and Guinaudée are the communal sections with the highest risk. 	

Source: Prepared by the authors.

Escalating gang violence and recurrent protests also hinder food stability. Haiti has experienced increasing insecurity and recurring social protests over the past few years, which hinder food stability. The Northwest department has seen several large-scale social protests and also kidnappings and gang violence,¹⁹ which obstruct supply chains and impede food stability. Rising security concerns in Port-au-Prince, which is the entry point for most imports into the country, has also hindered food stability across the country. An example of this has been the delay in the humanitarian response and aid in the aftermath of extreme climate events due to the control by gangs of key transport routes from the capital.

Price fluctuations also reduce food stability. In addition to continually rising, prices of basic goods have fluctuated substantially in recent years. Haiti is a net food and fuel importer, which makes it vulnerable

to fluctuations in the prices of these commodities in international markets. Supply chain disruptions and geopolitical tensions have resulted in changes to prices of goods in international markets that have a direct pass-through effect to the Haitian population and affect food stability. Furthermore, the control of key transport and supply routes by gangs has had a direct impact on supply and thus prices in Haiti. For example, in 2021, gangs brought economic activity almost to a complete standstill when they blocked fuel supply from the Varreux terminal, leaving the country with almost no fuel for weeks. During this time, a gallon of gasoline or diesel sold for more than 1,500 gourdes, while the official prices are 250 and 350 gourdes, respectively. This also resulted in fluctuations in the prices of other goods and services (FEWS NET, 2022).

¹⁹ See "Libération collective de 29 otages à Tibwadôm," *Le Nouvelliste*, January 8, 2022, available at <https://lenouvelliste.com/article/237375/liberation-collective-de-29-otages-a-tibwadom>



4

What Can Be Done to Promote Greater Food Security in Haiti's Northwest Department?

As outlined in previous sections of this paper, Haiti, and the Northwest department, face high levels of food insecurity that are the result of multiple factors. The problem of food insecurity in Haiti is severe and complex. This paper used the IPC and the IDB's Food Security Framework to disentangle some of the factors that affect the four dimensions of food insecurity in the Northwest department (IDB 2018). Based on the analysis in Section 3, as well as information from the FAO and discussions with IDB sector specialists in the country, this section recommends actions and proposes geographically- targeted investments that could help alleviate some of the factors contributing to food insecurity in the department across the four analyzed dimensions.²⁰ The recommendations do not constitute

a comprehensive list of all actions that could or indeed should be done to alleviate food insecurity in the department. Given the scale of the challenges, tackling food insecurity will require a coordinated, integrated and multi-sectoral approach at all administrative levels of the state, from local to national, and with the private sector and the donor community.

4.1 Expand Access to Basic Services to Improve and Complement Food Access and Utilization

Expanding access to basic services could improve nutrition, hygienic food intake, and the ability of households to obtain food, while taking into account both physical and financial resource constraints.

Food access and utilization could thus be directly improved. The following are proposed interventions to promote better access to services that could support greater food security in the Northwest department: (1) Expand unconditional cash transfers to provide needed resources to purchase food, as well as conditional cash transfers (e.g., cash for work programs) that can build community assets (e.g., water points, irrigation infrastructure, greenhouses); (2) Promote producer-to-people programs to build organized local markets where farmers can sell their produce under adequate hygienic conditions, and where the local population can access a broader variety of produce these initiatives could also be supported by investing in existing formal and informal market structures and transportation infrastructure, such as supporting the activities of Madam Saras;²¹ (3) Expand water and sanitation programs outside Port-de-Paix to increase access and improve hygiene standards in the Northwest department's rural zones, with positive effects on food utilization this could include investing in hand pumps with filtered water, harvesting of rainwater for consumption and irrigation, groundwater sources,

small-scale water distribution points, and sewerage infrastructure in households and communities; (4) Expand community scale off grid electrification in order to ensure that cold storage facilities can function, and that basic electricity requirements in shops and markets can be maintained, in order to support physical access;²² (5) Promote monthly food rations to families in poverty with conditions related to schooling children to promote financial access and better food utilization; (6) Provide funding and stipends to promote the completion of basic and secondary education for women and youth to support financial access and better food utilization; and (7) Expand mobile clinics and medical units in underserved rural areas to improve food utilization.

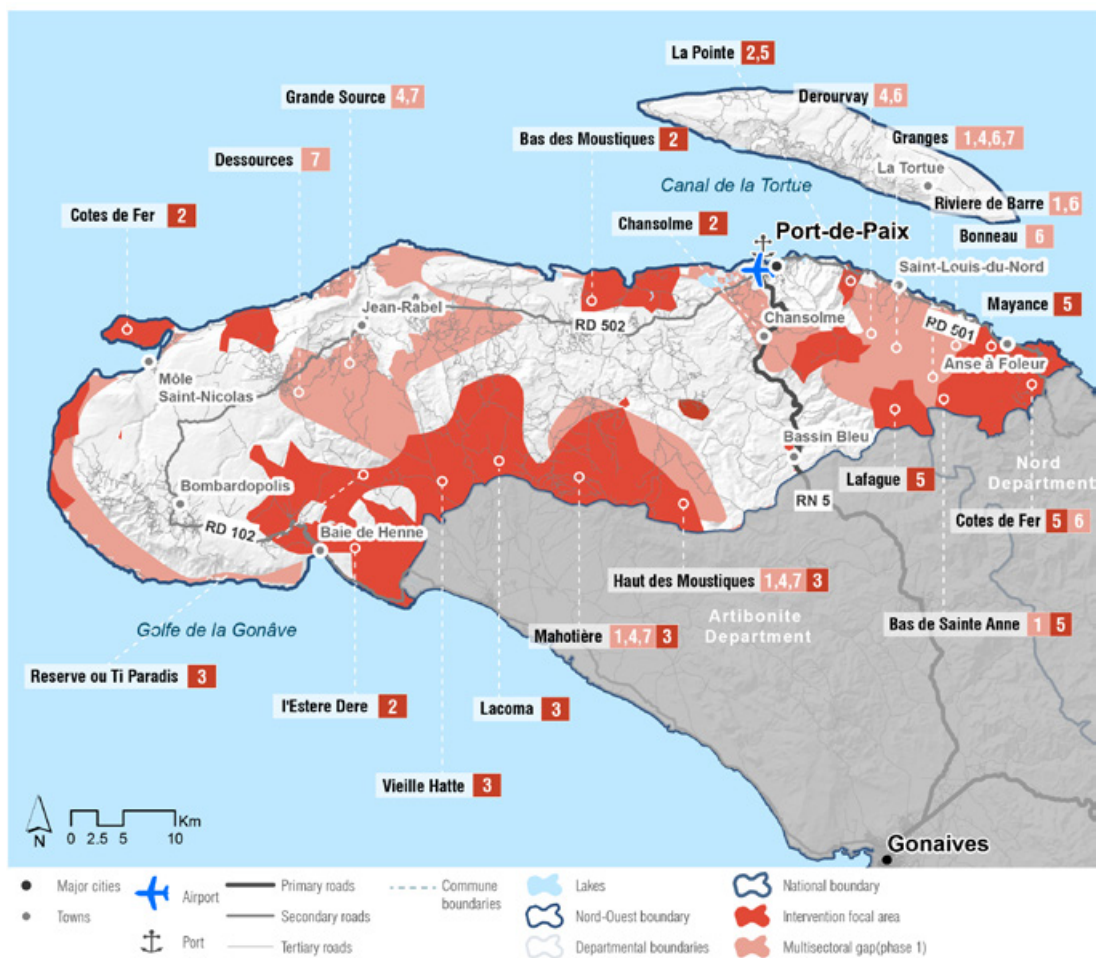
²⁰ The numbering of the proposed interventions in the text matches the numbering in the figures.

²¹ Madam Saras are predominantly rural women who purchase produce in rural areas, typically near where they live, and transport it to larger rural, regional, or urban markets.

²² Gaps in electrification particularly hinder production and storage processes, and reduce access to food products that are available in other areas where electricity is available.

These interventions could benefit an estimated 20 communal sections, improving basic services for close to 463,094 people and having direct positive effects on food access and utilization (Figure 5). There would also likely be indirect benefits, particularly in the education and health sectors and in poverty reduction. Although the Northwest department would benefit from these interventions, the map in Figure 5 highlights specific communal sections such as Haut des Moustiques, Mahotiere, and Granges that could particularly benefit from each of these seven interventions.

Figure 5. Focal Areas for Food Security Interventions to Improve Basic Services in Haiti's Northwest Department



Source: Prepared by the authors.

4.2 Promote Adequate Nutrition

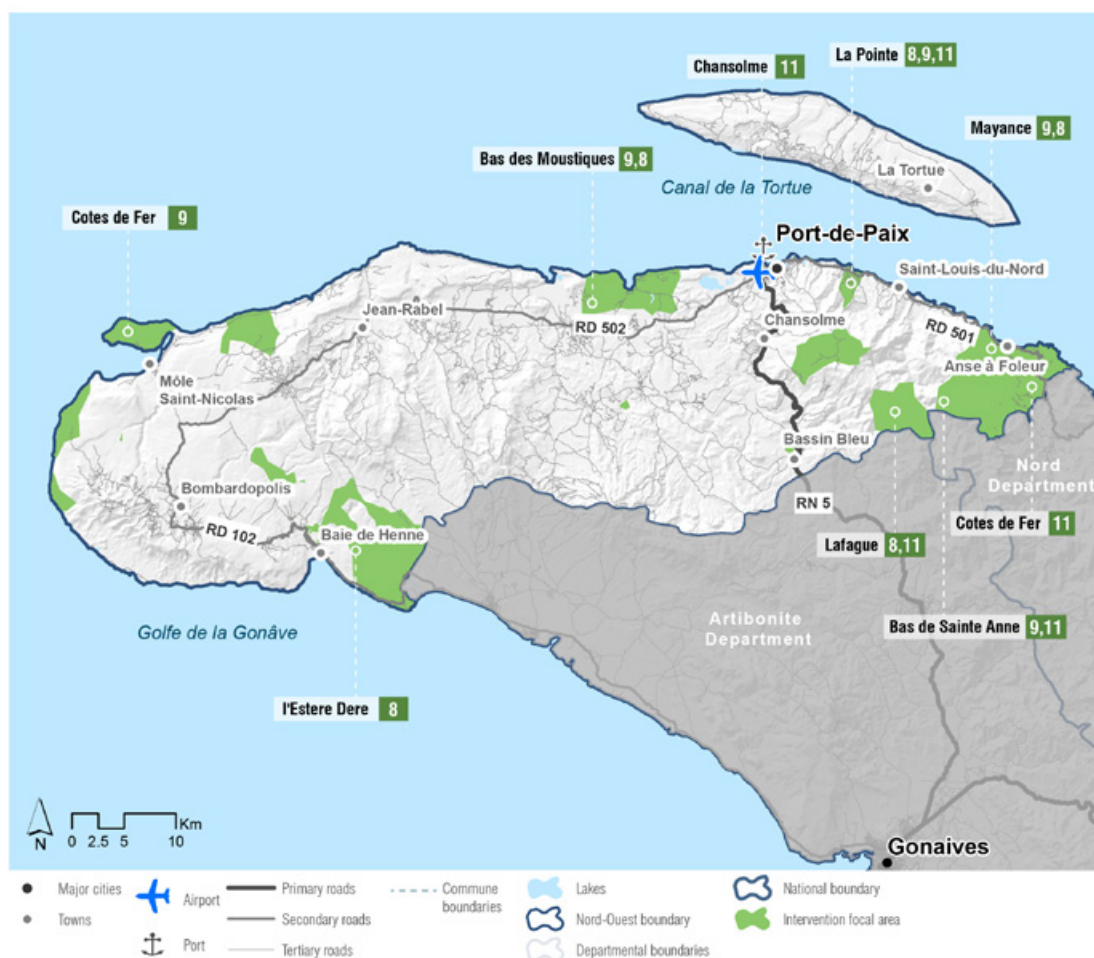
Programs to promote adequate nutrition are proposed to foster long-term progress in health development indicators and improve food access, utilization, and stability in the Northwest department.

Following chronologically the enumeration in the previous section, the following programs are proposed: (8) As a response to school closures because of insecurity, natural disasters, and the COVID-19 pandemic, establish and expand school meal programs for households affected by poverty and with a high concentration of stunted children this would have positive effects on all three highlighted food security dimensions; (9) Promote awareness campaigns related to food safety and nutrition to ensure that the population understands proper food utilization practices; (10) Ensure that food access and food security interventions in general include a component of food fortification (e.g., iron and other macronutrients missing in the department) in order to improve food utilization; and (11) Establish programs to develop the population's skills related to food fortification, snack production, packaging, and kitchen gardens particularly for women led households in order to improve household diets. This final proposal

would support existing efforts by the Bureau de Nutrition et Développement and the Organisation de Développement Rural Intégré du Nord-Ouest to address food security in the department. For example, vegetables gardens for schools and citizens' groups could be a positive way to increase food access and utilization in an inclusive manner and tackle both access and income constraints for key sectors of the population.

These interventions could benefit an estimated nine communal sections, ensuring access to adequate nutrition for close to 55,077 people (Figure 6). The interventions would likely have direct positive effects on food access, utilization, and stability. They could also have indirect positive effects on sectors such as education and health, livelihoods, and the environment. Although the department would benefit from these interventions, the map in Figure 5 highlights specific communal sections such as Bas de Sainte Anne, La Pointe, and Mayance that could particularly benefit from each of the interventions.

Figure 6. Focal Areas for Food Security Interventions to Promote Access to Adequate Nutrition in Haiti's Northwest Department



Source: Prepared by the authors.

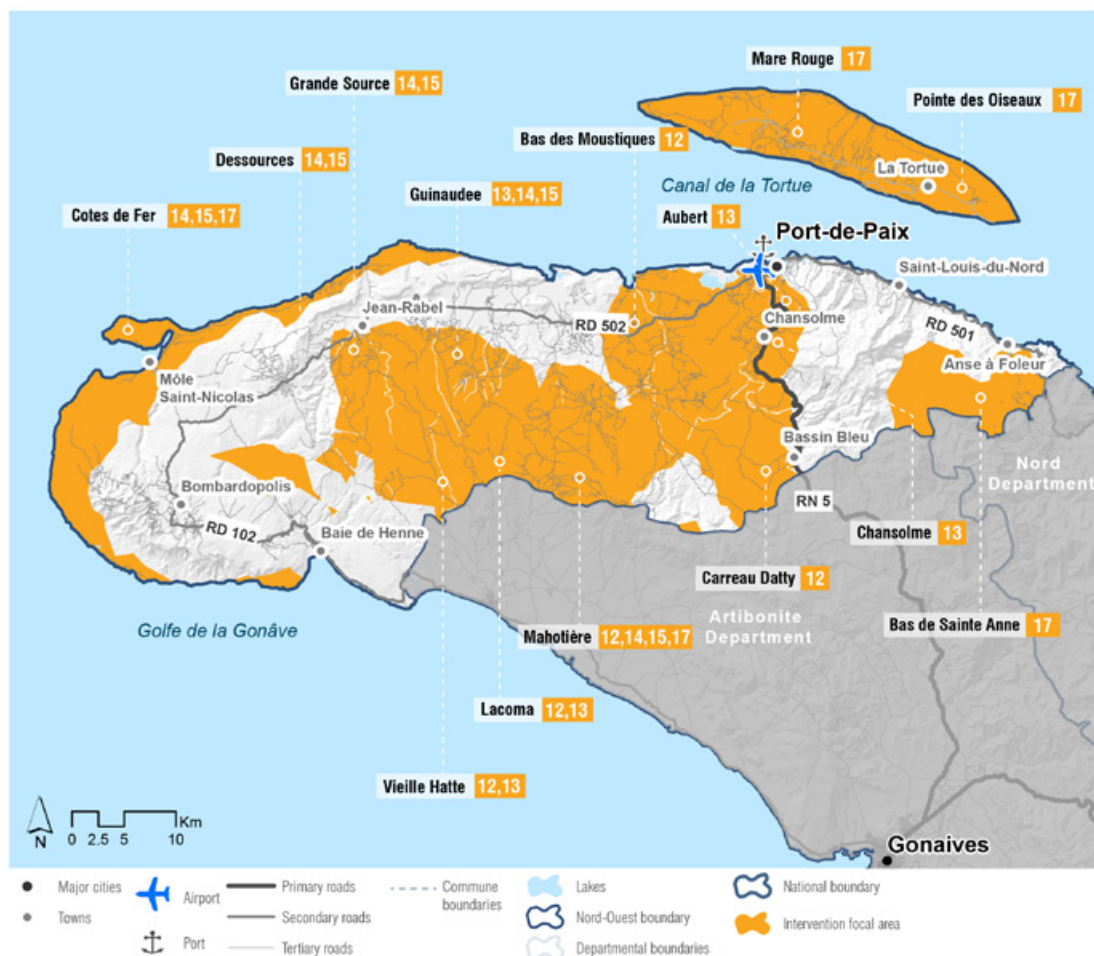
4.3 Support Productive and Sustainable Agriculture

These interventions are aimed at addressing and improving agricultural productivity and sustainability in the Northwest department, mainly through technical and diversification opportunities, with positive effects on food availability, access, and stability. Following chronologically the enumeration in the previous section, the following are the proposed interventions: (12) Increase funding for expansion of irrigation, prioritizing small and medium-size irrigation systems, or look into the possibility of promoting more extensive use of groundwater sources and drop irrigation; (13) Improve secondary and tertiary road infrastructure and maintenance to ensure access to processing facilities and farm-to-market routes, taking into account security reinforcement for key supply chain routes; (14) Improve post-production by increasing post-harvest storage capacity along with food stocks and grain reserves; (15) Invest in cold-chain storage facilities in key collection locations to accompany the expansion of electricity grids highlighted in action 4; (16) Provide oversight and management to increase crop intensification; and (17) Provide focused technical packages and assistance (e.g.,

seeds, fertilizers, equipment, etc.), coupled with finance solutions (e.g., credit guarantees, loans, etc.), to support small-scale farmers and women-led small and medium-sized enterprises.

These interventions could benefit an estimated 14 communal sections, improving productivity and sustainability for close to 574,375 people (Figure 7). These interventions would likely have direct positive effects on food availability and stability. They could also have indirect positive effects on sectors such as transportation and exports, as well as on conservation and the environment. Although the department would benefit from these initiatives, the map in Figure 7 highlights specific communal sections such as Mahotièrre, Guinaudée, and Dessources that could particularly benefit from each of these interventions.

Figure 7. Focal Areas for Food Security Interventions for Productive and Sustainable Agriculture in Haiti's Northwest Department



Source: Prepared by the authors.

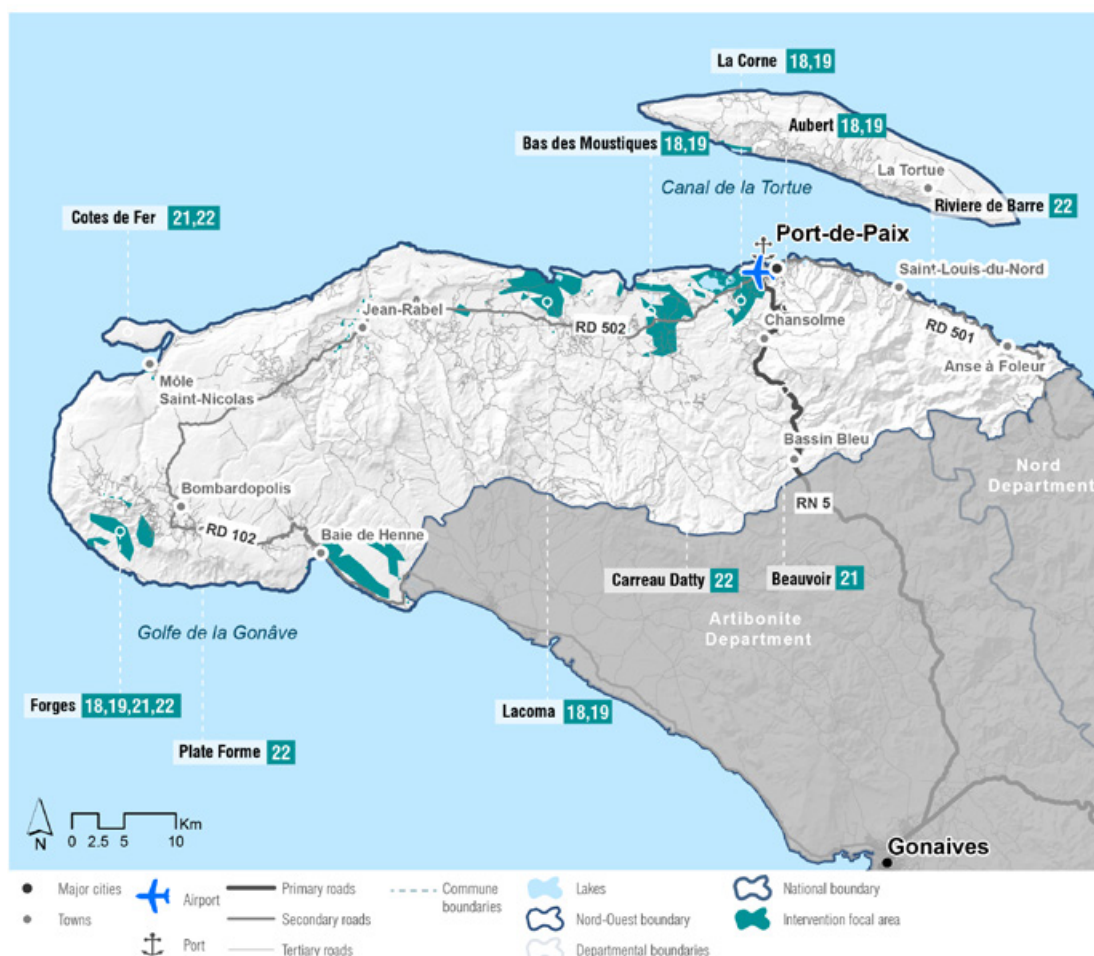
4.4 Increase Resilience to Shocks and Stresses

These interventions could help reduce and respond to the impacts of environmental and climate shocks and/or stressors, and increase resiliency through emergency preparedness, tolerant crops and livestock, and pest and disease control. Proposed actions could have a direct positive impact on food availability and stability. The interventions could also have potential spillover effects on poverty and vulnerability by increasing the resiliency of vulnerable populations. Following chronologically the enumeration in the previous section, the following are the proposed interventions: (18) Establish emergency preparedness and food assistance safety nets (e.g., resilience projects) in Bombardopolis and Baie de Henne to increase resilience in high-risk areas; (19) Promote technical packages and assistance for tolerant crops and livestock breeds to increase resilience to environmental shocks, climate shocks, and illnesses, and to increase food availability and stability; (20) Support agroforestry practices by providing micro credit loans, subsidies to farmers, and technical assistance, specifically on training in technology, and to increase food availability

and stability; (21) Establish management strategies for pest and disease control; (22) Establish a transportation distribution network that increases the system's resilience during all weather conditions and climate events, and to support food stability and access; and (23) Prevent and minimize significant food price volatility risks and increase competitiveness through strategies such as insurance, price and social protection programs, emergency food reserves, and fair trade initiatives for import reduction.

These actions would also benefit from food insecurity mappings that are updated regularly and ready to be used in the event of a disaster. This would increase food access and stability. These interventions could benefit an estimated 10 communal sections, increasing food access and stability for close to 134,821 people, (Figure 8). Although the department would benefit from these interventions, Figure 8 highlights the communal sections such as Forges, Côtes de Fer, and Beauvoir that could particularly benefit from each of the interventions.

Figure 8. Focal Areas for Food Security Interventions to Increase Resilience to Shocks and Stressors in Haiti's Northwest Department



Source: Prepared by the authors.



5 Conclusions

This paper has delved into the factors related to food insecurity in Haiti, and particularly its Northwest department. Haiti is one of the most food insecure countries in the world, ranking 109th out of 116 countries on the Global Hunger Index in 2021. The Northwest department records particularly high levels of food insecurity: 55 percent of the population is in urgent need of assistance and 6 of 10 households have reported adopting emergency adaptation strategies to meet their food needs in recent years (CNSA 2020). Using IPC data and the IDB Food Security Framework, this analysis implemented a geospatial approach and map allow the exploration of and geographic identification of factors that contribute to these high levels of food insecurity. From there this paper provides recommended measures that could alleviate the identified challenges in the Northwest department. The spatial approach has further allowed for a geographical characterization of these factors in order to develop specific, targeted proposals.

This study is part of a series of four analyses on development gaps and value chains for agricultural production in Haiti. Combined, these studies explore development gaps in the country, analyze factors that contribute to food insecurity, investigate the potential for export promotion of key agricultural goods, and examine value chains for selected agricultural products that could be promoted both for export and national consumption.

The spatial approach to analyze food insecurity, together with a review of additional socioeconomic factors, provides a geographically specific description of the location and extent of the challenges that hinder food availability, access, utilization, and stability in the Northwest department. The problem of food insecurity is severe and complex in Haiti, stemming from multiple, heterogeneous factors. The spatial-explicit analytical framework and methodology used in this study has analyzed the factors that contribute to food insecurity across four dimensions following the IDB's Food Security Framework: food availability, access, utilization, and stability (IDB 2018). The spatial analysis was complemented by a review of other socioeconomic factors that affect the four dimensions of food insecurity and combined, reduce supply and demand for food in the Northwest department. However, the study is limited by the availability and granularity of geo-referenced data for the socioeconomic analysis.

Food insecurity in the Northwest department is thus the result of a combination of limited food supply and access, inadequate food utilization, and challenges to food stability. As discussed in this paper, falling domestic production due to insufficient quality infrastructure and financing, insecurity, and natural disasters has occurred alongside international supply chain disruptions, affecting imports and stalling aid receipts. Combined, these factors are having a negative effect on food availability. Supply constraints and mobility restrictions, price shocks, and risks to sustained income are also having a negative impact on food access. Challenges to access potable water and sanitation infrastructure, as well as insufficient diet diversity, also hinder food utilization. Moreover, food stability is not guaranteed due to the department's natural endowment, insufficient irrigation infrastructure, vulnerability to climate shocks, price fluctuations and insecurity.

Based on the factors identified as contributing to challenges in the various dimensions of the food security framework, as well as on discussions with IDB specialists and organizations working on these issues in Haiti, this paper has developed four broad recommendations and within them has recommended specific interventions to alleviate food insecurity.

- **First, improve access to basic services to support food access and utilization.** Expanding income support programs for poor households, as well as access to services such as electricity, health, education, and water and sanitation, could help tackle accessibility and food utilization challenges that contribute to food insecurity. Although Figure 5 highlights different communal sections in the Northwest department that could benefit from the proposed interventions, Haut des Moustiques, Mahotiere, and Granges could particularly benefit.
- **Second, promote access to adequate nutrition to improve food access, utilization, and stability.** This could be done by promoting awareness and education programs about nutrition and the different food groups and by ensuring that food security interventions include food fortification measures. Although Figure 6 highlights different communal sections in the Northwest department that could benefit from the proposed interventions, Bas de Sainte Anne, La Pointe, and Mayance could particularly benefit.
- **Third, support productive and sustainable agriculture to improve food availability and stability.** Specific proposed actions include investing in necessary infrastructure for the production, processing, and distribution of food, supporting crop intensification, and providing focused technical assistance and finance solutions. Although Figure 7 highlights different communal sections in the Northwest department that could benefit from the proposed interventions, Mahotiere, Guinadee, and Dessource could particularly benefit.
- **Finally, increase resilience to shocks and stresses to increase food availability and stability.** Measures to increase climate change mitigation and adaptation include reducing price volatility, which, in the Northwest department, could particularly benefit the communal sections of Forges, Côtes de Fer, and Beauvoir, as shown in Figure 8. However, tackling challenges that stem from severe climate events would benefit not only food insecurity in the Northwest department, but also in Haiti as a whole.





Annex

Annex 1. Indicators and Data Sources

The food insecurity spatial approach was designed to complement and capture intricacies of the Integrated Food Security Phase Classification (IPC) and the Inter-American Development Bank's Food Security Framework, while providing a higher level of granularity and assessing potential causes and areas in need of improvement. To achieve this, data were aggregated

at the communal section level and normalized on benchmarks and quantiles. Annex Table 1 includes a list of all the indicators and sources of data used for the analysis, while Annex Table 2 presents a summary of the 23 proposed recommendations to promote food security in Haiti's Northwest department.

Annex Table 1. List of Indicators and Data Sources

Dimensions	Indicator	Measurement description	Geographic Unit	Source	Year	
Food availability	1	Agriculture production	Production area (SAU) by crop groups (Cereals, Legumes, Vegetables, Fruits and nuts, Oilseeds, sugarcane)	Commune	Census/MARNDR	2008
			Number of livestock heads (Cattle, pigs, sheeps, goats)	Commune	Census/MARNDR	2008
	2	Physical access to food	Travel time to food markets/ agriculture markets	Point	OSM/ Fewsnet	2020
Food Access	3	Population socioeconomic status	Income inequality	Sections Communales	IDB	2019
			Poverty rate	Sections Communales	IDB	2019
Food Utilization	4	Food Intake/Nutrition	% of children stunted	Raster (5km)	USAID	2016
			% of Anemic women	Raster (5km)	USAID	2016
	5	Basic service	% of household with improved water source	Raster (5km)	USAID	2016
Food Stability	6	Climate Vulnerability	% of household with open defecation (sanitation)	Raster (5km)	USAID	2016
			% of drought risk zone	Polygon	WB	2017
Food Insecurity Outcome	7	Food Insecurity	% of flood risk zone	Polygon	WB	2017
			Level of food security (Minimal, stressed, or crisis)	Polygon	IPC	2020

Source: Prepared by the authors.

Annex Table 2. Proposed Interventions to Promote Food Security in Haiti's Northwest Department

	Proposed Intervention	Possible Communal Sections to Be Targeted
1	Expand conditional cash transfers and programs by linking them to a basic needs program in health or education.	Haut des Moustiques, Mahotiere, Granges, Riviere de Barre, and Bas de Sainte Anne
2	Establish a "farm to people" program in production hotspots related primarily to cereals, starches, legumes, and vegetables that targets people in poverty without access to food markets.	Chansolme, Côtes de Fer (Mole Saint Nicolas), Bas des Moustiques, l'Estere Dere, and la Pointe
3	Expand Global Water Sanitation and Hygiene (WASH) programs to areas outside Port-de-Paix to achieve access to those services and improve hygiene standards in rural zones.	Mahotiere, Haut des Moustiques, Lacoma, Vieille Hatte, and Reserve ou Ti Paradis
4	Expand community scale off-grid electrification (i.e., mini-grids).	Haut des Moustiques, Derourvay, Granges, Mahotiere, and Grande Source
5	Provide free monthly ration to families in poverty for sending their children to school (e.g., Food for Education program).	Côtes de Fer (Anse-à-Foleur), Bas de Sainte Anne, Lafague (Chamoise), la Pointe, and Mayance
6	Establish funding and stipends to promote completion of basic and secondary education for women and the department's young population.	Derourvay, Granges, Riviere de Barre, Bonneau, and Côtes de Fer (Anse-a-Foleur)

7	Expand mobile clinics and medical units in underserved rural areas.	Haut des Moustiques, Mahotiere, Grande Source, Granges, and Dessources
8	As a response to the school closures as a result of the COVID-19 pandemic, establish programs to provide weekly school meals to households affected by poverty and with a high concentration of stunted children.	Lafague (Chamoise), Mayance, la Pointe, Bas des Moustiques, and l'Estère Dere
9	Promote awareness campaigns related to food safety and nutrition-sensitive actions to ensure proper food utilization practices.	La Pointe, Côtes de Fer (Môle Saint Nicolas), Bas des Moustiques, Mayance, and Bas de Sainte Anne
10	Ensure that food access and food security interventions include a component of food fortification (e.g., iron and other macronutrients missing in the department) as part of the food goods being provided.	Department-wide policy
11	Establish programs for women's skill development related to food fortification, snack production, packaging, and kitchen gardens to support existing efforts by the Bureau de Nutrition et Développement and the Organisation pour le Développement Rural Intégré d Nord-Ouest to address food security in the department.	Côtes de Fer (Anse-a-Foleur), Bas de Sainte Anne, Lafague (Chamoise), la Pointe, and Chansolme
12	Increase funding for expansion of irrigation by repurposing the PITAG/PAPAIR irrigation and environmental management program.	Mahotiere, Bas des Moustiques, Carreau Datty, Vieille Hatte, and Lacoma
13	Improve secondary and tertiary roads to ensure access to processing facilities and farm-to-market access.	Chansolme, Lacoma, Guinaudee, Aubert, and Vielle Hatte
14	Improve post-production by increasing post-harvest storage capacity along with food stocks and grain reserves.	Côtes de Fer (Môle Saint Nicolas), Mahotiere, Guinaudee, Dessources, and Grande Source
15	Establish cold-chain storage facilities.	Côtes de Fer (Môle Saint Nicolas), Mahotiere, Guinaudee, Dessources, and Grande Source
16	Provide oversight and management to increase crop intensification.	Department-wide policy
17	Focalize technical packages and assistance (e.g., seeds, fertilizers, equipment, etc.) and finance solutions (e.g., credit guarantees, loans, etc.) to support small-scale farmers and women-led small and medium-size enterprises.	Mare Rouge, Mahotièrre, Pointe des Oiseaux, Bas de Sainte Anne, and Côtes de Fer (Môle Saint Nicolas)
18	Establish emergency preparedness and food assistance safety nets (e.g., resilience projects) in the communes of Bombardopolis and Baie de Henne to increase resilience in high-risk areas.	La Corne, Aubert, Lacoma, Forges, and Bas des Moustiques
19	Provide technical packages and assistance to promote tolerant crops and livestock breeds to increase resilience to environmental shocks, climatic shocks, and illnesses.	La Corne, Aubert, Lacoma, Forges, and Bas des Moustiques
20	Promote agroforestry practices by providing micro credit loans, subsidies to farmers, and training in technology.	Department-wide policy
21	Establish management strategies for pest and disease control.	Côtes de Fer (Môle Saint Nicolas), Forges, and Beauvoir
22	Establish a transportation distribution network that increases the system's presence under all weather conditions and during climate events.	Carreau Datty, Riviere de Barre, Côtes de Fer (Môle Saint Nicolas), Forges, and Plate Forme
23	Prevent and minimize significant food price volatility risks and increase competitiveness through strategies such as insurance, social protection, emergency food reserves, and fair-trade initiatives for import reduction.	Department-wide policy

References

- Coordination Nationale de la Sécurité Alimentaire (CNSA). 2019. Enquête Nationale de la Sécurité alimentaire et Nutritionnelle (ENUSAN 2019). CNSA, Port-au-Prince. Available at: <https://www.cnsahaiti.org/enquete-nationale-de-la-securite-alimentaire-et-nutritionnelle-enusan-2019/>
- Coordination Nationale de la Sécurité Alimentaire (CNSA). 2020. Evaluation Rapide de l'Impact COVID-19 sur la Sécurité Alimentaire, Moyens d'existence et Production agricole. CNSA, Port-au-Prince. Available at: https://fscluster.org/sites/default/files/documents/rapport_final_evaluation_samepa_29102020.pdf
- Famine Early Warnings System Network (FEWS NET). Undated. Haiti Food Security Outlook: Limited Improvement Following Spring Harvests Amid Rising Food Prices and Civil Insecurity: June 2022 to January 2023. U.S. Agency for International Development, Washington, DC. Available at <https://fewsn.net/central-america-and-caribbean/haiti/food-security-outlook/june-2022>
- Food and Agriculture Organization (FAO). 2007. "Organic agriculture and access to food". Conference Report, Italy, 3-7 May 2007. Rome: FAO. Available at: <https://www.fao.org/3/ah949e/ah949e.pdf>
- Food Security Information Network (FSIN). 2022. Global Report on Food Crises 2022. Rome: FAO. Available at: <https://www.fao.org/documents/card/en/c/cb9997en/>
- Giles Álvarez, L., J.C. Vargas-Moreno, and L.P.T. Cavalcanti. 2021. Maps for Gaps: A Geospatial Approach to Estimating Development Gaps in Haiti. Inter-American Development Bank, Washington, DC: Available at: <https://publications.iadb.org/en/maps-gaps-geospatial-approach-estimating-development-gaps-haiti>
- Giles Álvarez, L., J.C. Vargas-Moreno, A. Mejia, and N. Jean-Baptiste. 2022 (forthcoming). Food for Export. An Analysis of Haiti's Agricultural Export Potential in the NW Department. Inter-American Development Bank, Washington, DC.
- Institut Haïtien de l'Enfance (IHE), and ICF International 2018. Enquête Mortalité, Morbidité et Utilisation des Services – EMMUS-VI 2016-2017. Available at: <https://www.dhsprogram.com/publications/publication-fr326-dhs-final-reports.cfm>
- Institut Haïtien de Statistiques et d'Informatique (IHSI). 2012. Enquête sur les Conditions de Vie des Ménages après Séisme 2012 (ECVMAS) Database. IHSI, Port-au-Prince.
- Integrated Food Security Phase Classification (IPC). 2022. Haiti: Acute Food Insecurity Projection, Update March-June 2022. Available at: <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155488/?iso3=HTI>
- Inter-American Development Bank (IDB). 2018. Food Security Sector Framework Document. Inter-American Development Bank, Washington, DC. Available at: <https://www.iadb.org/en/sector/agriculture/sector-framework>
- Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural (MARNDR). 2008. Recensement Général de l'Agriculture. République d'Haïti, Port-au-Prince. Available at: http://agriculture.gouv.ht/statistiques_agricoles/EnqueteCommunautaire/documents/menu.html
- Ministère de l'Agriculture des Ressources Naturelles et du Développement Rural (MARNDR). 2014. National Agricultural Production Estimation Survey (ENEPA). République d'Haïti, Port-au-Prince.
- Morris, M., A.R. Sebastian, and V.M.E. Perego. 2020. Future Foodscapes: Re-imagining Agriculture in Latin America and the Caribbean. World Bank, Washington, DC. Available at: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/942381591906970569/future-foodscapes-re-imagining-agriculture-in-latin-america-and-the-caribbean>
- Pokhriyal, N., O. Zambrano, J. Linares, and H. Hernández. 2019. Estimating and Forecasting Income Poverty and Inequality in Haiti Using Satellite Imagery and Mobile Phone Data. Inter-American Development Bank, Washington, DC. Available at: <https://publications.iadb.org/en/estimating-and-forecasting-income-poverty-and-inequality-in-haiti-using-satellite-imagery-and-mobile-phone-data>
- FAO/WHO 2021. The state of food security and nutrition in the world. Available at: <https://www.fao.org/3/cb4474en/online/cb4474en.html>
- United Nations Development Programme (UNDP) 2022. Impact socioéconomique de la pandémie COVID-19 en Haïti: Résultats de l'enquête auprès des ménages Haïtiens. Available at: <https://www.undp.org/fr/haiti/publications/impact-socio%C3%A9conomique-de-la-pand%C3%A9mie-covid-19-en-ha%C3%A9ti>
- United Nations System Standing Committee on Nutrition (UNSCN). 2016. Investments for Healthy Food Systems. UNSCN, Rome. Available at: https://www.unscn.org/files/ICN2_TPM/EN_final_Investments_for_Healthy_Food_Systems_UNSCN.pdf
- U.S. Agency for International Development (USAID). 2021. Haiti: Nutrition Profile. May. Available at: https://www.usaid.gov/sites/default/files/documents/Copy_of_tagged_Haiti-Nutrition-Profile.pdf
- Van Vliet, Geert, Sandrine Freguin-Gresh, Thierry Giordano, Jacques Marzin, and Gael Pressoir. 2017. La problématique foncière en Haïti: Comment le Recensement Général Agricole de 2010 questionne les politiques publiques. Centre de Coopération Internationale en Recherche Agricole pour le Développement. Available at : <https://agritrop.cirad.fr/580373/7/ID580373.pdf>

