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Haiti: Hurricane Matthew

Informing mobile platform initiatives by WFP in Haiti:

Estimated Handset Type Distribution as of 22 November 2016

Flowminder Foundation - Digicel Haiti - World Food Programme

Produced on 24 November 2016

FLOWMINDER.ORG

Our mission is to improve public health and welfare

We provide global public goods, working with partners to collect, aggregate, integrate and analyze anonymous mobile operator data, satellite and household survey data. We characterize and map vulnerable populations at risk in low- and middle-income countries.

All estimates and maps are available on the WorldPop Project
website:
www.worldpop.org

Disclaimer: It should be noted that statements made in this report are the expression of individual views and opinions and do not necessarily reflect the facts or agency policy or guidance, and cannot be construed as official representations of (as examples) statutes or regulations.

Cover photo: Cpl. Kimberly Aguirre. U.S. Marine Corps; www.dvidshub.net

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Background

Call detail records (CDRs) are registered by mobile operators for billing purposes. They include information on the cell tower used by subscribers when sending and receiving text messages and making calls. In de-identified formats, they can be used to estimate mobility patterns of a population. CDRs also include information on the type of handset used to make or receive a call or text, which can be combined with the estimated mobility patterns to estimate the distribution of handset types at a given point in time out of those with home in the most affected Departments. The CDR analysis described here was undertaken in compliance with the GSMA privacy guidelines developed in the context of the Ebola outbreak (GSMA, 2014).

The analyses have been performed on request by humanitarian agencies to inform communication strategies with affected populations. The information provided aims to support decision making by responders wishing to deploy surveys via call, sms and mobile apps, or deploy mobile money cash distribution via ussd, sms and mobile apps.

Methodology

Estimating handset type distribution

We divide phone handset types into three categories: BASIC, FEATURE and SMARTPHONE. The classification is based on the following features of the handset: Operating System, GSM protocols, and network protocols. Table 1 provides an overview of the handset properties.

Table 1: Handset type properties

Handset type	Handset properties
Basic	<ul style="list-style-type: none"> • Voice and SMS functionality only • Generally at a lower price point than feature or smartphones
Feature	<ul style="list-style-type: none"> • Usually have a limited proprietary operating system • Have limited third-party software support • Can include GPS, camera, full HTML browser, social networking applications, 3G capability • Generally at a price point between basic and smartphones
Smartphone	<ul style="list-style-type: none"> • Have a third-party operating system (Android, Windows Mobile, iOS etc.) • Run third-party software/apps • Wide array of functionality including GPS, camera, touch

	<p>screen, etc.</p> <ul style="list-style-type: none"> • Generally at a higher price point than basic or feature phones
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To compare the spatial distribution of phone handset types we look at the locations of de-identified Digicel subscribers during pre- and post-hurricane periods, together with their most commonly used handset type during each period.

We restrict our analysis to **users who lived pre-hurricane in the Departments of Sud, Grande Anse and Nippe**, based on their locations from 2016-09-21 to 2016-09-28. Out of these users, we select those who were also active in the post-hurricane from 2016-11-16 to 2016-11-22. For these users we provide information on the type of handset used. We provide this information for both the pre and post-hurricane period.

We produce maps showing the the proportion of smart, feature, and basic phone types active in each Section Communale, based on a one week period before the hurricane (2016-09-21 to 2016-09-28), and after the hurricane (2016-11-16 to 2016-11-22). Because we do not show the percentage of unknown phone types, percentages may not sum to 100% across the maps. The proportion of handset types for the users with pre-hurricane homes in the Departments of Sud, Grande Anse, or Nippes in the post-hurricane period are shown in Table 2.

Table 2: Proportion of handset types in the post-hurricane period for the users with pre-hurricane homes in the Departments of Sud, Grande Anse, or Nippes.

Handset type	Percentage handset type in the post-hurricane period among the selected users
Basic	18%
Feature	24%
Smartphone	32%
Unknown	26%

Estimating locations of users by handset type

In addition to estimating the percentage of phone types used by Digicel subscribers who lived in Departments of Sud, Grande Anse, or Nippes pre-hurricane, we provide a breakdown of how users of each phone type are spatially distributed during the benchmark and focal periods.

We produce maps showing the percentage of smart, feature, and basic phone users located in each Section Communale during the pre- and post-hurricane periods. We restrict our analysis to users who lived in the Departments of Sud, Grande Anse, and Nippes during the pre-hurricane period, and can be located in both periods.

Supporting Datasets

Haiti Administrative Boundaries Level 0 - 3

UN OCHA Haiti, 5 October 2016

<https://data.humdata.org/dataset/hti-polbndl-adm1-cnigs-zip>

Project Partners

Flowminder Foundation and WorldPop Project

www.flowminder.org www.worldpop.org

The Flowminder team pioneered the analysis of mobile network data to support responses to natural disasters and epidemics (Zanzibar 2009 malaria, Haiti 2010 earthquake and cholera outbreak). The WorldPop project is the leading open data repository for population densities and distributions, and is Flowminder's main dissemination platform.

Digicel www.digicelhaiti.com

Digicel Group is a leading global communications provider with operations in 33 markets in the Caribbean, Central America and Asia Pacific. Digicel is the largest operator in Haiti.

UN World Food Program www.wfp.org

WFP is the world's largest humanitarian agency, fighting hunger worldwide.

Contacts

Chris Brooks chris.brooks@flowminder.org +44 7815 944012

Linus Bengtsson linus.bengtsson@flowminder.org +41 789 648 828

Jonathan Gray jonathan.gray@flowminder.org

Results

Key insights

Of subscribers with pre-hurricane homes in the Department of Sud, 20% had a basic phone, 27% had a feature phone, and 25% had a smartphone. In the Department of Nippes, basic phone ownership is 1% higher, feature phone ownership is 2% lower, and smartphone ownership 1% lower. In the Department of Grande Anse, basic phone ownership is 21%, with the highest feature phone, and lowest smartphone ownership of 30%, and 22% respectively. Some uncertainty exists in these estimates, as 20% of phones have not been possible to type.

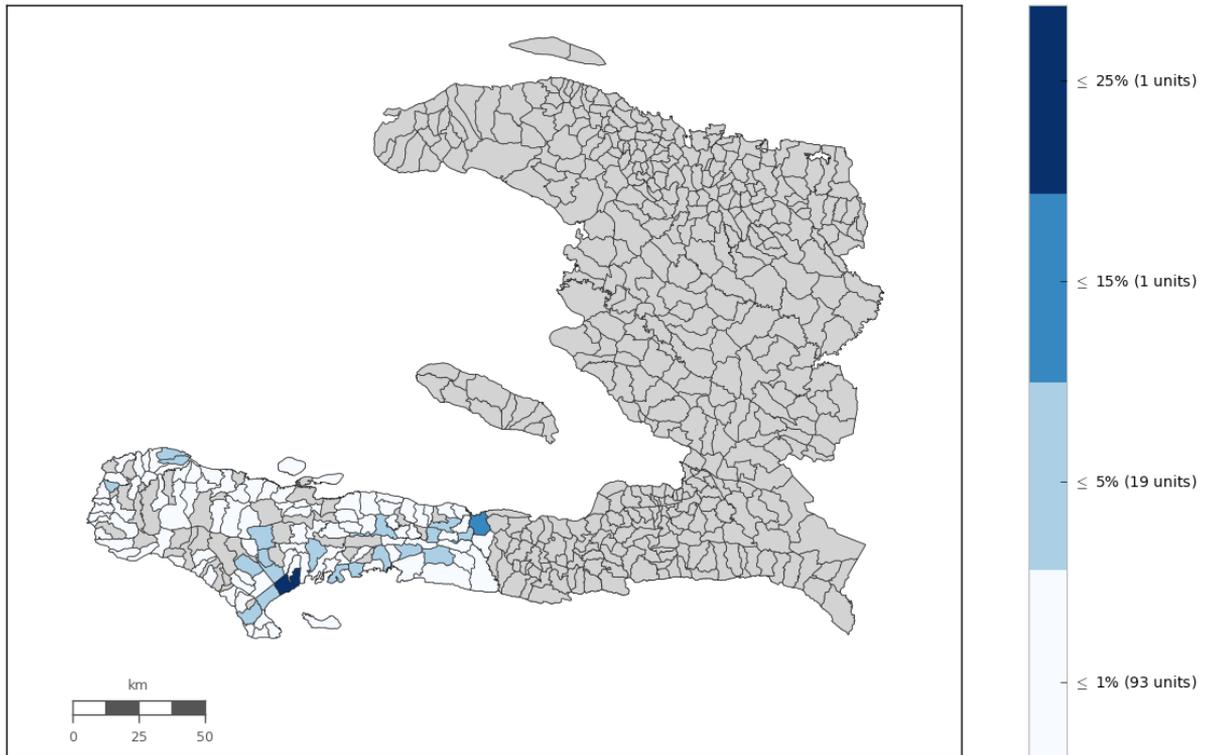
Smartphones are more common in urban areas (31% average for the city of Les Cayes), whilst feature phones are most prevalent in rural areas. The percentage of users of each handset type who relocated after the hurricane is shown in Table 3. A similar percentage is found for each phone type.

Table 3: Proportion of users who relocated post-hurricane, by handset owned for users with homes in the Departments of Sud, Grande Anse, or Nippes.

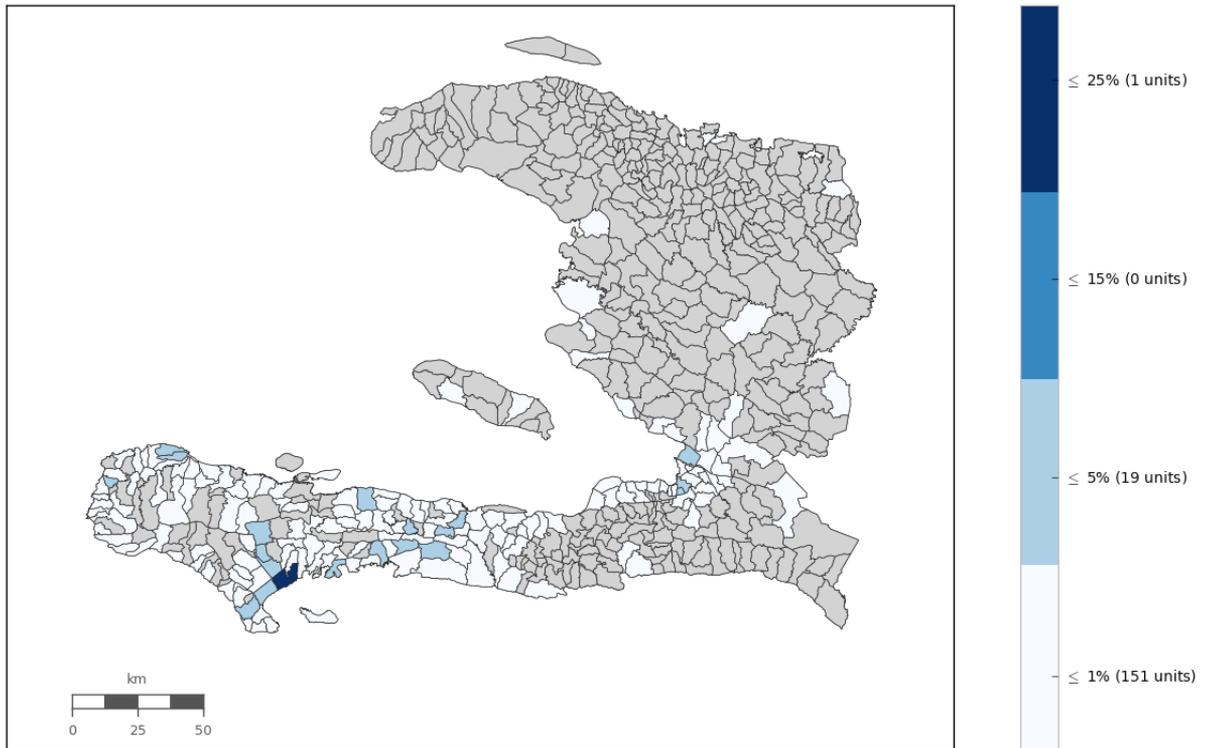
Handset type	Percentage of users who relocated
Basic	27%
Feature	27%
Smartphone	26%
Unknown	28%

Location of users by handset type

Smartphones

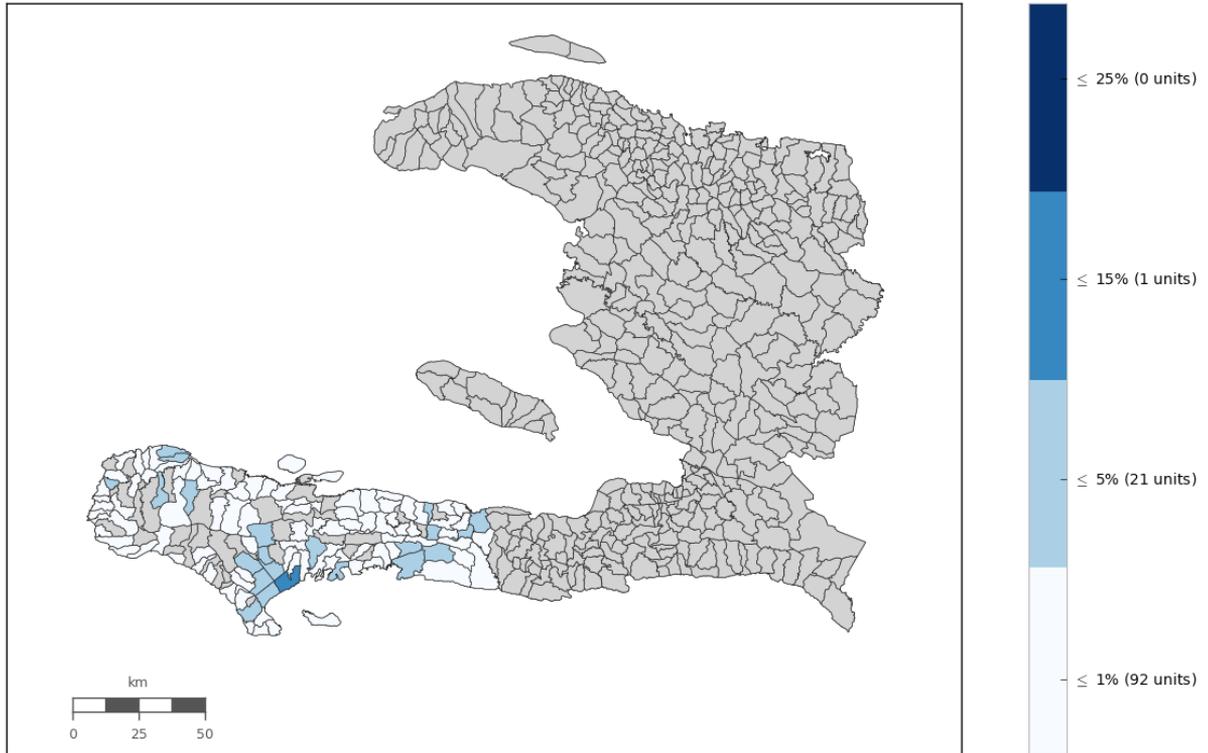


Map 1: Location of smartphone users with homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the pre-hurricane benchmark period. Here, we take the pre-hurricane location of users from the Departments of Sud, Grande Anse, or Nippes, and take the subset who are smartphone users. The spatial distribution of these smartphone users is then determined at the Section Communale level. Grey areas indicate insufficient data.

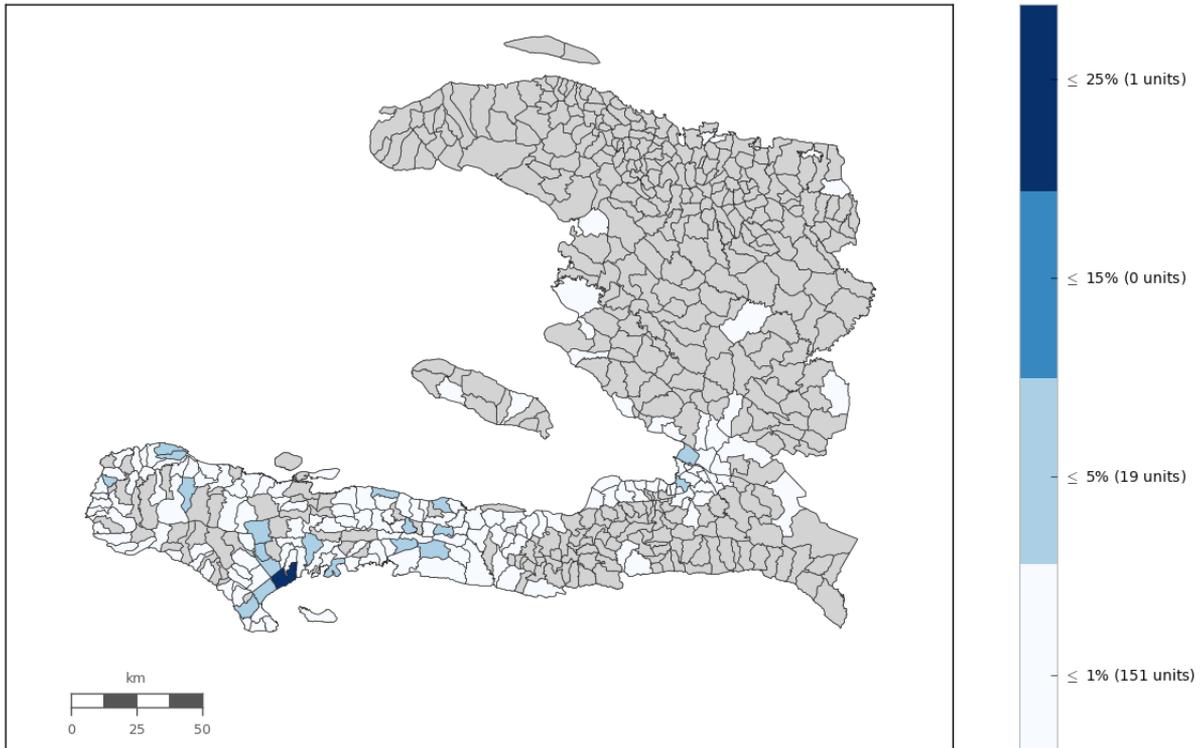


Map 2: Location of smartphone users with pre-hurricane homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the post-hurricane focal period. Here, we take the post-hurricane location of users from the Departments of Sud, Grande Anse, and Nippes, and take the subset who are smartphone users. The spatial distribution of these smartphone users is then determined at the Section Communale level. Grey areas indicate insufficient data.

Feature Phones

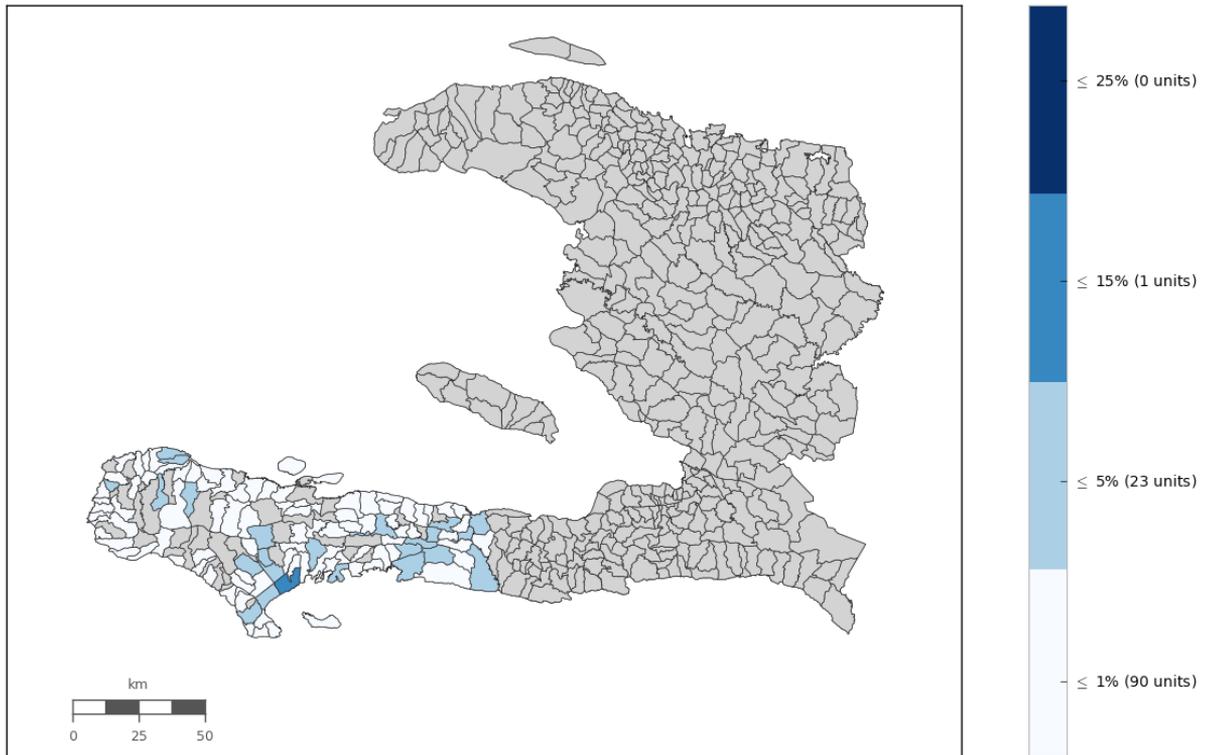


Map 3: Location of known feature phone users with homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the pre-hurricane benchmark period. Here, we take the pre-hurricane location of users from the Departments of Sud, Grande Anse, or Nippes, and take the subset who are feature phone users. The spatial distribution of these feature phone users is then determined at the Section Communale level. Grey areas indicate insufficient data.

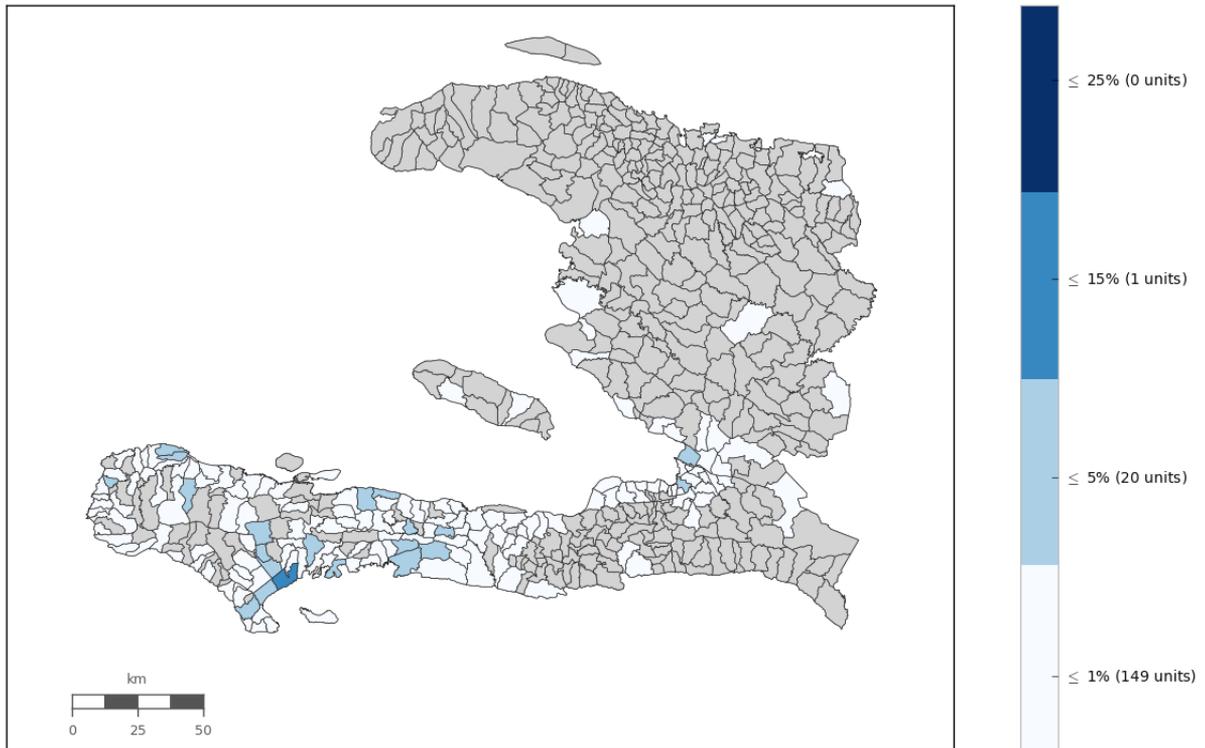


Map 4: Location of known feature phone users with homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the post-hurricane focal period. Here, we take the post-hurricane location of users from the Departments of Sud, Grande Anse, or Nippes, and take the subset who are feature phone users. The spatial distribution of these feature phone users is then determined at the Section Communale level. Grey areas indicate insufficient data.

Basic Phones



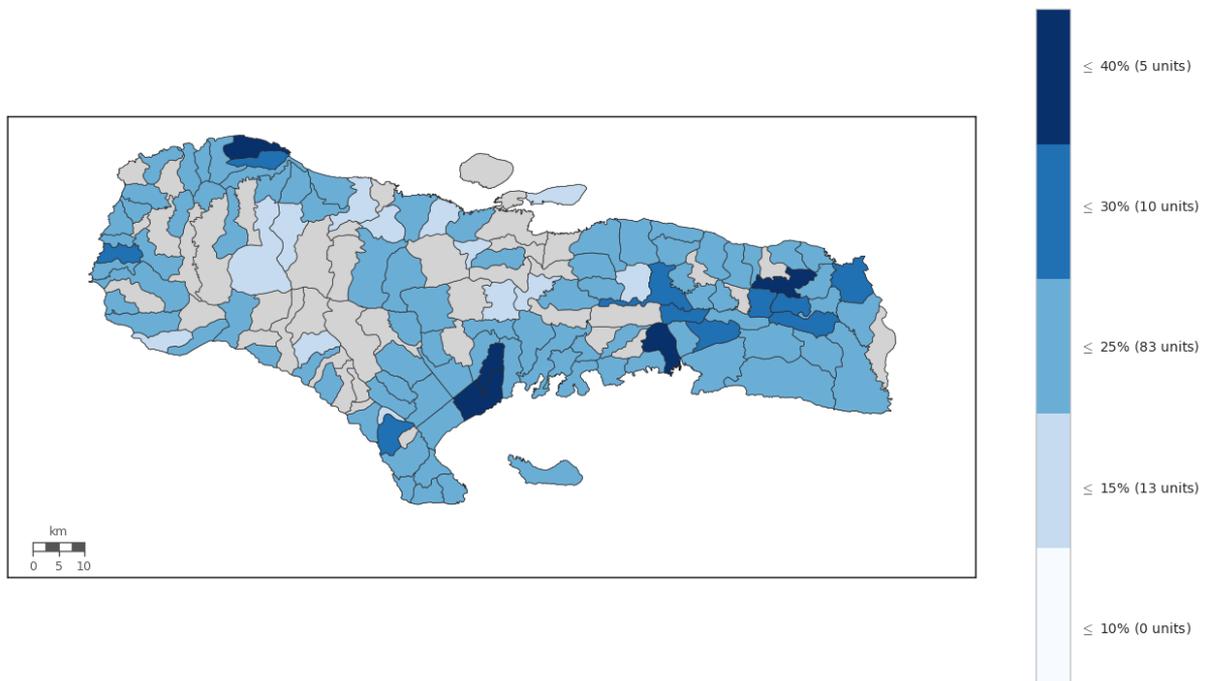
Map 5: Location of known basic phone users with homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the pre-hurricane benchmark period. Here, we take the pre-hurricane location of users from the Departments of Sud, Grande Anse, or Nippes, and take the subset who are basic phone users. The spatial distribution of these basic phone users is then determined at the Section Communale level. Grey areas indicate insufficient data.



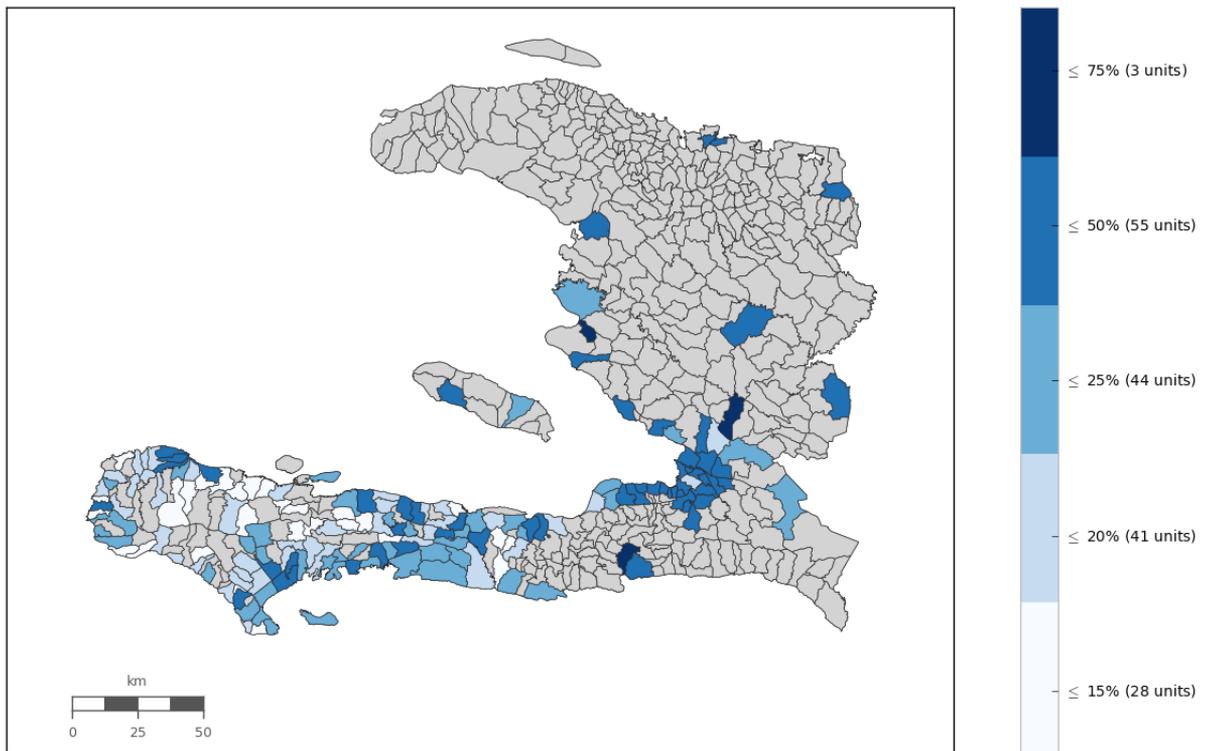
Map 6: Location of known basic phone users with homes in the Departments of Sud, Grande Anse, or Nippes, located in each Section Communale during the post-hurricane focal period. Here, we take the post-hurricane location of users from the Departments of Sud, Grande Anse, or Nippes, and take the subset who are basic phone users. The spatial distribution of these basic phone users is then determined at the Section Communale level. Grey areas indicate insufficient data.

Breakdown of users' handset types

Smartphones

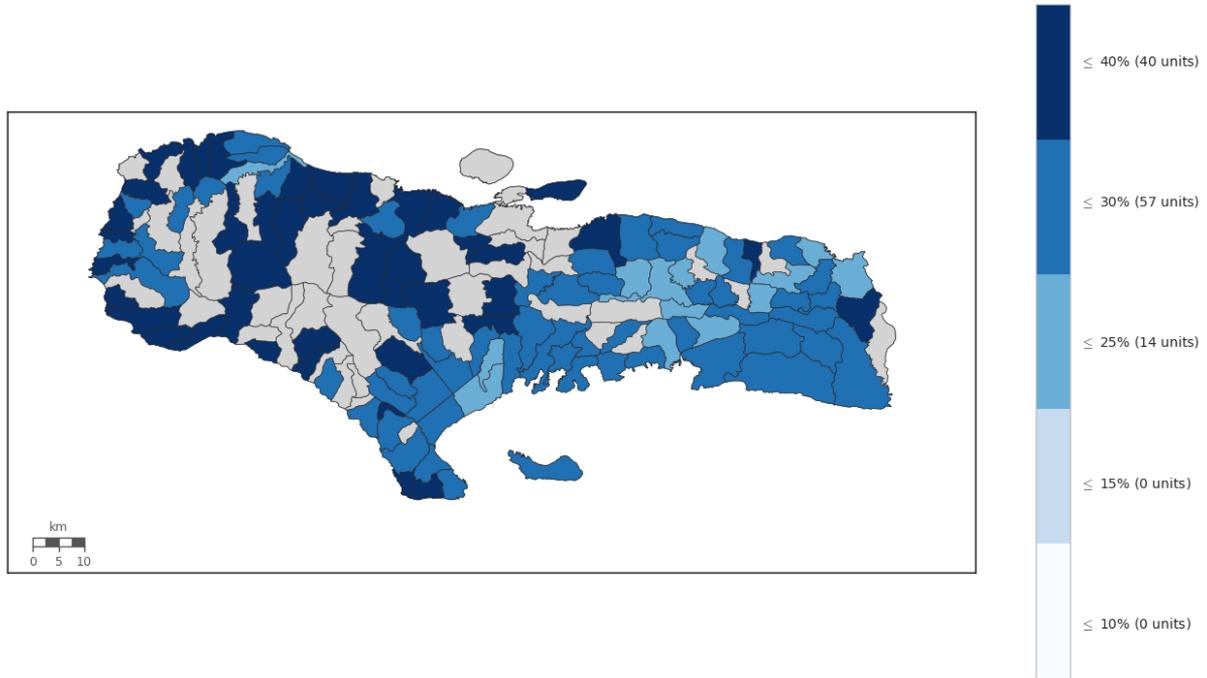


Map 7: Smartphones as a percentage of handsets of the users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. The pre-hurricane home Section Communale of users in the Departments of Sud, Grande Anse and Nippes is used to determine the handset location. Grey areas indicate insufficient data.

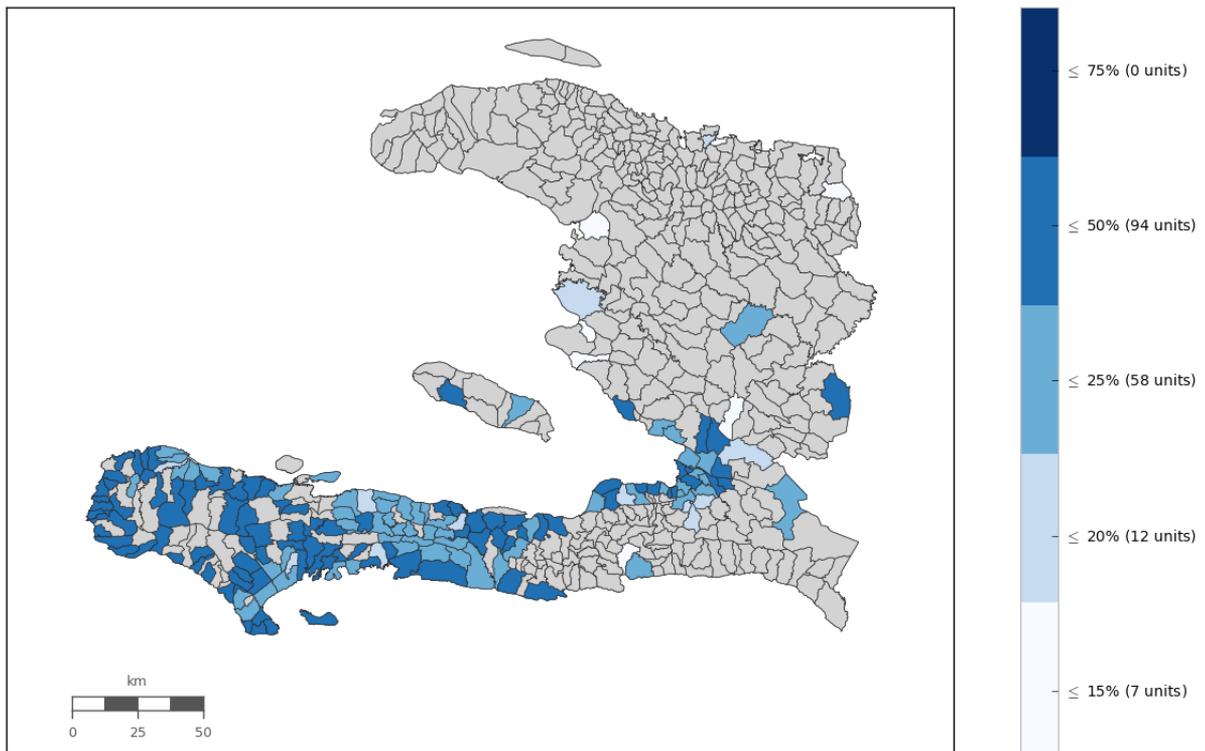


Map 8: Smartphones as a percentage of all handset types for users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. Most of these users are still in the Departments of Sud, Grande Anse and Nippes, while a smaller proportion are located outside. Data as of 22 November 2016. Grey areas indicate insufficient data.

Feature Phones

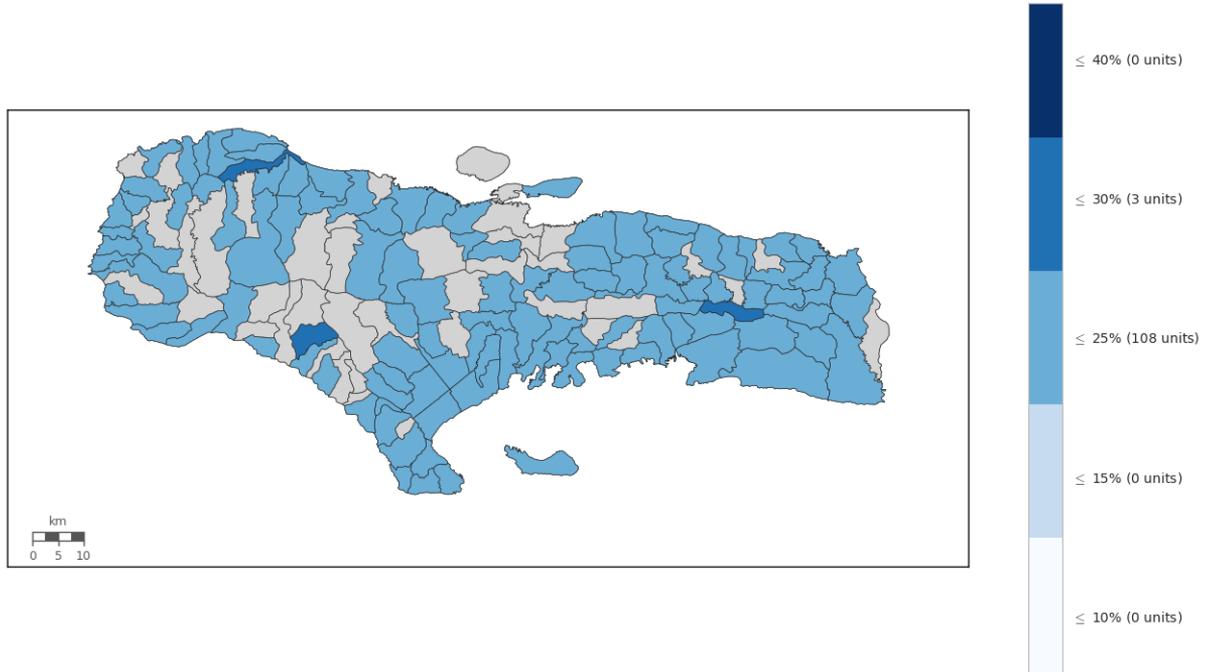


Map 9: Feature phones as a percentage of handsets of the users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. The pre-hurricane home Section Communale of users in the Departments of Sud, Grande Anse and Nippes is used to determine the handset location. Grey areas indicate insufficient data.

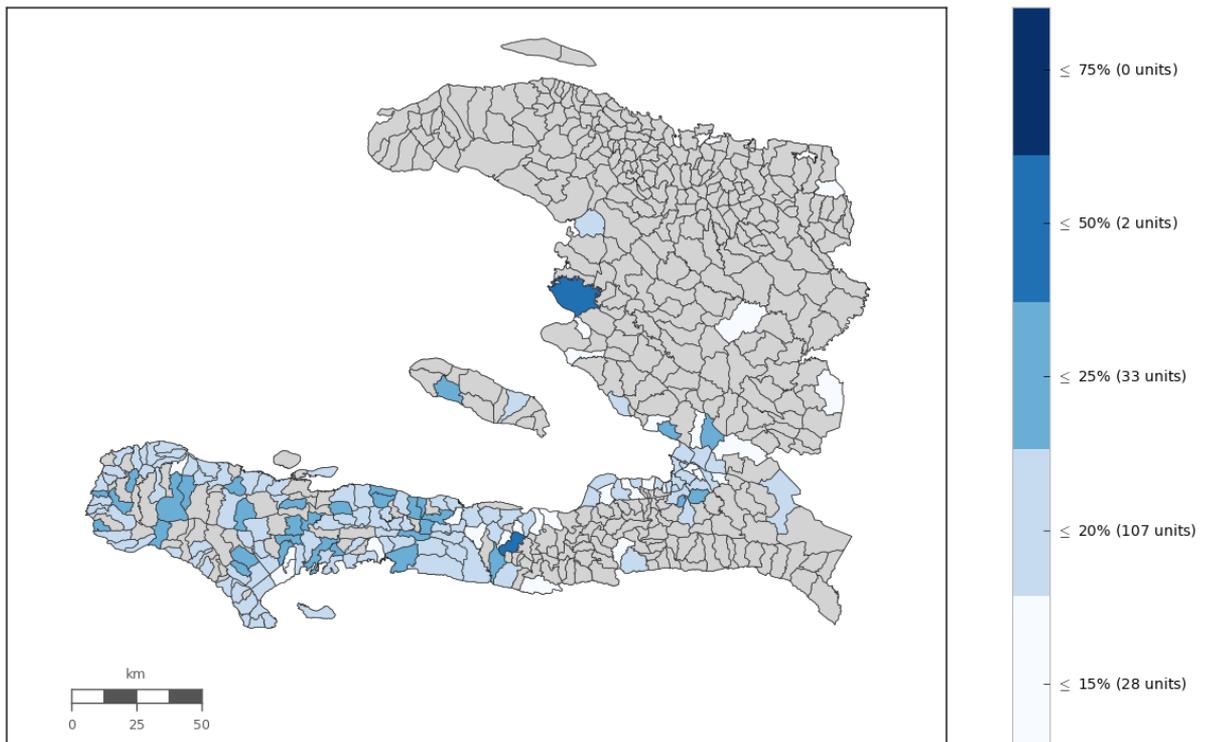


Map 10: Feature phones as a percentage of all handset types for users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. Most of these users are still in the Departments of Sud, Grande Anse and Nippes, while a smaller proportion are located outside. Grey areas indicate insufficient data.

Basic Phones



Map 11: Basic phones as a percentage of handsets of the users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. The pre-hurricane home Section Communale of users in the Departments of Sud, Grande Anse and Nippes is used to determine the handset location. Grey areas indicate insufficient data.



Map 12: Basic phones as a percentage of handsets of the users who had their pre-hurricane home in the Departments of Sud, Grande Anse and Nippes. The location of users who left their pre-hurricane home Section Communale in the Departments of Sud, Grande Anse and Nippes is used to determine the handset location. Grey areas indicate insufficient data.