Photo by Bokade David, PNLP Digitalization Technician, April 2023 in Bedjondo

Review of the Use of Technology to Facilitate Insecticide-Treated Net (ITN) Distribution for Vector Control in Complex Operating Environments

CASE STUDY: Digitalizing ITN mass campaign distribution in Chad's Complex Operating Environments

Background

With a population of 20 million,[1] Chad faces economic vulnerabilities with 45% of the population living below the national poverty line.[2] Covering more than 1.28 million square kilometers, Chad is the fifth-largest country in Africa,[3] which poses logistical challenges for delivery of health services. Security challenges have increased because of conflicts in neighboring countries. This has led Chad to host more than 1.2 million refugees—the most of any country in West and Central Africa—as well as approximately 300,000 internally displaced persons (IDP).[4] Increasing flooding and drought exacerbate these challenges, as the country is recognized as the most climate-vulnerable country in the world.[5]

Chad's health system remains fragile and particularly vulnerable to epidemics and outbreaks. Malaria represents a significant public health burden, and remains the principal cause of morbidity and mortality, as well as a leading cause of childhood mortality

1 World Bank Group, Data, Chad (2025). https://data.worldbank.org/country/chad. Accessed September 16, 2025.

2 World Bank Group, Data, Chad (2025).

3 African Heritage Center. Facts about Chad. https://africanheritagecentre.org/chad-2/. Accessed September 16, 2025

4 World Bank (2024). Chad. Sahel Adaptive Social Program. https://www.worldbank.org/en/programs/sahel-adaptive-social-protection-program-trust-fund/country-work/chad#:-:text=Of%20a%20population%20of%2018.3,a%20low%20capacity%20to%20respond. Accessed September 16, 2025.

5 World Bank (2024).

for children under five. After declining between 2014 and 2016, malaria incidence has now risen to 73 per 1,000.[6] In response, the National Health Policy has set the ambitious goal of reducing malaria-related morbidity and mortality by at least 90% by 2030.

Introduction

This case study is complementary to the existing report *Success in Digitizing LLIN Mass Distribution Campaigns to Combat Malaria in Chad* supported by the United Nations Development Programme (UNDP). It highlights how digital solutions, including the Mobile Device Management (MDM) approach, can be used to address the unique challenges of complex operating environments (COE) in Chad, within the framework of Chad's Ministry of Public Health (MOPH) National Malaria Control Program (NMCP), supported by UNDP and the Global Fund. As part of a Review of the Use of Technology to Facilitate Insecticide-Treated Net (ITN) Distribution in COEs, coordinated by the Alliance for Malaria Prevention (AMP) Humanitarian & At-Risk Populations Working Group and Catholic Relief Services (CRS), this case study presents contributions from key informant interviews with MOPH/NMCP and UNDP as well as cited sources summarizing approaches, results, and lessons learnt during ITN campaign and digitalization planning and implementation in Chad.

ITN Campaigns and Digitalization

Within the COE context described above, the NMCP and its partners managed ITN distribution campaigns prior to 2023 using paper forms. This method posed several difficulties with tracking coverage, managing stock, ensuring data quality, and timely access to information. Furthermore, the paper forms were also prone to being lost or becoming unavailable for future analysis.

To address these challenges, the NMCP and UNDP Chad developed a digital solution for the 2023 ITN distribution campaign, leveraging lessons from a 2022 seasonal malaria chemoprevention campaign that successfully tested a digital tool based on the District Health Information System (DHIS2).

The new digital solution integrated three cloud-based systems: KoboToolbox for household-level data collection and inventory management, DHIS2 for data analysis and monitoring, and PowerBI for data visualization. This combination eliminated the need for in-house infrastructure and significantly reduced upfront costs.

The campaign successfully distributed more than 9.4 million ITNs to 3.5 million households across 17 provinces, demonstrating the effectiveness of the digital approach.

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Opportunities for Digitalization in Chad's COE Context

The NMCP plans to fully digitalize future campaigns, including the upcoming 2026 ITN distribution, with continued support from UNDP Chad. It is also worth noting that in Chad, the NMCP had already experimented with several digitalization initiatives, which allowed the NMCP and ITN campaign actors to learn from it. Digital solutions can be further leveraged to address some of the unique challenges of operating in Chad's complex environments during future ITN and seasonal malaria chemoprevention campaigns. These include the following.

1. Mobile Device Management (MDM)

To address the risk of lost or stolen tablets, the 2023 ITN campaign used an MDM server. This server allowed for the remote tracking of tablets, and the ability to limit their functionalities and monitor their movement if needed. It also helped identify tablets that never connected to the network during the campaign, which allowed for direct follow-up with ITN campaign personnel to guide a more

6 PNLP Chad (2023) Plan d'Action Operationnel-2023, Organisation de la Campagne Nationale, Distribution De Moustiquaires Imprégnées d'Insecticide

professional and engaged approach. The MDM approach can be used to confirm the location of campaign staff, review key campaign activities, monitor tablet use and if needed remotely protect data or block the device in case of loss or theft. By strengthening equipment tracking and security, these improved MDM solutions helped optimize the distribution of ITNs, particularly to populations living in remote, hard-to-reach, or insecure areas.

2. Reaching Refugees, Nomads, and Marginalized Populations

To effectively reach refugees and IDPs in Chad and ensure effective ITN access, digital solutions can be further enabled for geolocation, registration and mapping of households and sleeping spaces during door-to-door approaches in camp and host community settings. Distribution teams chosen from trained staff within the camps and host communities can be trained in using the digital tools and systems and synchronizing the data to contribute to ongoing monitoring and support as needed. The ability to store contact information can also be leveraged to reinforce ITN access even in cases of ongoing population fluctuations and movement. In 2023, the digital solution enabled the registration and geolocation of over 3.5 million households, which will also be useful for scattered or nomadic populations.

3. Offline Data Collection, with Synchronization.

The digital solution, particularly the KoboToolbox system, provides for offline data collection on Android tablets, allowing campaign personnel to continue their tasks even in remote areas with limited or no internet connectivity. The collected data can then be synchronized with the server once the tablets are reconnected. This offline functionality has been crucial for overcoming infrastructural challenges and ensuring the continuity of the campaign.

Photo by Nanhassengar Emmanuel Nagorngar, PNLP Digitalization Technician, August 2023 in Haraze Djombo

4. Protection During Rain and Floods.

Heavy rains and floods are a recurrent challenge in Chad, affecting travel and increasing the risk of malaria transmission. The provision of rain gear and device carrying straps or cases has helped in protecting the devices from water damage during campaign activities.

The 2023 ITN distribution campaign in Chad successfully demonstrated the role of digital solutions, through the integrated use of KoboToolbox, DHIS2, and PowerBI, in effectively addressing the unique challenges facing ITN distribution, monitoring, and evaluation in COEs. Success factors include the:

- Leadership of the MOPH/NMCP, with support from the UNDP and the Global Fund, which enabled the development and implementation of this digital approach, leveraging lessons learnt from a 2022 seasonal malaria chemoprevention campaign.
- Importance of incorporating user feedback. For example, the digital solution was informed by the successful piloting of a digital tool during the 2022-2023 mass campaign, allowing the NMCP and partners to reinforce digitalization.