Population movements from cholera-affected areas in Port-au-Prince and identification of communes at potentially increased risk of new outbreaks: Situation as of 16 November

Executive summary

Our research[1] on the 2010 cholera outbreak showed that mobility indicators derived from aggregated and anonymised Call Detail Records (CDRs) were predictive (with uncertainty) of the geographic spread of the epidemic. Here, we show **mobility patterns from the Port-au-Prince metropolitan area relevant to the ongoing outbreak** and replicate our analyses to **identify areas potentially at increased risk of new outbreaks**. In combination with other evidence, this can help **identify areas to be prioritised for surveillance and interventions**.

Most trips are short-distance. Travel from the Port-au-Prince metropolitan area, where there are high numbers of suspected cases, is **concentrated in nearby communes in the Ouest department** but longer trips are also observed, particularly to the **Nippes and Sud departments** (Map 1). Our modelling of the estimated flows of infectious persons (Map 2) **shows large similarities with our report a week ago but the frontier of the epidemic has moved and more areas now experience increased infectious pressure**. Map 2 highlights **communes in the central, especially in the north-west of Ouest department, and south parts of the country as areas at potentially increased risk of new outbreaks**. We also show that geographic proximity to communes with confirmed cases alone may not equate to higher risk of new outbreaks. However, our methods may overestimate risk in areas along major travel corridors (e.g. highways).

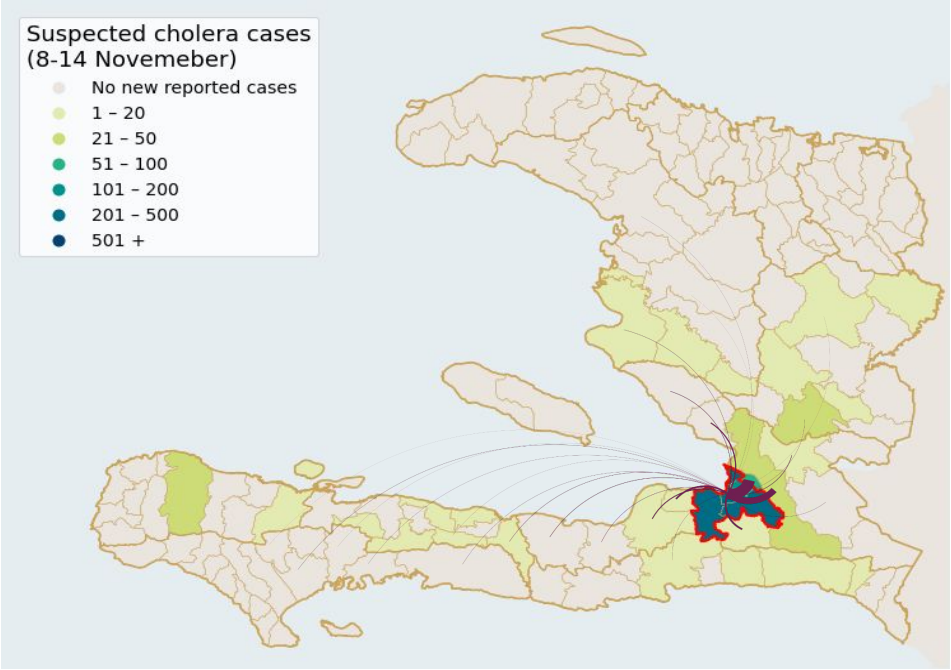
The analyses have limitations and should be used in conjunction with other available evidence (see Considerations). **We welcome feedback from responders to help us improve future reports and any requests for specific analyses**. As new areas acquire local transmission, **the risks shown in this report will change** and we aim to update the analyses.

Where are people in cholera-affected areas of Port-au-Prince metropolitan area travelling to?

Flows of subscribers from communes most affected by cholera and lying within the Port-au-Prince metropolitan area

The background of Map 1 (right) shows the **number of suspected cases of cholera in the past 7 days (08 – 14 Nov.) across Haiti**, calculated from reports by the Ministry of Public Health and Population (MSPP). The lines indicate our estimate of the **largest flows of subscribers from these cholera-affected communes within the Port-au-Prince metropolitan area** to other communes across Haiti. We used CDR data from the 16 October to 14 November 2021 (see Data section for more information) to estimate the flows of people travelling from communes in the Port-au-Prince metropolitan area in which there have been more than 75 confirmed cholera cases reported (highlighted area) in the past 30 days (16 Oct – 14 Nov. 2022).

Travel from the most cholera-affected areas of Port-au-Prince is **mostly short distance within the Ouest department**, but there are a smaller number of longer trips, including to **communes in the Sud, Nippes and Artibonite departments**. **These mobility patterns remain consistent with our previous reports**. Table 1 (page 3) **ranks the communes receiving the greatest flows of subscribers** from communes within the Port-au-Prince metropolitan area, **according to the estimated number of incoming subscribers**.



Which areas are at potentially increased risk of new outbreaks of cholera?

Estimated infectious pressure on communes with no recent confirmed cases

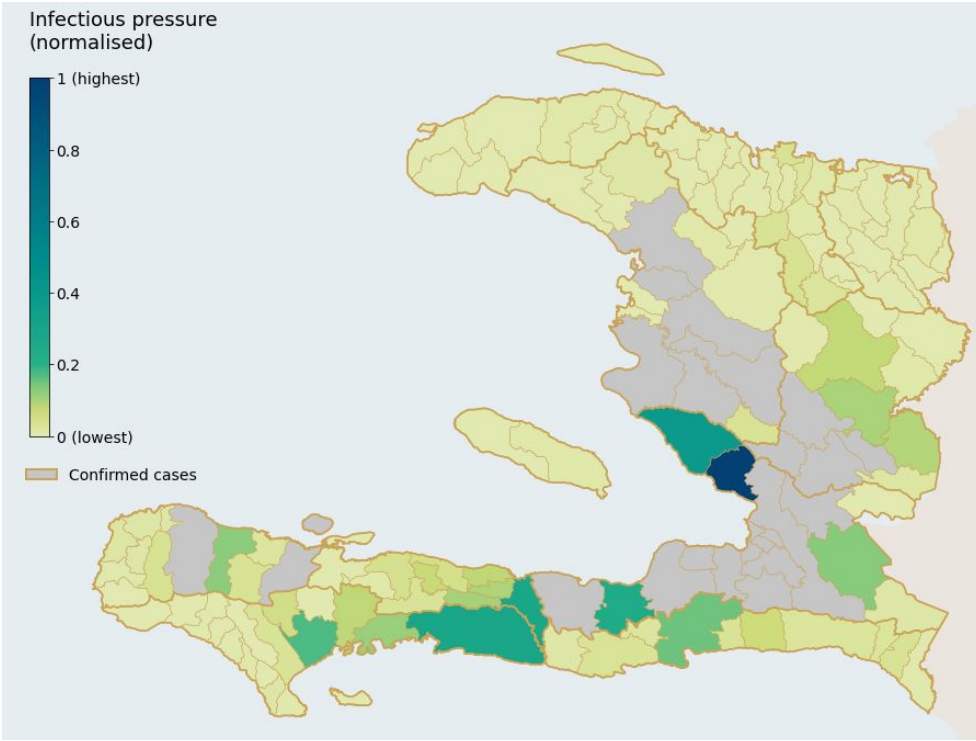
Infectious pressure is an indicator describing broadly the **estimated daily number of incoming infectious persons to each commune**, over the 7 days from 08 to 14 November. Our previous research[1] shows that this indicator is predictive (with uncertainty) of new outbreaks in the coming 7 days for areas with no known outbreak.

Map 2 (right) shows the normalised **infectious pressure for each commune** as of 14 November 2022 (rescaled between 0 and 1), **with greater infectious pressure associated with greater risk.** We estimate this from the flows of subscribers between areas and the number of suspected cases reported by MSPP.

Infectious pressure is **highest in communes in the central and south part** of the country. **It is highest in communes in Ouest department, especially Cabaret and Arcahaie communes.** However, **many communes adjacent to those with confirmed cholera cases do not have elevated infectious pressure**. There is also **substantial infectious pressure on communes in the south**, especially Aquin.

Table 2 (page 3) lists **the communes with no confirmed cases in the past month, which experience the greatest infectious pressure (indicative of increased risk of new outbreaks)**.

Note: *Infectious pressure is an indicator of risk of new outbreaks originating from people coming into a commune. For communes with ongoing transmission, including those with no confirmed cases, the highest risk of continued spread will likely stem from the ongoing transmission within those communes, and not from the infectious pressure shown on Map 2.*



About this report

Data

The analyses in this report use Call Detail Records (CDRs) provided by Digicel Haiti. Cholera case data are provided by Ministry of Public Health and Population of Haiti. For more information please visit:

www.flowminder.org/haiti-cholera-2022-3-eng#data

Data considerations

The estimates shown are our best current assessment of movements. However, there are a number of uncertainties. The information should be interpreted together with other available evidence. For more information please visit:

www.flowminder.org/haiti-cholera-2022-3-eng#considerations

Methodology

For information on how these indicators were calculated, please visit:

www.flowminder.org/haiti-cholera-2022-3-eng#methodology

Data privacy and protection

No personal data, such as an individual's identity, demographics, location, contacts or movements, is made available to the government or any other third party at any time. All results are fully anonymised and our methodologies comply with the European Union's General Data Protection Regulation (EU GDPR 2016/679). For more information please visit:

www.flowminder.org/haiti-cholera-2022-3-eng#privacy

We welcome feedback to help us improve future reports and requests for specific types of analysis

Please email info@flowminder.org with any feedback and suggestions, or if you have any specific analytical requirements we can support.

References

[1] Bengtsson, L., Gaudart, J., Lu, X., Moore, S., Wetter, E., Sallah, K., Rebaudet, S. and Piarroux, R., 2015. Using mobile phone data to predict the spatial spread of cholera. Scientific reports, 5(1), pp.1-5.

Table 1

Communes receiving the greatest flows of subscribers from communes within the Port-au-Prince metropolitan area where there are substantial confirmed cholera cases (highlighted area, Map 1).

Ranking	Commune	Departement	Normalised Flow
1	Tabarre	Ouest	1
2	Croix-Des-Bouquets	Ouest	0.6
3	Kenscoff	Ouest	0.2
4	Gressier	Ouest	0.2
5	Cabaret	Ouest	0.1
6	Léogâne	Ouest	0.09
7	Thomazeau	Ouest	0.04
8	Arcahaie	Ouest	0.04
9	Petit-Goâve	Ouest	0.03
10	Miragoâne	Nippes	0.03

Table 2

Communes with no confirmed cholera cases in the last month (14 October - 14 November 2022) which experience the highest infectious pressure. Higher infectious pressure is associated with an increased risk of new cholera outbreaks.

Ranking	Commune	Departement	Normalised infectious pressure
1	Cabaret	Ouest	1
2	Arcahaie	Ouest	0.4
3	Aquin	Sud	0.3
4	Miragoâne	Nippes	0.3
5	Grand-Goâve	Ouest	0.2
6	Les Cayes	Sud	0.2
7	Jacmel	Sud-Est	0.2
8	Ganthier	Ouest	0.1
9	Roseaux	Grande'Anse	0.1
10	Saint Louis du Sud	Sud	0.1

Acknowledgements

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