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CASE STUDY: DIGITALIZATION OF THE 2020 AND 2023 MASS INSECTICIDE-TREATED NET (ITN) CAMPAIGNS IN TOGO: THE EXPERIENCE OF “BRING YOUR OWN DEVICE” (BYOD)

CONTENTS

BACKGROUND

	3
The digitalization process	4
“Bring Your Own Device” (BYOD)	5
Digitalization of campaign components	6
Challenges	8
Successful outcomes	10



BACKGROUND

Malaria remains a leading cause of morbidity and mortality in Togo, with the entire nation at year-round risk. In 2020, an estimated 1.89 million malaria cases and 3,600 deaths were reported¹ among a population of around 8.4 million. In 2021, cases rose to two million, with 3,715 deaths reported² and in 2022, a further rise in cases to 2.2 million³ was documented. To combat this increasing disease burden, the Government of Togo's Ministry of Health, Public Hygiene and Universal Access to Healthcare (MSHPAUS), through the National Malaria Control Programme (NMCP), has adopted a multi-faceted malaria control strategy, which includes a full spectrum of malaria interventions for prevention, including the distribution of insecticide-treated nets (ITNs), seasonal malaria chemoprevention, intermittent preventive therapy during pregnancy and deployment of the malaria vaccine, as well as case management, including malaria diagnosis and treatment and management of severe malaria cases.

The MSHPAUS and the NMCP organized the first national-scale ITN distribution in December 2004 as part of an integrated child health campaign, targeting children under five with a package of interventions including polio immunization, Vitamin A, deworming and ITNs⁴. Under the leadership of the MSHPAUS and in collaboration with partners, mass ITN distribution campaigns have been organized every three years since 2004. Additionally, ITNs are distributed to pregnant women and children under five through routine health services. Following severe flooding, displaced populations relocating from Burkina Faso to the northern part of Togo are also targeted for ITNs.

During the 2017 campaign, challenges were encountered with data management, especially with archiving data and the inability to obtain disaggregated information for in-depth analyses requested by the Against Malaria Foundation (AMF), one of the major funders of the campaign ITNs. To address the lack of timely, quality data from the campaign processes, the NMCP, with the support of its partners, decided to adopt digitalization for some key components of the 2020 mass ITN distribution campaign.

The decision to use digital tools in the 2020 ITN distribution campaign was a strategic move, driven not only by the need to fulfil donor and contractual obligations but also to collect detailed, disaggregated data, enhance data quality and efficiency of data transmission and enable real-time analysis and decision-making to optimize outcomes. A significant factor in the decision was strong commitment, leadership and dedication from management. The campaign benefited from a leadership that was deeply invested in adopting digital tools not only for ITN campaigns but for the entire health system, which drove the momentum of the digitalization process.

Prior to the 2020 campaign, a national commission was established by the National ITN Campaign Coordinating Committee to evaluate the feasibility of digitalization. The commission assessed the main distribution challenges including the availability of data after a campaign which could be improved by digitalization, internet penetration within the country, capacity of community health workers (CHWs) to use devices, etc.

¹ <https://www.malariaconsortium.org/where-we-work/togo.htm>

² <https://www.afro.who.int/sites/default/files/2023-08/Togo.pdf>

³ <https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2023>

⁴ <https://malariajournal.biomedcentral.com/articles/10.1186/1475-2875-11-389>

The assessment concluded that there were enough resources and capacity within the country to implement digitalization at a larger scale. Following this, an information and communication technology (ICT) committee was formed, comprising a coordinator, four IT technicians, a statistician, the head of monitoring and evaluation for the NMCP, two campaign monitoring and evaluation team members and the NMCP campaign focal point, all of whom were primarily drawn from within the MSHPAUS.

The digitalization process

The main goal of the ITN campaign digitalization was to enhance operational efficiency and improve data management. This involved transforming the traditional data collection tools, which relied heavily on Excel files and paper forms, into a digital platform. In-house applications and Android-based tools were developed to manage data collection of various aspects of the campaign including microplanning, household registration, distribution, supervision and post-campaign monitoring.

Very broadly, the digitalization process involved:

- Organizing ICT committee meetings
- Designing a platform based on thematic committee inputs (e.g. logistics and monitoring and evaluation)
- Aligning the thematic needs with the country's context and resources to select suitable solutions
- Conducting pre-tests and validation workshops, followed by adjustments
- Designing a device management system
- Training users on the platform
- Following the implementation of campaign activities and troubleshooting issues arising

Leveraging existing human resources within departments, such as those at the Ministry of Health, proved to be a cost-effective strategy for digitalization. The formation of an ICT committee within the Ministry, comprising personnel from the national malaria programme and MHSPAUS, facilitated the efficient use and mobilization of internal resources, contributing to the campaign's overall success. This strategy was used for both the 2020 and 2023 campaigns.

Constrained by resources, the NMCP innovatively developed its own data collection platform in-house using national expertise, and used mobile phones owned by community volunteers ("Bring Your Own Device" [BYOD]) for the 2020 campaign, a strategy which was continued for the 2023 campaign. As BYOD was used during both the 2020 and the 2023 campaigns, important lessons learned and recommendations for other programmes considering a similar strategy have been generated and are summarized in this case study.



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“Bring Your Own Device” (BYOD)

The mobilization of mobile phones from the community was a crucial part of the digitalization strategy and was adopted to mitigate the difficulty of funding new smartphones for the programme. The campaign initially planned to use 5,000 smartphones that were previously purchased for community health workers and to acquire others from other institutions. However, the needs quantified for the campaign (8,000) exceeded the phones available from those sources. In addition to the lack of funding to procure the devices, the procurement process for mobile phones and other devices was inflexible and overly rigid, leading to delays. Acquiring new smartphones proved impossible and the programme needed to find an alternative solution to meet its requirements. The NMCP also understood that the process of managing the security and safety of procured devices would be cumbersome and so sought to avoid that issue.

Recognizing the widespread use of social networks like WhatsApp among health workers which indicated high smartphone usage, as well as the rising internet access driven by mobile telephony, the NMCP identified an opportunity to mobilize community smartphones for the campaign⁵. The level of penetration of telephony was deemed sufficient in 2020 at 63 per cent of the population. By 2023, results showed that the mobile telephony penetration rate had risen to 83.8 per cent and the mobile data penetration rate was 64 per cent, further supporting the BYOD approach⁶. In 2024, Togo ranks second in Africa after South Africa in mobile internet penetration⁷. It was felt that a great advantage was that each campaign actor was responsible for their own smartphone, including its charging, and that the risk of loss or theft was almost nil. In addition, ownership of the device within the community gave more of a sense of buy-in to the campaign by community members.



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To initiate the BYOD process, the following activities were implemented:

- A communication was sent to district directors of health services to conduct a “smartphone census”, with a particular focus on devices owned by CHWs. The census was led by the district malaria focal persons and aimed to physically inspect and map available smartphones meeting specific technical criteria deemed essential for supporting the campaign’s digital platform based on a technical specification from DHIS2. The specification included a phone with an Android version 8 or more, a minimum of 512 megabytes of memory, availability of enough memory space including five gigabytes of free storage, eight hours of battery life, and Wi-Fi and GPS capabilities. To verify the battery strength, CHWs were asked about how long it takes for the battery to die after a full charge.

⁵ PowerPoint case study: Digitalization of the LLIN distribution campaign. <https://allianceformalariaprevention.com/resource-library/resource/digitization-for-a-mass-campaign-the-togo-experience/>

⁶ https://allianceformalariaprevention.com/wp-content/uploads/2024/02/1.5-Fazazi-Bah-Traore_PNLP-Togo.pdf

⁷ <https://afccia.io/tiny-togo-leads-west-africa-in-mobile-internet-penetration/#:~:text=As%20of%202024%2C%20Togo%20boasts,regional%20average%20of%20around%2050%25>.

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- Brief guidelines were developed to show health facility managers how to check the above specifications for five commonly used brands of phones in the country.
 - Templates were designed and shared with health directors/malaria focal persons and health facility managers to be used in assessing the mobile phones. Health facility managers compiled and sent the results to the district malaria focal persons.
 - The census results indicated that mobilizing the required number of smartphones from the community was feasible since more than 90 per cent of the devices checked met the criteria. CHWs who did not have mobile phones that met the criteria were asked to use phones from their close relatives or borrow from a community member.
 - The NMCP then prioritized recruitment and training of CHWs who owned smartphones meeting the minimum technical specifications as registration and distribution staff for the upcoming campaign. This approach ensured that individuals with the necessary technical capabilities to implement the campaign activities were enlisted.
 - To further encourage CHWs' involvement, the programme offered a flat rate of 1,000 FCFA (approximately USD 1.62) per day for the use of their smartphones throughout the campaign (maximum 12 days).

Digitalization of campaign components⁸

For the 2020 ITN mass campaign, the NMCP transitioned from paper-based to digital data collection for key campaign activities: micro-planning, household registration, ITN distribution, supervision and post-campaign monitoring. Prior to this, the only major digitalization experience for the NMCP was the post-distribution monitoring of the 2017 campaign, which involved revisiting communities that had

received ITNs twice post-campaign to verify the availability, hanging, usage and condition of the nets. The data were collected and transmitted by campaign actors using mobile devices.

A review of the digitalized campaign components and the differences between the 2020 and the 2023 campaigns can be seen in Table 1. Both campaigns adopted the BYOD strategy.

⁸ See also the case study: Distribution of long-lasting insecticidal nets during the COVID-19 pandemic at: https://allianceformalariaprevention.com/wp-content/uploads/2022/06/CS_Campaign_Togo_COVID-122020_EN.pdf and PowerPoint presentation of the same campaign at: https://allianceformalariaprevention.com/wp-content/uploads/2022/05/AMP_digitalisation_mass_campaign_Togo_EN.pdf

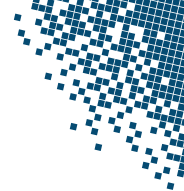



Table 1: Campaign components digitalized in 2020 and 2023: a comparison

Campaign component	2020	2023
Platform selection 	The ICT team initially created an in-house Android application for online data entry and server aggregation but faced challenges with geolocated data and synchronization. The team decided to use an open platform, Kobo Toolbox, for household registration and distribution due to its effectiveness in handling complex and high-volume data.	To overcome difficulties encountered with the in-house application in the 2020 campaign, the 2023 campaign adopted DHIS2, a free and open-source software platform that is accessible and familiar to health personnel, is interoperable with other applications and platforms and offers seamless integration with existing national-level systems.
Registration of households and ITN distribution 	In the implementation of household registration (HHR) and ITN distribution, carried out in a single phase in 2020, Kobo ToolBox was used as the data collection tool. The application was installed on CHWs' smartphones where they recorded recipients' information, including geolocation, along with detailed household data such as the number of individuals in the household and the number of sleeping spaces, to determine the number of ITNs required per household. Each day, the CHWs also aggregated the household registration data and generated daily distribution data summaries.	To further improve integration and ensure use of the existing national health information system (DHIS2), the 2023 campaign digitalization adopted the use of DHIS2 for household registration and ITN distribution. The DHIS2 Capture software was installed on CHWs' own devices for both HHR and distribution.
Logistics 	In 2020, the logistics operation for the ITN mass campaign was not digitalized.	In 2023, the logistics process was fully digitalized. Nets arrived at the port and were sent to the central warehouse, then to the district, health facility, and finally to the Distribution Zone (ZDD), all tracked digitally. The ZDD managers had the DHIS2 application installed on their personal devices. Delivery agents transported nets to the ZDD and returned to the warehouse, logging their deliveries in an app. They recorded when people collected nets and, at the end of the day, distributors counted and logged the distributed nets. A Delivery Note was issued for traceability and logistical management. The logistics management module oversaw daily operations, with personal smartphones used for most data entry, while facility managers utilized computers.



Campaign component	2020	2023
Data transmission 	<p>Data collection in the field was conducted offline using smartphones owned by community health workers. After daily activities, supervisors validated the data on the phones to ensure accuracy and completeness before synchronizing to the central server. Once verified, the data were transmitted to the server after each day's work. Funds were provided to CHWs to cover data transmission costs, ensuring uninterrupted data transfer.</p> <p>In 2020, challenges arose in downloading and accessing data during the campaign. Despite being highly effective and familiar to community agents, the local application Delphi faced hurdles in these tasks. The data were too voluminous and the NMCP lacked the server to host such data. Hence the change to DHIS2 for the 2023 campaign.</p>	

Challenges

Developing and deploying in-house software solutions required technical expertise. The NMCP needed to ensure that its ICT team had the necessary skills and resources to create and manage digital tools effectively. Developing and integrating the necessary software applications, especially for microplanning, required substantial time and effort. The development process was iterative, with continuous adjustments based on campaign needs and implementation experiences.

Ensuring that CHWs' smartphones met the required specifications for storage capacity, battery life and GPS capability was a logistical challenge. Verifying the technical specifications of each smartphone required additional time and effort, as not all devices met the criteria. Some CHWs had older smartphones that did not meet the campaign's requirements. Those with phones that did not meet the specifications were asked to borrow mobile phones from their relatives or other community members. Owning or borrowing an appropri-

ate device was a criterion for selection. Those who did not meet that criterion were not used. Coordinating the distribution of smartphones and ensuring they were configured correctly were logistical challenges that needed careful planning and execution. Additionally, managing the compensation for the use of personal smartphones required meticulous record-keeping and payment processing to ensure fairness and transparency.

Togo's experience highlighted the need for adequate budgeting for digitalization, covering both logistics and human resources. The use of community-mobilized digital resources, like personal smartphones, though successful, presented challenges in standardization due to varying capabilities of the devices. This variation affected troubleshooting and resolution of challenges. In addition, data collected on personal devices are prone to potential data loss or unauthorized access, compromising confidentiality. Building on the 2020 lessons on the BYOD strategy, a small number of registers were printed



for CHWs as a back-up in case of any challenges with personal devices while in the community. Users were also advised to put their phones on airplane mode to preserve the battery life while

working. A troubleshooting manual covering the different makes of phones was developed for common issues faced in the 2023 campaign.



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Training campaign staff and community members, including community health workers, in the use of digital tools was crucial for successful digitalization. This process, while essential, demanded time and resources to ensure effective adoption of technology and the shift to digital workflows. The campaign workers needed thorough training to become proficient in using smartphones and the campaign platform effectively.

Togo's diverse geographical landscape presented connectivity challenges. Even though the digital tools allowed for offline data collection, there were instances where network connectivity issues hindered the real-time transmission of data from remote locations, leading to delays in data synchronization.

Although digital data collection improved accuracy, the verification of collected data remained essential. Ensuring the accuracy and reliability of data collected in the field was a critical challenge. Data collected in remote areas occasion-

ally contained errors or discrepancies. Verifying these data and ensuring their quality required additional effort.

The iterative development of digital tools requires ongoing refinement and adjustments. As the campaign progressed, and in spite of previous pre-testing, it became evident that certain aspects of the digital tools needed adjusting based on field experiences. This iterative process demanded flexibility and adaptability. For example, while the plan to integrate microplanning and data collection with the DHIS2 platform was ambitious and promising, it also presented challenges in terms of technical integration and ensuring data compatibility. This meant that CHWs had to continuously update the application on their own device while the campaign was ongoing, an activity which was difficult to control in comparison to the situation where devices procured by NMCP would have mobile device management allowing changes to be made from the national level.

Successful outcomes

Despite the various implementation challenges faced, digitalization and the BYOD strategy in Togo were considered successful. The digitalization of the microplanning process allowed for a more **streamlined and accurate planning process**. The use of digital tools for collecting and processing data minimized human errors, a common issue in manual data handling.

Digitalizing data collection led to **more reliable and precise information**, which is vital for evaluating the campaign's progress and making informed decisions. Although digitalization faced many challenges, it significantly improved the accuracy of data management.

The establishment of a **governance mechanism**, including the ICT committee, played a crucial role in assessing the feasibility and monitoring the progress of the digitalization. This committee's mandate extended to making key decisions throughout the digitalization process, ensuring that the 2020 and 2023 campaigns remained aligned with their objectives and adapted effectively to emerging challenges.

Furthermore, the introduction of digital tools **enhanced monitoring and supervision allowing for corrective action during the campaign** to ensure the programme achieved its targets. The availability of near to real time data facilitated more efficient information-sharing and improved monitoring, ensuring timely feedback and correction to field team members on performance. Digitalization allowed the conduct of a mid-campaign monitoring after four days to check for inconsistencies. The real-time data enabled the identification of inaccuracies and areas for follow-up, such as low distribution in some areas.

In 2023, the comparison between purchasing smartphones and utilizing the BYOD approach revealed the latter to be **more cost-effective**. The workforce, including registration and distribution agents, amounted to 9,756 individuals. With a minimum purchase cost of a smartphone of 30,000 FCFA (USD 48.83 approximately), the purchase cost of smartphones for CHWs would have amounted to 292,680,000

FCFA (USD 476,413). In contrast, the highest incentive offered to CHWs in the BYOD approach is 12,000 FCFA (USD 19.53) (for 12 days of work), totalling 117,072,000 FCFA (USD 190,565). The financial implications highlighted a significant cost difference of approximately 2.5 times in favour of the BYOD approach.



Before the implementation of digitalization in 2017, the process of gathering data, establishing a data entry centre and inputting data lasted over four months. The paper-based approach led to numerous inaccuracies in data which needed to be corrected, delaying the distribution of ITNs. However, with the introduction of digitalization, these labour-intensive and time-consuming tasks were streamlined. For both the 2020 and 2023 campaigns data **validation at the end of the campaign took no more than a week and the reports on the distribution numbers were produced immediately after the campaign was completed**. Overall, digitalization reduced the campaign's duration from over a year to just four months.



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

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