Haiti: public health conditions & the cholera outbreak

An integrated analysis

February, 2024

KEY MESSAGES

- **Attack rates since October 2022 are highest in Centre department, Cité Soleil and Port-au-Prince communes.** In Centre department, where cholera incidence has been consistently high since October 2022, WASH conditions are very poor overall – and so could be facilitating the faecal-oral transmission of cholera. Cité Soleil and Port-au-Prince are affected by gaps in essential healthcare services, food and livelihoods.
- **Since October 2022, continuous high incidence of cholera cases has been observed in Artibonite department,** where household hunger is severe and there are high levels of unmet health needs. Gang violence could be affecting financial and physical access to essential services.
- **Sud department has seen a sharp rise in cases since October 2023.** Overall public health dimensions don't show important gaps, except for very high levels of health need reported in the department, suggesting negative health outcomes and inadequate healthcare provision.
- **Although cholera incidence is not high in Grand'Anse department, its population faces severe public health conditions.** The area was struck by an earthquake in June 2023, impacting access and availability of essential services. WASH conditions are poor, a low proportion of the population has access to nearby healthcare facilities, and a great share are in urgent need of food assistance.
- **Overall gaps in public health services, combined with the effects of shocks** like flooding, give rise to vulnerabilities which make Haiti susceptible to rises in cholera cases.

CONTEXT & RATIONALE FOR ANALYSIS

Haiti is on the island of Hispaniola in the Greater Antilles archipelago of the Caribbean Sea, where it shares a land border with the Dominican Republic. It is in the grip of a severe, complex crisis, with people suffering the effects of climatic/seismic and sociopolitical shocks. Five and a half (5.5) million of Haiti's 11.7 million population need humanitarian assistance (OCHA, 2023[1]).

The country is experiencing its second cholera epidemic, facilitated by poor public health conditions and shock-driven factors. The objective of this analysis is to identify gaps in public health domains in priority departments or communes in Haiti. Identifying the factors which make an area vulnerable highlights the most necessary public health areas of intervention to provide communities with improved conditions so that they can take measures against cholera transmission and infection.

APPROACH

This analysis uses data from the Multi Sectoral Needs Assessment (MSNA), cholera data from the Haitian Ministry of Health and other information sources to build a picture of the factors which contribute to cholera risk and vulnerability across Haiti. The MSNA is a nationwide, household-level survey identifying people's most pressing needs. It therefore gives information on perceptions of public health conditions and gaps at household-level.

MSNA METHODOLOGY:
From June through August 2023, REACH teams collected primary data from 4,362 households across Haiti, with a separate assessment of 655 households conducted in the Metropolitan Zone of Port-au-Prince (ZMPAP). Results are representative at the level of the department – or in the ZMPAP, at the level of the commune – at a 95% confidence level with a 10% margin of error, excluding some areas where security limitations on data make results only indicative. Annex I gives details of the MSNA methodology.

Reemergence of cholera in Haiti

- Cholera had not been endemic to Haiti until it was inadvertently imported by United Nations security forces in October 2010. The introduction of the El Tor strain of the Vibrio cholerae bacterium caused an epidemic, with 820,000 suspected cases and an estimated 10,000 deaths.[2]
- January 2019 was the last recorded case of the 2010 epidemic in Haiti, leading the country to be declared cholera-free on 4 February 2022.[3]
- In October 2022, an outbreak was reported in Haiti, its epicentre Port-au-Prince. It spread to affect all ten of Haiti's departments, and the latest numbers from 7 December 2023 reported over 71,000 suspected cases (World Health Organisation Situation Report[4]). In comparison, in the Dominican Republic – Haiti's neighbouring country on the island of Hispaniola – as of 15 September 2023, 111 confirmed or suspected cases of cholera were reported, with no deaths.[5]

Analyses suggest that the reemergence of cholera in Haiti was caused by a descendent of the 2010 strain of bacteria; it likely persisted in environmental reservoirs, making it now endemic.[6] It is believed that this outbreak was facilitated by a combination of factors. One is a rising proportion of susceptible population members due to both naturally and vaccine-acquired immunity waning over time, and children under three having had no exposure. Another is the degradation and deficiencies of water and sanitation (WASH) infrastructure, compounded by damage caused by environmental disasters.

Key terms

Attack rate – the proportion of an at-risk population that contracts a disease over a specified time period.

Confirmed cholera case – isolation of toxigenic Vibrio cholerae O1 or O139 from a stool specimen collected from a patient with diarrhoea.

Endemic – a cholera-endemic area is one where confirmed cases detected in the last 3 years were not imported, but came from local transmission.

Environmental reservoir – a place, outside the bodies of animals, which harbours an infectious pathogen.

Hotspot – a place where there is either elevated incidence of a disease, or higher risk of disease transmission, or probability of disease emergence.

Incidence – the number of new cases during a particular time period.

Suspected cholera case – any person with or dying from acute watery diarrhoea and severe dehydration (in a place where a cholera outbreak has been declared).

Cholera cases: location & numbers

The Haitian Ministry of Health's 6 November 2023 Situation Report[7] publishes that there were 69,992 suspected cases in Haiti between 1 October 2022 and 6 November 2023. The Ouest department (in which Port-au-Prince commune is located) accounts for the largest proportion of these (n=26,337, 37.6% of suspected cases), followed by Centre department (n=14,400, 20.6%) and Artibonite department (n=9,941, 14.2%). In the same period, 1,054 deaths were recorded.

This report illustrates that hotspots for continued high incidence of cholera cases since October 2022 are Centre and Artibonite departments, and that Sud department has seen a sharp rise in cases since October 2023. The attack rate (calculated using suspected cases) is especially high in Centre department, Cité Soleil and Port-au-Prince communes: over three times higher than that of other departments/communes. Annex II gives more details on cholera case patterns and rates.

Age and gender case demography[8]

Gender: 53.1% of suspected cholera cases from October 2022 to November 2023 are men, and 46.9% are women.

Age: The age distribution for suspected and confirmed cases shows that those aged 1-4 are most affected, followed by the 5-9 age group (36% of patients with suspected cholera are aged <10) and then those aged 20-29, and 30-39. The 10-19 age group are relatively less affected.

Children under five years old are known to be more susceptible to diarrheal diseases, including cholera. Malnutrition and lack of previous exposure to the bacteria could be contributing factors to cholera infection causing worse clinical outcomes for children under five.

How is cholera being spread?

The more exposed people are to sources of or behaviours which increase the risk of transmission or falling ill, the more vulnerable they are to cholera infection.

Key transmission pathways:

Unimproved water. A key locality-level determinant of cholera during the 2010-19 epidemic was being close to rivers and unimproved water sources, which increased risk of cholera (standardized incidence ratio 1.71, 95% Confidence Interval (CI) 1.02– 2.87; p = 0.04).[12]

A 2020 systematic review of WASH risk factors for cholera transmission globally found that untreated water poses a risk (Odds Ratio (OR) 2.80, 95%CI 1.82-4.29; p <.001), as does surface water as a drinking source (OR 2.88%, 95%CI 1.69-4.90; p <.001). Significant lower odds for transmission are seen when drinking rainwater (0.34, 95%CI 0.21–0.60; p <.001).[13]

Unimproved sanitation. Practicing open defecation makes it almost three times more likely that there will be cholera cases in a household (OR 2.69, 95% CI 1.58-4.39; p <.001).[14]

Protective factors and practices:

Hand hygiene. All handwashing was found to be protective against cholera risk (0.36, 95% CI 0.25–0.52; p <.001). Handwashing before eating lowers the likelihood of cholera transmission by half (0.45, 95%CI 0.32–0.65; p <.001), and after defaecation by more than two thirds (0.28, 95% CI 0.17–0.45; p <.001).[17]

Presence of soap. Found to be protective against cholera transmission (0.31, 95% CI 0.22–0.45; p<.001).[18]

Contributing factors:

Household hunger. Both moderate (Adjusted Odds Ratio (AOR) 1.51, 95% CI 1.30–1.76; p <.0001] and severe (AOR 1.73, 95% CI 1.45–2.08; p <.0001) household hunger have been found to be associated with increased history of cholera in the household in Haiti.[15]

Conflict. A study looking at Nigeria and the Democratic Republic of Congo found that cholera and conflict were associated; the rate of reported cholera cases increased in areas of high conflict (3.6 times increased risk in Nigeria and 2.6 times increased risk in DRC). Conflict disrupts service access or delivery: roadblocks or fear stop people from accessing healthcare or safe WASH sources/facilities, or hospitals are damaged or do not receive supplies of stocks. Cholera cases also rose in areas surrounding those where conflict-intensity was high, likely because of displacement.[16]

SHOCKS AND HAZARDS

Almost all the population in Haiti (over 96%, according to the World Bank[9]) are exposed to natural hazards, including drought, flooding, hurricanes and earthquakes. The displacement, damage to WASH infrastructure and contamination of water sources caused by floods can catalyse the spread of cholera. Indeed, **a rise in incidence of cholera cases nationally was recorded in June 2023, when much of Haiti was struck by destructive flooding.** This points to a need for future responses to include rapid distribution of oral cholera vaccine (OCV), chlorine to treat water which could have become contaminated, and case management in flood-affected areas and for displaced populations.

Gang-related violence in Haiti has been rapidly intensifying since 2021.[10] The Armed Conflict Location & Event Data Project (ACLED) records very high counts of conflict events and fatalities in the departments of Ouest and Artibonite, the nation's main rice-growing region. Blockades by gangs on shipments and distribution of gas have contributed to reduced operationality and/or closures of health facilities and water treatment centres.[11] This limits the availability of safe drinking water and health services: both key for preventing cholera transmission.

MSNA findings show that 4.3% of households nationally experienced movement restrictions in the three months prior to data collection; 8.5% in Artibonite and 6.8% in Ouest, and 33.8% of households in the ZMPAP. Over a fifth of households (22%) reported that a shock they experienced affected their access to healthcare. Insecurity can affect household's ability to financially access health services due to loss of income because of disruptions to livelihoods, or cause security-related physical access limitations.

Major recent shocks

14 August 2021: 7.2 magnitude earthquake. Major damage concentrated in Nippes, Sud and Grand'Anse departments.

17 August 2021: a tropical storm causes flash floods and landslides.

5 October 2022: calls for a humanitarian corridor to open to allow release of fuel from blocked port, after lack of gas forces health centres to close and water treatment and distribution are interrupted.

2-3 June 2023: destructive flooding across 7 of Haiti's 10 departments, especially damaging the western region. Almost 45,000 people affected and 12,646 displaced. Agricultural land flooded and garbage washed up in low-lying neighbourhoods.

6 June 2023: 5.5 magnitude earthquake affecting Grand'Anse department.

Population movement and relocation to sites where living conditions are sub-optimal also increases risk of cholera transmission. According to International Organization for Migration (IOM) displacement tracking data from December 2023, over a quarter of a million (313,901) people are internally displaced in Haiti, mainly due to gang violence (about 93%).[19] Approximately half (146,584) are in Ouest (mainly in the Port-au-Prince metropolitan area). The IOM identifies a key trend wherein over half of those internally displaced in Ouest are living in sites (either formally established camps, or spontaneous sites which use the grounds of school buildings or open clearings for example), while in other departments in Haiti, almost all IDPs live with host families.

In sites, especially spontaneous/improvised sites, IDPs describe unsanitary conditions, with absences of latrines and no waste disposal systems, and very limited access to medical care.[20] Environments like these can allow localized cholera outbreaks to spread fast. Additionally, for both IDP and host communities, a bigger local population increases the demand for health services, which depletes their ability to meet health needs. More people using water sources and sanitation facilities leads to long queues and shortages, and consequently can drive people to less safe water sources or sanitation practices.

PUBLIC HEALTH CONDITIONS

Public health conditions, especially indicators giving information on key transmission pathways and contributing factors for cholera risk, were analysed using MSNA data. Household reports of these conditions highlight where gaps could be facilitating cholera transmission, or where conditons make a department potentially vulnerable.

Water sources

Cholera is transmitted through ingestion of water or food which is contaminated with the Vibrio cholerae bacterium, from the faecal matter of infected people.[21] It is therefore crucial that safe water is available, but lack of functionality of the water treatment system in the country limits this availability. A World Bank story reports how in the database of the Integrated Drinking Water and Sanitation Information System in Haiti in 2022, of the 13,626 improved water sources facilities recorded, only 51% were working. Remote areas looked worse off: of the 1,041 piped water supply systems serving dense rural areas and small towns, only 41% were functional that year.[22] UNICEF reported in October 2023 that in Artibonite department, 2 of the 3 water treatment centres had shut down due to insecurity, and the third one faced distribution challenges.[23]

MSNA results found that nationally across Haiti, three quarters of households (75.2%) have access to an improved drinking water source. In the ZMPAP, almost all households (99%) have access to an improved drinking water source, although this includes bottled/sachet water and water from kiosks in higher proportions than the rest of the country, which is a costlier source. The leading water source in Haiti excluding the ZMPAP is public faucets (22.2%). Unimproved sources include unprotected sources for over a quarter of households (17.2%) with higher proportions drinking from this source in Centre (38.4%), Grand'Anse (35.7%) and Nord-Ouest (28.7%). Other unimproved sources used are unprotected wells (4.7% nationally) and surface water (for which there is a stronger risk for cholera) for a smaller but still relevant portion of households (2.6%). Departments where higher proportions of households are drinking surface water are Nippes (5.9%), Grand-Anse (5%) and Nord-Ouest (4.6%).

Only just over half (52.6%) of households report no problems accessing sufficient water – but almost a quarter (23.9%) say that water points are too far away (20.9% of households who have to travel over 30 minutes to collect water), a tenth (9.4%) say that water points are too few or there is a long wait for them. This potentially pushes households to resort to less safe water sources.

Sanitation

The type of latrine used by people can present differing risks of putting them in contact either directly or by contamination of water sources with cholera-infected faecal matter. Only just over half of households in Haiti have access to improved sanitation facilities (52.7%), while almost a quarter (23.5%) use unimproved sanitation facilities and the same proportion (23.8%) does not have any sanitation installation.

Open defecation, a key risk factor, is practiced by over a fifth (22.1%) of households in the country. It is an especially widely used sanitation practice in Grand'Anse, by half of all households (49.7%). Open defecation is the second most common sanitation practice after using pit latrines with covering slabs (29.2%) and is followed by pit latrines without lids (19.9%). In the ZMPAP, the majority of the population (77.4%) is using improved sanitation. although it is lower in Cité Soleil, (48.9%). where open defecation is reported by a quarter (25%) of households.

Handwashing and Soap

Washing hands after using the bathroom and before preparing or eating food, especially with soap, can break the faecal-oral pathway of the bacteria. MSNA results found that in Haiti, water for handwashing is available in 92.3% of households and soap in 85.5% of households. In the ZMPAP, availability of soap is a little higher (90.3%) but handwashing water a little lower (88.4%) than the rest of Haiti – handwashing water availability is lacking in Carrefour commune (72.7%).

Nationally, most households (90.3%) report washing their hands after going to the toilet. Slightly fewer (69.5%) households wash their hands before eating, although just a small proportion (6.4%) do so before breastfeeding or feeding children. Under half (38.8%) wash their hands before preparing food. In the ZMPAP, handwashing practices are quite good, although any limitations on handwashing raises transmission risk. Particular areas of concern in the ZMPAP are that lower proportions of households report washing their hands after going to the bathroom in Cité Soleil (82%) and Tabarre (79.4%) communes, and washing hands before eating is reportedly done by less than a fifth (18.8%) in Croix des Bouquets commune.

Healthcare

A paper published in 2020 qualitatively analysed the health situation in Haiti using a World Health Organisation model of geographic, financial and service access.[24] It found that all, but especially rural, populations face limited access because of an insufficient number of facilities (125 out of 571 communal sections lacked a health service), difficulties reaching facilities: the paper found that distance was a barrier for 37% of Haitians, and cost of or lack of transport also prohibitive. Traditional medicine was found to be more physically and culturally accessible, although expensive. Underfunding, stock-outs and a high turnover and migration of health staff all contributed to low service availability across the country.[25] There have been attacks on hospitals, for example in July 2023 in the ZMPAP.[26]

MSNA results reflect accessibility issues: healthcare needs in Haiti are high – nationally, over a quarter (26.5%) of households had had a health problem in the three months prior to data collection. The vast majority (78%) of households with health needs did not have these needs met. Of this unmet need, over half (51.8%) was for a sudden/acute illness such as fever or diarrhoea, potentially cholera. Sud and Centre had particularly high levels of health needs, 36.6% and 34.3% respectively. In the ZMPAP, health needs are especially high (39.4% compared to 26.5% in the rest of Haiti).

Distance issues and low coverage are also echoed by MSNA results. Nationally, only half (52.3%) of the population can access a functional health facility in less than 30 minutes. Ability to access healthcare in under half an hour is higher in ZMPAP compared to the rest of the country (75.6% compared to 52.3%) although this number falls to half in Cité Soleil, Croix des Bouquets and Pétition-Ville. This suggests either low availability of services at these facilities, financial barriers to care or, in contexts particularly concerned by gang violence, safety considerations to physical access.

Food insecurity

In Haiti, 4.35 million people are experiencing acute food insecurity as of August 2023 (valid until February 2014) (IPC AFI Phase 3+), with 1.4 million facing emergency food consumption and livelihood gaps (IPC AFI Phase 4). Grand'Anse, Cité Soleil and Port-au-Prince are the most food insecure departments with at least 20% of the population in IPC AFI Phase 4.[27]

Nationally, MSNA results found that almost two thirds (57.3%) of households experience moderate hunger, indicative of IPC AFI Phase 3, and over a quarter (16.8%) reported severe (indicative of IPC AFI Phase 4) or very severe (indicative of IPC AFI Phase 5) hunger. A quarter (23.8%) in the ZMPAP reported a severe or very severe household hunger score – with especially severe findings in Port-au-Prince and Croix des Bouquets. Acute food insecurity and self-reported severe household hunger contribute to increasing risk of cholera incidence.

INTEGRATED ANALYSIS

Integrated outbreak analysis encourages us to see the linkages between factors affecting cholera risk and transmission dynamics: local water, sanitation and hygiene quality, access and practices, health and food insecurity, as well as considering how shocks play into these dynamics.

For this analysis, indicators used to capture public health conditions included WASH factors (improved water sources, improved sanitation facilities, handwashing water and soap availability, handwashing practices, and water collection round-trip timings), food security (IPC AFI classification, household hunger scores) and health (health needs, unmet health need, and access to a functioning health facility).

Severity scoring for departments/communes was calculated using counts of 'very high' 'high,' 'medium' and 'low' classifications for each indicator, as per thresholds which can be seen in Annex IIII, along with the tables used to analyse indicators in public health sectors.

Cases: incidence, attack rate and patterns	Public health conditions: WASH, food security and health
Attack rate for suspected cases of over 2,000 per 100,000 people OR Sharp increases in suspected cases in the last 6 months observed	Severity score over 25
Attack rate for suspected cases of over 600 per 100,000 people	Severity score over 20
Attack rate for suspected cases between 400 and 600 per 100,000 people	Severity score over 15
Attack rate for suspected cases of under 400 per 100,000 people	Severity score under 15

Departments are in order of highest to lowest attack rate, except for Sud which does not have one of the highest attack rates but where sharp increases in cases can be seen towards the end of 2023.

Department / Commune	Cholera incidence, attack rate and case patterns – from October 2022 to November 2023, using Haitian Ministry of Health 7 November Situation Report	Public health conditions captured by MSNA – percentages presented in Annex III.
Cité Soleil (commune)	Very high attack rate	• Very low access to improved sanitation. Low proportions of households wash hands after going to the bathroom and low proportion doing so before eating. • 55% of the population are in IPC AFI Phase 3+. • High levels of health needs. • High numbers of gang violence related events and fatalities
CENTRE	High incidence (a fifth of all of Haiti's cases are in Centre department) and it is the department with the highest attack rate.	• WASH conditions are very poor, with a low percentage of households accessing improved water and improved sanitation, a lack of handwashing water available and very sub-optimal handwashing practices. • 40% of the population are in IPC AFI Phase 3+. • Health needs are high, with a low proportion of households able to access healthcare in less than 30 minutes.
Port-au-Prince (commune)	Very high attack rate	• Weak handwashing practices with low use of water and soap • 50% of the population are in IPC AFI Phase 3+. More than a third of households report severe or very severe hunger. • Very high levels of health needs and unmet health needs. • High numbers of gang violence related events and fatalities.
SUD	Low numbers of cases throughout the outbreak, but a recent sharp October 2023 rise in incidence is worrying	• WASH results are in line with the national average, except for a lower-than-average percentage of households with soap. • 42% of the population are in IPC AFI Phase 3+. Self-reported household hunger is lower than Haiti's average. • Very high levels of health need reported by 36.6% of households.
Carrefour (commune)	Testing rate particularly low High attack rate	• Lack of water available to wash hands. • 40% of the population are in IPC AFI Phase 3+ and very high score on reported household hunger. • Very high levels of health needs and unmet health needs.
Delmas (commune)	High attack rate	• 40% IPC AFI phase 3+ population. • High levels of health need.
NORD-EST	Nord-Est only really began to have cases in March 2023, and then saw a flat curve until August 2023, and cases have been consistently low since.	• Percentage of households with soap is the lowest in the country, and the percentage with handwashing water quite low. The percentage of households reporting washing hands before eating and before feeding children is low. • 40% of the population are in IPC AFI Phase 3+. • Health results are in line with the national average.

NIPPES	Cases relatively low but slight increases seen in September and October 2023 so the area should be monitored.	• WASH results overall do not look dramatically out of line with the national average, however Nippes has the highest proportion of households needing to make a round trip of over 30 minutes to collect water, and has the highest proportion of households drinking surface water (5.86% compared to 2.59% nationally). Even if only some of the population are drinking surface water, there is the risk of localised outbreaks, as we might already be seeing – which could spread. • 38% of the population are in IPC AFI Phase 3+. 16.1% have severe or very severe household hunger. • Health needs and unmet health needs are slightly higher than average, and Nippes has the lowest percentage of households with nearby health services.
NORD	Nord has seen high cases over the course of the outbreak, especially from January 2023, with a peak in June 2023. Cases have fallen since then, but since September have been climbing slightly again. Testing rates are quite low.	• WASH results overall are average or slightly better than Haiti's national average for access to improved water and sanitation, however there is low handwashing water availability and handwashing practices are sub-optimal. • 32% of the population are in IPC AFI Phase 3+. Nearly a quarter of households (23.8%) have severe or very severe household hunger. • Health results are in line with the national average for the country.
ARTIBONITE	Cases occurring consistently in high numbers.	• The majority do have access to close improved water sources, although less to improved sanitation. • 46% of the population are in IPC Phase 3+. 16.79% experience severe or very severe household hunger. • Unmet health needs are high despite a high proportion of households being able to access a functioning hospital in less than 30 minutes. • High numbers of gang violence related events and fatalities
Pétion-Ville (commune)	Attack rate similar to rest of Haiti, a little lower than the average	• Low proportion of population washing hands before feeding infants / breastfeeding. • 45% of the population are in IPC AFI Phase 3+. 19.2% have severe or very severe household hunger. • Health need is a lower than in the rest of ZMPAP, but a large proportion of this need is unmet.
NORD-OUEST	Nord-Ouest had high numbers of cases in January 2023, which was its peak, but cases have been consistently low since March 2023 without signs of rising.	• Very low proportions of the population can access improved water sources and improved sanitation. • 43% of the population are in IPC Phase 3+. 26.2% of households experience severe and very severe household hunger. • Health indicator results are average or better than Haiti's national average.
Tabarre (commune)	Attack rate similar to rest of Haiti, a little lower than the average. High testing rate	• Lower than ZMPAP-average presence of soap and lower handwashing water availability. Low proportions of households washing hands after going to the bathroom. • 50% of the population are in IPC AFI Phase 3+. • Very high levels of health need.
GRAND-ANSE	There are low numbers of cholera cases in Grand'Anse, with no increase seen and low attack rates for suspected cases – 66% of which are being tested.	• WASH results are very poor – especially access to improved sanitation and improved water sources. Lowest proportion nationally being able to do a roundtrip water collection in under 30 minutes, and among the worst for having water available for handwashing. Open defecation common and low proportions of household washing hands after using the bathroom. • Low proportions of households able to access healthcare in under 30 minutes, but other health indicators are more positive. • 58% of the population are in IPC AFI Phase 3+. • Affected by an earthquake on 6 June 2023, just before MSNA data was collected. The disruptions or damage caused by this disaster to WASH infrastructure and livelihoods could be why results are very poor.
Croix des Bouquets (commune)	Low attack rate	• Low access to improved sanitation. A very low proportion of households wash hands before preparing food. • 50% of the population are in IPC AFI Phase 3+. Severe and very severe household hunger is experienced by 31.91%. • Very high levels of health need. • High numbers of gang violence related events and fatalities
SUD-EST	Cases have been consistently low, apart from a spike in June 2023.	• Access to improved water and sanitation is a little better than average, however the percentage of households with soap is second lowest**,** and the percentage of households washing hands before preparing food is the lowest in the country. • 40% of the population are in IPC AFI Phase 3+. 15.21% have severe or very severe household hunger. • Unmet health needs are very high.
OUEST	Huge numbers of cases in Oct-Nov 2022 at the start of the outbreak. Then a steady decrease, a smaller spike again in June 2023 before a drop and a gradual slight rise from October 2023, which seems to fall off in November. But results for Ouest include the ZMPAP. Cholera cases for Ouest sans ZMPAP are not available.	• MSNA results are for Ouest excluding the ZMPAP, and public health results in all domains are in line with the national average-

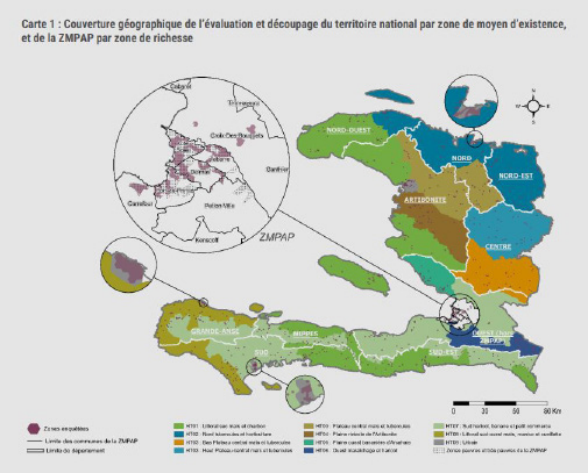
ANNEXES

Annex I: MSNA methodology[28]

Primary data was collected by REACH teams between 16 June and 15 August 2023, across the whole of Haiti. 4362 households were sampled in total – 655 in the Port-au-Prince metropolitan area (ZMPAP), 3780 in the rest of the country.

The MSNA used two-stage random cluster sampling. The results are stratified by both department and livelihood zone (as per the Integrated Phase Classification breakdown) and are representative at the level of the strata, at a 95% confidence level with a 10% margin of error – excluding some areas where security limitations on data collection make results only indicative: livelihood zones HT07, HT04, HT09, HT08 and HT02.

Separate analysis was conducted in the Port-au-Prince metropolitan area (ZMPAP), following the same sampling strategy at the same representativeness level but stratifying by wealth zone rather than livelihood zone, and then by commune. The areas for which results are only indicative are Croix de Bouquet P+ TP and Petion Ville P+ TP.



From REACH Haiti Note Methodologique 2023

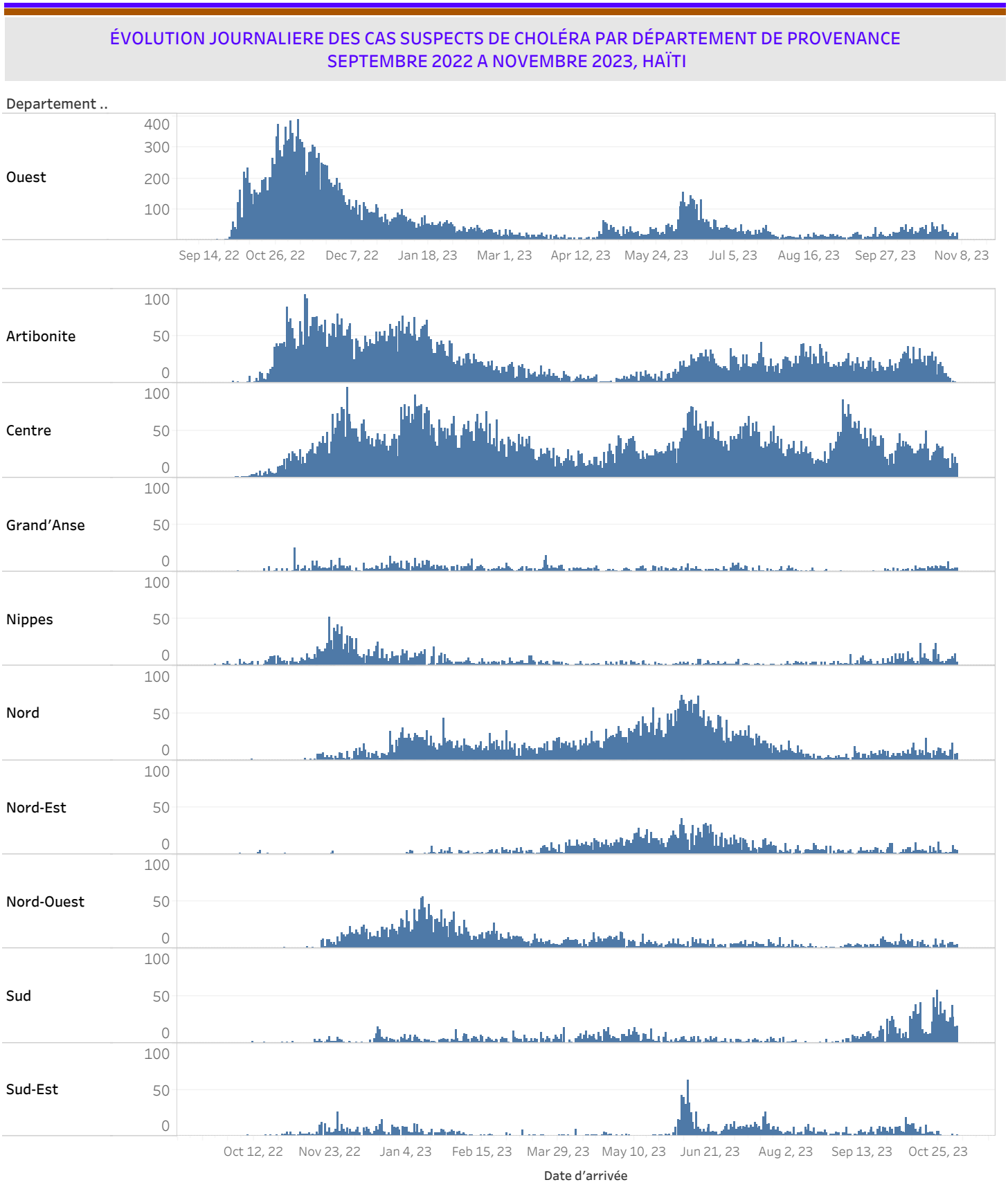
Annex II: Cholera incidence, attack rates, and testing

Case information is from the Haitian Ministry of Health's cholera epidemic situation report, for cases from 1 October 2022 to 6 November 2023.

department	confirmed cholera cases	suspected cholera cases	population estimate	attack rate per 100,000 (confirmed cases)	attack rate per 100,000 (suspected cases)	tests per-formed	testing rate	confirmed cases / tests
TOUT LE PAYS	4,080	69,992	10,175,315	40	688	12,174	17.4	33.5
ARTIBONITE	259	9,941	1,606,381	16	619	920	9.3	28.2
CENTRE	501	14,400	670,058	75	2,149	1,551	10.8	32.3
GRAND-ANSE	275	1,186	432,863	63	274	792	66.8	34.7
NIPPES	80	2,085	317,938	25	656	548	26.3	14.6
NORD	247	6,276	984,176	25	638	644	10.3	38.4
NORD-EST	256	2,356	341,791	75	689	815	34.6	31.4
NORD-OUEST	114	3,397	690,159	16	492	385	11.3	29.6
OUEST	1,913	26,337	3,910,076	49	673	5,322	20.2	35.9
SUD	143	2,245	556,331	52	318	522	23.3	27.4
SUD-EST	292	1,769				675	38.2	43.3
ZMPAP			310,000					
Carrefour	135	4,158	398,677	34	1,043	318	7.7	42.5
Cité Soleil	198	3,587	145,448	136	2,466	698	19.5	28.4
Croix des Bou-quets	129	1,244	829,574	15.5	150	368	29.6	35
Port-au-Prince	438	7,080	347,277	126	2,039	1,041	14.7	42
Delmas	296	2,714	290,004	102	936	820	30.2	36
Pétion-Ville	346	2,588	474,299	73	546	791	30.6	43.7
Tabarre	67	729	159,593	42	457	462	63.4	14.5

ANNEXES

Annex III: Epidemiological curves, from Haitian Ministry of Health's 7 November cholera situation report



NB:La graduation de l'axe du graphique du département de l'Ouest n'est pas uniforme à celle des autres en raison du nombre de cas journalier qui est beaucoup plus élevé. De ce fait, la comparaison des hauteurs des bars n'est possible qu'entre les graphiques des autres departements. Cependant,les graphiques peuvent toujours servir à suivre la tendance intra et inter departementale.

Annex IIII: Key public health indicator table

Department	IDPs	shocks	% in IPC classification Phase 3+	HHS severe and very severe	% able to collect & return with water in < 30 mins	% access to improved drinking water source	% using improved sanitation	% HH with soap	% HH with handwash-ing water available	% washing hands after going to the bathroom	% wash-ing hands before eating	% washing hands before preparing food	% washing hands before feeding infants / breastfeeding	health need	unmet health need	% with nearest health facility <30 mins away
TOUT LE PAYS	313,901	Flooding, landslides and tropical storms /hurricanes affect all of Haiti. An active fault line (Enriquillo) runs through the south of the country, making it very vulnerable to devas-tation by earthquakes. Another fault line (Septentrional) runs just above the north of the country. ACLED data is from 01/09/2022 to 18/01/2024	44	16.8	73	75.2	52.7	85.5	92.3	90.3	69.5	38.8	6.4	26.5	78	52.3
CENTRE	22,935	Medium' numbers (relative to rest of Haiti) of conflict events and fatalities recorded by ACLED	40	15.7	73.1	56.9	38	70.8	79.7	83	51.3	26	3.2	34.3	79.8	36.6
GRAND-ANSE	24,758	Earthquake-affected in June 2023. Relatively low numbers of conflict events and fatalities according to ACLED data.	58	11.3	47.6	58	30.8	76.7	73.5	79.3	70.9	49.3	5.3	22.7	62	36.1
SUD-EST	37,208	Relatively low numbers of conflict events and fatalities according to ACLED data.	40	15.5	70.1	79.5	54.3	63.7	100	96.5	69	17.4	2.8	21.7	84	45
NIPPES	16,251	Relatively low numbers of conflict events and fatalities according to ACLED data.	38	16.1	55.1	69.5	52.2	88.5	100	87.1	75.1	32.5	10.6	27.5	82.2	31.7
NORD-OUEST	no data	Relatively low numbers of conflict events and fatalities according to ACLED data.	43	26.2	70	58.2	35.9	100	82.5	96.5	79.5	32.4	2.5	23.3	62.9	51.3
NORD	no data	Medium' numbers (relative to rest of Haiti) of conflict events and fatalities recorded by ACLED.	32	23.8	85.3	81.5	50.6	90.4	73.2	81.	53	35.8	5.7	28.6	79.2	66.9
NORD-EST	no data	Relatively low numbers of conflict events and fatalities according to ACLED data. HHs in MSNA report not being able to travel to gang-controlled areas.	40	9.8	83.3	73.7	64.8	55.7	79.7	93.5	61.8	42.1	1.9	20.7	74	61.5
ARTIBONITE	27,430	More recently conflict affected. High numbers of conflict events and fatalities according to ACLED data, and high proportions of households facing movement restricts in MSNA results	46	16.8	77.6	79.9	60.2	86.9	95	92.8	71.7	42.4	3.6	22.5	82	63.9
Port-au-Prince	63284	High numbers of conflict events and fatalities according to ACLED data	50	36.6	88.4	98.8	84.5	83.3	83.3	92	80.5	52.9	2.3	41.6	82.8	86.2
Croix des Bouquets	4,396	High numbers of conflict events and fatalities according to ACLED data	50	31.9	100	91.5	64.6	100	100	93.8	75	18.8	2.1	39.8	42.2	51
Carrefour	11,990	As for whole of ZMPAP.	40	15.2	88.3	100	85.3	86.4	72.7	90.7	95.7	67.1	2.1	40.9	86.2	86.4
Tabarre	5861	As for whole of ZMPAP.	50	15.9	70.8	98.1	89.7	90.5	95.2	79.4	76.6	47.7		43.2	54.8	75.3
OUEST (exclud-ing ZMPAP for MSNA results)	146,584	Outside the ZMPAP area, conflict events are more at a 'medium' level, but in the MSNA HHs report being prohibited to relocate to other areas by armed gangs, so there are movement restrictions	45	17.2	72	85.4	65	93.3	95	90.7	75.9	39.7	13.2	26.1	79.6	46.2
ZMPAP	139,853	Gangs operate in the ZMPAP area. Also sea-level, so vulnerable to floodwater & debris collecting in streets	no data	23.8	88.1	99	77.4	90.3	88.4	88.8	80.5	53.4	3.9	39.4	70.5	75.6
Cité Soleil	20,200	Often mentioned as an arena for gang violence	55	7.1	87	100	48.9	100		82	71	54	12	37.4	45.6	50
Pétion-Ville	1770	As for whole of ZMPAP.	45	19.2	81.6	100	86.9	100	100	92.3	89.7	69.2	1.3	27.2	76.8	53.3
SUD	38,735	Medium' numbers (relative to rest of Haiti) of conflict events and fatalities recorded by ACLED	42	5.8	72.4	83.2	52.5	71	98.8	98.3	85.7	64.9	13	36.6	80.8	53.1
Delmas	32352	As for whole of ZMPAP. Business district.	40	6.6	96.8	100	92.5	95.5	100	87.4	86.3	55.8	2.1	35.3	70.6	77.9

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severity																	
low	< 10,000	Relatively few conflict events	< 40	< 5	> 80	> 80	> 70	> 80	> 90	> 95	> 80	> 60	> 10	< 20	< 60	> 70	
medium	10,000 - 50,000	Average for Haiti numbers of conflict events. Or low numbers, but disaster-affected or movement restrictions.	40-44	5 to 9	71-80	71-80	61-70	71-80	81-90	90-95	71-80	41-60	5 to 10	20-30	60-70	61-70	
high	50,000 - 100,000	Highly conflict affected plus either climate or movement restriction affected	45-49	10 to 14	60-70	60-70	50-60	60-70	70-80	80-90	60-70	20-40	2 to 5	31-40	71-80	40-60	
very high	> 100,000	Heavily conflict affected, movement restrictions, and seismic / effects of environmental disasters vulnerability	> = 50	> = 15	< 60	< 60	< 50	< 60	< 70	< 80	< 60	< 20	< 2	> 40	> 80	< 40	

																		Final score
CENTRE	medium	medium	medium	very high	medium	very high	very high	medium	high	high	very high	high	high	high	high	very high		30
GRAND-ANSE	medium	medium	very high	high	very high	very high	very high	very high	high	very high	medium	medium	medium	medium	medium	very high		30
SUD-EST	medium	low	medium	very high	high	medium	high	high	low	low	high	very high	high	medium	very high	high		25
NIPPES	medium	low	low	very high	very high	high	high	low	low	high	medium	high	low	medium	very high	very high		24
NORD-OUEST	no data	low	medium	very high	high	very high	very high	low	medium	low	medium	high	high	medium	medium	high		23
NORD	no data	medium	low	very high	low	low	high	low	high	high	very high	high	medium	medium	high	medium		21
NORD-EST	no data	low	medium	medium	low	medium	medium	very high	high	medium	high	medium	very high	medium	high	medium		20.5
ARTIBONITE	medium	very high	high	very high	medium	medium	high	low	low	medium	medium	medium	high	medium	very high	medium		20
Port-au-Prince	medium	very high	very high	very high	low	low	low	low	medium	medium	low	medium	high	very high	very high	low		20
Croix des Bouquets	low	very high	very high	very high	low	low	medium	low	low	medium	medium	very high	high	high	low	medium		19.5
Carrefour	medium	high	medium	very high	low	low	low	low	high	medium	low	low	high	very high	very high	low		18.5
Tabarre	low	high	very high	very high	medium	low	low	low	low	very high	medium	medium		very high	low	low		18
OUEST (excluding ZMPAP for MSNA results)	no data	medium	high	very high	medium	low	medium	low	low	medium	medium	medium	low	medium	high	high		17
ZMPAP	very high	very high		very high	low	low	medium	low	medium	high	low	medium	high	high	high	low		16.5
Cité Soleil	medium	very high	very high	medium	low	low	very high	low		high	medium	medium	low	high	low	medium		16.5
Pétion-Ville	low	high	high	very high	low	low	low	low	low	medium	low	low	very high	medium	high	medium		16.5
SUD	medium	medium	medium	medium	medium	low	high	medium	low	low	low	low	low	high	very high	high		16
Delmas	medium	high	medium	medium	low	low	low	low	low	high	low	medium	high	high	high	low		14.5

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