



## **CASE STUDY:**

Using geospatial tools and data to improve the ITN campaign microplanning process in Burundi

November 2022



**amp** | The Alliance for  
Malaria Prevention  
Expanding the ownership and use of mosquito nets

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*All photographs were taken at  
the GIS microplanning workshop  
in Burundi, March 2022.  
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## CONTEXT

As part of its National Strategic Plan for Malaria Control (2018—2023), the Burundi National Integrated Malaria Control Programme (PNILP) is planning an insecticide-treated net (ITN) mass distribution campaign in September 2022 with the objective of achieving universal coverage with effective malaria prevention. The campaign involves the procurement and distribution of three ITN types (standard, piperonyl butoxide [PBO] and IG2™). The PNILP organized and completed the microplanning exercise for the 43 targeted districts in March 2022.

Immediately following the paper-based microplanning, Burundi's PNILP implemented a pilot project to digitalize the mapping process of a small portion of the country using geographic information systems (GIS) and satellite imagery to improve the quality and accuracy of the microplans. The overall aim was to generate important lessons in digitalization of the microplanning process, with the hope of extending digitalization to microplanning for all districts in future campaigns. The geospatial microplanning pilot for the ITN campaign was part of a larger digitalization effort funded by the Global Fund through its COVID-19 Response Mechanism (C19RM).



# ITN MASS CAMPAIGN MICROPLANNING:

## challenges and opportunities

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Microplanning is one of the most important activities for the success of a mass ITN distribution campaign. It is a bottom-up process to create a detailed, delivery-level operational plan for identifying and reaching the target population, allocating and managing resources and monitoring outcomes. The microplanning exercise also helps identify potential gaps that can be addressed through the establishment of additional ITN distribution points (DPs) or the reallocation of existing resources. The advantages of microplanning include:

- Ensuring all households and populations are covered
- Cross-validating the population count with information from the operational level
- Identifying newly created administrative areas
- Optimizing the allocation of all resources, including ITNs

An effective microplanning exercise requires knowledge of where target populations are located, how they can be accessed and available local resources.

The availability of geographically accurate information is a prerequisite for developing an effective ITN campaign microplan. The strong geographic dimension associated with ITN microplanning leads to the development and use of maps to represent the spatial distribution and/or extent of the relevant geographic features (health facilities and other points of service delivery, administrative boundaries, population settlements, transportation network, landmarks, water bodies, elevation, hard-to-reach or inaccessible areas) as well as associated information and statistics (settlement and infrastructure names, travel time, population size). Maps are the starting point of any ITN mass distribution microplanning process.

Typically, maps have predominantly been sketches drawn by hand based on local knowledge, which are used as the basis for planning the movement of household registration teams, outreach and mobile distribution points, and supervision and monitoring teams. They are extremely important to help in the process of selecting ITN distribution points and their “catchment area”, identifying hard-to-reach areas, and illustrating any key feature (such as markets, schools and religious institutions, as well as population groups that have known barriers to access health services) that must be taken into account in planning and implementing operational level activities.

However, hand-drawn maps to support microplanning present some challenges:

- If they include all the necessary information they become difficult to read (population figures, hard-to-reach areas, seasonal barriers to movements, landmarks, etc.)
- They cannot be easily updated without having to be re-drawn
- They are difficult to share and to archive so they can be consulted in the future
- They cannot provide accurate population distribution information within the catchment area
- They cannot properly feature accurate and precise position, legend and scale
- They are prone to human error

The use of geospatial data and tools can help address some of the above challenges and also improve the population distribution estimates, and measure physical accessibility to health services (distance, travel time). The maps that are produced can easily be updated with new information and they can be copied and archived for future reference.

It is in this context that the Burundi PNILP undertook a pilot project to digitalize the microplanning process using GIS tools and data as part of the 2022 ITN mass distribution campaign to demonstrate the value of GIS microplanning in the ITN campaign.



# PROCESS

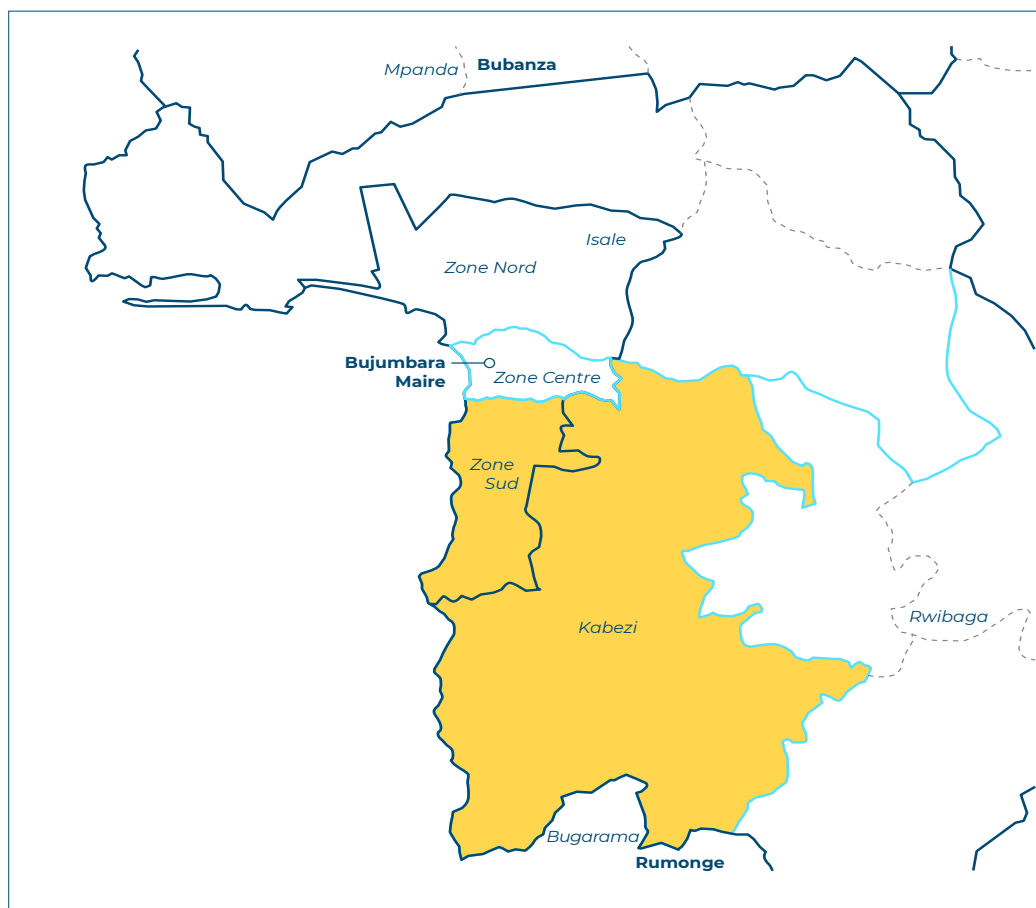
The pilot project was designed as a three-step process:

## 1. Scope

This step involved defining the area to be covered and understanding the needs of that area. It was suggested to pick a reasonably small portion of the country for the pilot. Two health districts were deemed sufficient for learning and demonstrating the process. Criteria used for the selection of a suitable area of interest included:

- An area that would benefit from improved intelligence on where the population is located. For instance, an area which has not conducted a census in a long time or a health district where health officers are not familiar with a significant part of the terrain.
- An area with high quality geo-datasets ready (this criterion was advantageous but not mandatory). For instance, a health district with recent, quality datasets of population distribution and health facilities.

The PNILP selected the health districts of Zone Sud (Bujumbura Mairie) and Kabezi (Bujumbura Rural) for the pilot. In addition to the initial criteria, both health districts were chosen for the pilot because of their proximity to the central level, allowing coordination and monitoring to be carried out more efficiently.



**Figure 1:** Map of Burundi, showing the chosen pilot districts

## 2. Collect datasets and prepare the base maps

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This step required conducting a rapid assessment to evaluate the availability and quality of spatial data and data sources to be used as inputs in the GIS microplanning process for the targeted health districts. As part of this step, GIS consultants in collaboration with the ITN campaign team:

- Developed a list of data sets required to produce base maps. Data categories included the administrative divisions, population estimates, demographics, health facilities, boundaries of health catchment areas, distance/travel time, road networks, points of reference
- Identified data gaps and additional data sources. WHO GIS Centre for Health helped compile, in advance, an extensive inventory of globally available data sources on Burundi
- Gathered both publicly available datasets at global level (including satellite imagery, buildings footprints, OpenStreetMap roads, etc.) and datasets from local sources. One of the global data sources that was extensively used is [WorldPop Open Population Repository](#), an open spatial demographic dataset that provides access to gridded population estimates and high-resolution geospatial data on population distributions, demographics and dynamics. As for local available datasets, the team mainly used the hand-drawn maps and Excel files from the paper-based microplanning workshops in the two districts.

Once the data assessment and cleaning were completed, the GIS experts, with the support of the WHO GIS Centre and in collaboration with the ITN campaign team, prepared the base maps for the selected health districts using the two leading GIS applications, QGIS and ArcGIS.

- ArcGIS Online is a licensed online platform and comes with many mapping functions. This platform was extensively used by the WHO GIS Centre<sup>1</sup> to provide high resolution satellite imagery of the targeted areas (including other baseline information on population estimates, distribution sites and their catchment areas, etc.) ready to be printed for the GIS microplanning workshop.
- The QGIS platform is a free and open-source desktop GIS application that supports viewing, editing, printing and analysis of geospatial data. This platform was mainly used by the project consultant to complement ArcGIS Online information on the quantification of estimated populations, households, the distribution sites and buffer zones, other baseline information on administrative boundaries, settlement names, health facilities, roads, etc.
- Both ArcGIS and QGIS have the same processing imagery tools.

The output of this step was the development of large-scale printable maps that contained the information most relevant for the GIS microplanning workshop, based on practicalities and ITN campaign needs. However, the digital maps were not printed prior to the workshop due to time constraints.

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1. <https://who.maps.arcgis.com/home/index.html>



### 3. Microplanning workshop

A three-day workshop was organized in each of the two health districts but only one district (Mairie Sud) was able to complete the exercise, while the second district (Kabezi) was not completed due to time and logistics constraints. The target audience of the workshop was the ITN distribution teams, district health officers and data managers. The workshop, facilitated by national malaria programme staff and GIS consultants (with remote support from WHO GIS team) trained the teams on the digitalization process, so they understood the maps and had confidence in their accuracy and value. This included a basic training on installation and use of GIS platforms (ArcGIS and QGIS).

Accounts were created to allow participants to access the WHO ArcGIS Online as this is a proprietary software requiring a licence, while QGIS Desktop was installed on some of the participants' laptops as a free open-source software. The workshop involved group exercises on delimitation of campaign teams' and supervisors' areas as well as creating health facility boundaries. The exercises also included analysis of population estimates using QGIS based on WorldPop data. Other data sources used to improve the base maps included the conventional microplan Excel files, central/local government data, satellite imagery, etc.

The workshop was largely an iterative process, where the base maps were validated and improved by the teams, serving to calibrate the digitalization results and improve the final map products. The ArcGIS Online platform allowed the teams to interact with the tools and improve the maps based on ground knowledge.

Key outcomes of the workshop in Bujumbura Mairie Sud district included updated health facility boundaries, demarcation of the team areas and upward revision of the campaign target population, which in turn led to the update of the microplans including an increase in the number of distribution points from 34 to 44.





# LESSONS LEARNED AND KEY CONSIDERATIONS

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Microplanning using geospatial data and tools/technologies is one of the options available to strengthen the microplanning process. While the development of hand-drawn maps has tended to be a highlight of the microplanning process in the past, and while digitalization has its own set of challenges, relying on more accurate maps helps to ensure that national malaria programmes can better identify populations and plan for more accurate, efficient and effective ITN distributions, ensuring that they reach all households in the areas targeted. This pilot exercise clearly demonstrated the value and accuracy of digital maps versus hand-drawn maps. It also identified key lessons learned for the planning of future GIS microplanning workshops if that is the direction that the PNILP takes:

- The importance of access to a **stable and reliable internet connection** if web-based tools or data are being used.
- The need for local **high-resolution printing capability** for the geospatial maps to facilitate their update by workshop participants. It is advantageous to print the A0 (large size – 841 x 1188 mm) maps and work on them before shifting to the online platform. While using the online platform, users must pin any Point of Interest that can help them draw the border lines. Users can later delete unnecessary Points of Interest that were just pinned to help with the delimitation process.
- GIS software to use: the licence is quite expensive for ArcGIS, while QGIS is totally free.
- **Technical capacity:**
  - ↘ Internal: Burundi PNILP has a monitoring and evaluation (M&E) officer with GIS capacity who was nominated as the focal point for the pilot
  - ↘ There is a need for **local capacity to generate base maps** and not over rely on the WHO GIS centre. For the Burundi pilot, GIS experts (two consultants) were recruited including an international consultant
  - ↘ Use of geospatial maps for microplanning does not require all workshop participants to be experts or have background skills in GIS. Experts at national level can lead the exercise, with focal persons in each district that have learned enough of the tools to facilitate the workshops. For most participants, they only need to work with the facilitation team to define their areas and the distribution points
- **Cost considerations:** fee for GIS expert consultants (international and national), training costs (venue, equipment, stationery, transportation and lodging cost), high resolution colour printing of the base maps in A0 format, purchasing of GIS software licence (desktop or cloud based) for data management, analysis and visualization











## AMP CONTACTS

To join the weekly AMP conference call each Wednesday at 10:00 AM Eastern time (16.00 PM CET) use the following Zoom meeting line:

<https://us06web.zoom.us/j/2367777867?pwd=a1lhZk9KQmcxMXNaWnRaN1JCUTQ3dz09>

You can find your local number to join the weekly call:

<https://zoom.us/u/acyOjklJ4>

To be added to the AMP mailing list visit:

<https://allianceformalariaprevention.com/weekly-conference-call/signup-for-our-mailing-list/>

To contact AMP or join an AMP working group please e-mail:

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<https://allianceformalariaprevention.com>

