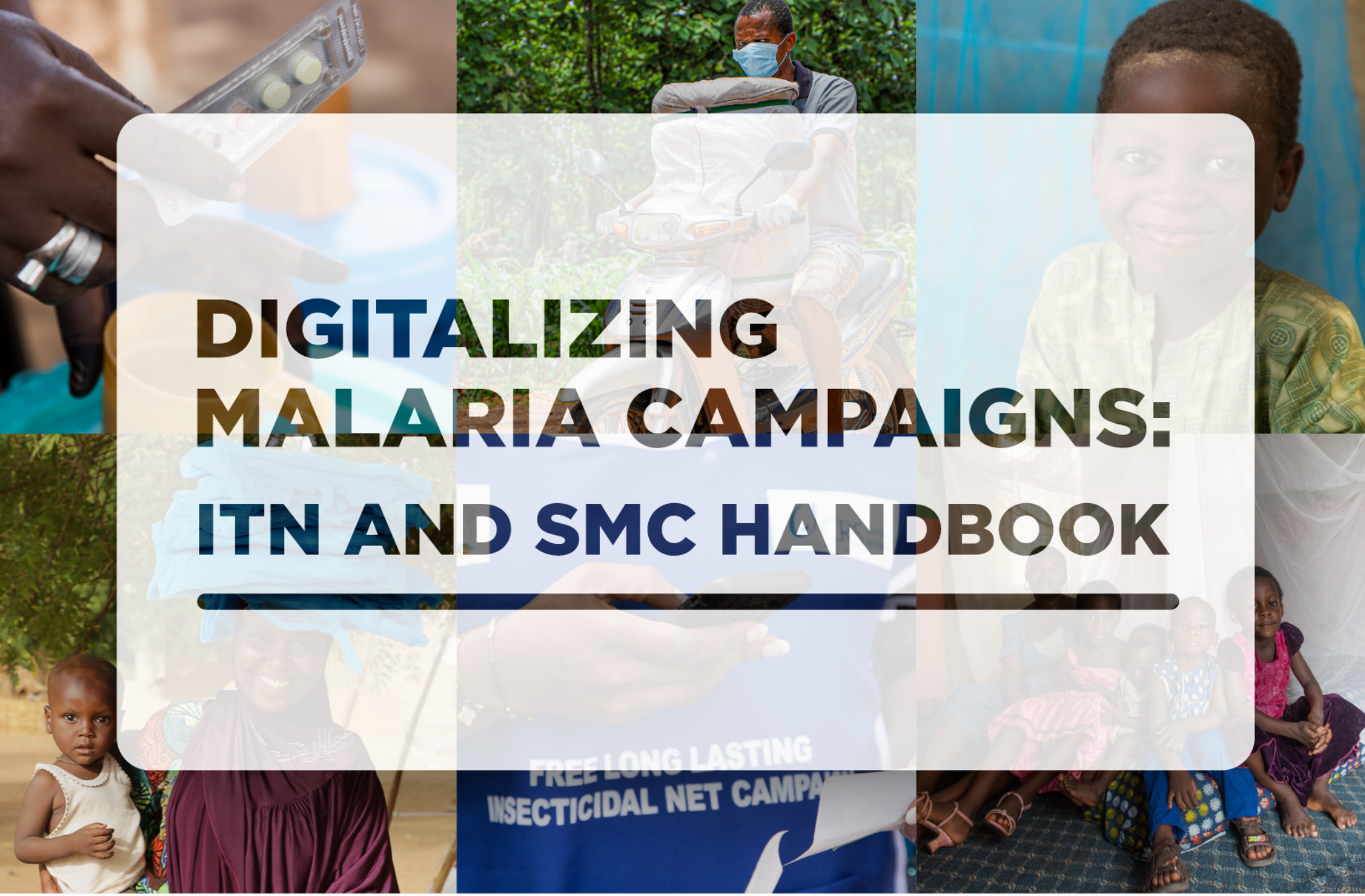

DIGITALIZING MALARIA CAMPAIGNS: ITN AND SMC HANDBOOK

CRS CATHOLIC RELIEF SERVICES faith. action. results.

amp | The Alliance for Malaria Prevention

OPT-SMC
Optimizing Seasonal Malaria Chemoprevention in West and Central Africa

TABLE OF CONTENTS

Click
THE COLORED BUTTONS TO NAVIGATE TO THE DESIRED SECTION OF THE GUIDE.

Introduction 04-16

People 17-26

Process 27-34

Technology 35-43

Appendix 43-45

LIST OF ACRONYMS

AMP	The Alliance for Malaria Prevention
CHW	Community Health Worker
CMT	Campaign Monitoring Team
CRS	Catholic Relief Services
DHIS2	District Health Information Software 2
GIS	Geographic Information System
HMIS	Health Management Information System
ICT4D	Information and Communication Technology for Development
ITN	Insecticide-Treated Net
LMIS	Logistics Management Information System
MEAL	Monitoring, Evaluation, Accountability, and Learning
MDM	Mobile Device Management
NFC	Near-Field Communication
ODK	Open Data Kit
OPT-SMC	Optimizing SMC Project
QR	Quick Response code
SBC	Social and Behavior Change
SMC	Seasonal Malaria Chemoprevention
WHO	World Health Organization

CLICK HERE RETURN TO TABLE OF CONTENTS

Introduction

- Acknowledgements
- Foreword
- About this handbook
- The fight against malaria
- What are Insecticide-Treated Nets (ITNs)?
- What is Seasonal Malaria Chemoprevention (SMC)?
- What is digitalization?
- Why digitalize campaigns?
- Experience from The Gambia
- Barriers to introducing technology

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PRIMARY SPONSOR

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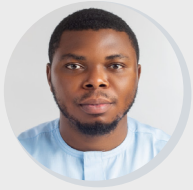

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This handbook was made possible in collaboration with OPT-SMC and AMP through interviews with CRS staff and technical experts to share their insights and experience. Please see the appendix for a list of individuals and organizations that contributed their expertise to this effort.

FOREWORD

Nora Lindström

Senior Director of ICT4D, CRS

Global development and humanitarian assistance is about building a world where all people reach their full human potential in the context of just and peaceful societies.

Catholic Relief Services (CRS) is an innovator and leader in the application of information and communication technologies for development (ICT4D) to assist poor and marginalized people in developing communities. The agency was an early adopter of digital tools to enable mass health campaigns, first enabling the digitalization of The Gambia's LLIN campaign in 2014.

Since then, CRS has scaled up its efforts and supported digital health campaigns, including LLIN/ITN, SMC, TB, and onchocerciasis campaigns, in over ten countries across West, Central, and Southern Africa. Today, over 80% of our malaria programs leverage technology for increased programmatic quality, impact, and reach.

This handbook represents an effort to share our learnings from a decade of implementing digital campaigns. It outlines key considerations and recommendations for the digitalization of large-scale campaigns, with the aim of helping partners better understand the people, processes, and technology solutions required to successfully digitalize their campaigns.

Working in partnership is a central value to CRS and we hope that our diverse partners, from global to regional and national level working groups and committees, including national malaria control and elimination programs and research institutions, will find this handbook to be of use. We also want to thank the Optimizing-SMC project and the Alliance for Malaria Prevention for their support in producing this handbook.

Finally, learning and continuous improvement remains as central to our ICT4D practice now as it was ten years ago. We therefore welcome your feedback on the handbook and hope that we together can build on the current version in years to come, with the goal of enabling the impactful use of digital technologies to eliminate malaria and other neglected, tropical, and vector-borne diseases.

FOREWORD

Prof. Jean Louis Ndiaye

OPT-SMC Project Director Head of the Innovation and Research Department, at the Universtiy of Thiès

Malaria continues to be a major public health challenge, with an estimated 619,000 deaths from malaria in 2021. The most intense malaria transmission occurs in West and Central Africa during and shortly after the rainy season. Seasonal Malaria Chemoprevention (SMC) is a proven strategy developed specifically for these areas, which was first introduced in 2012. Its use was rapidly expanded through the ACCESS-SMC project, which showed that there were marked reductions in the number of malaria cases, severe cases, and deaths in hospital due to malaria, when SMC was introduced.

The challenge now is to ensure that within the areas where SMC is being implemented, it is done effectively, and all children are being reached and are receiving all their three doses of monthly treatments. Very high coverage is possible through door-to-door campaigns, but this is not being achieved everywhere. The reasons vary, and operational research is needed to understand the local challenges and the steps needed to address them. There is an urgent need to close these gaps and to optimize SMC delivery to protect all eligible children.

The OPT-SMC project aims at identifying and implementing with countries and key local partners some key areas of operational research to support optimization of SMC, while reinforcing capacities of the National Malaria Control Programs in areas where there are identified gaps.

One key element of SMC Optimization is the digitization of SMC campaigns to collect timely data for immediate analysis and timely decision making. This would allow addressing issues as they arose and improve data quality as shown in countries who have already adopted digital tools. Therefore the OPT-SMC project management team has joined forces with Catholic Relief Services to review and endorse this handbook for digitalizing malaria campaigns as an important tool for implementing organizations and countries.

FOREWORD

Marcy Erskine

Manager, Malaria Programmes at IFRC

The Alliance for Malaria Prevention (AMP)

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More than 3.4 billion people are at risk of malaria, or nearly half the world's population. But the majority of those who die from malaria are children under five years of age in Africa. Through great efforts over the last decades, the death toll has declined since 2000, in some countries dramatically, due to increased investment and improved operational strategies to deliver malaria control interventions. Despite these advances, the human cost of malaria is still significant and more needs to be done.

Sleeping under insecticide-treated nets (ITNs) provides protection from malaria-carrying mosquitoes and has been shown to reduce malaria incidence by 50 percent and all-cause child mortality by 17 percent. Since 2002 many countries, through the strong leadership of Ministries of Health, have successfully implemented large-scale campaigns to deliver over 2.5 billion ITNs to help reduce malaria cases and deaths.

Digitalization of malaria campaigns can improve operational efficiency as countries transition from paper-based systems to fully digitalized approaches. This can mean several things in terms of scope and scale. While many national malaria programmes are using digital platforms for recording and aggregating household registration and ITN distribution data, digitalization is also expanding to other ITN campaign components and activities, including microplanning, social and behaviour change (SBC), supply chain management, supervision, monitoring, evaluation, and payments.

The Alliance for Malaria Prevention (AMP) was established in 2004. AMP partners assist and advocate for country-specific support to plan and implement ITN distribution, mass and continuous, and to mobilize resources should gaps in ITNs or operational costs occur. The AMP partnership works to ensure that best practices and new ideas being used or tried by national malaria programmes and partners are collected and shared to ensure that high quality distributions continue to take place. Part of the sharing of knowledge happens through face-to-face meetings, such as AMP trainings and technical assistance missions, while another part is based on guidance and documentation for planning and implementing mass ITN distribution campaigns.

This handbook draws from previously published AMP toolkits and the ITN Campaign Digitalization Matrix to continue to serve partners in digitalizing malaria campaigns.

The successful digital transformation of malaria mass campaigns

has contributed to averting an estimated 3.8 million cases of malaria in children under five and saved an estimated 26,000 lives, through CRS' malaria portfolio of malaria programs.

For example, from 2007 to 2022, CRS and partners distributed over 200 million nets globally. Leveraging digitalized campaigns in 2022, CRS supported the distribution of over eight million nets in just one state in Nigeria alone. Digitalizing campaigns also allows national health experts to see coverage rates and identify bottlenecks in real time, facilitating targeted and timely decision-making -- as well as integration with simultaneous or consecutive health campaigns.

The purpose of this handbook is to support country partners to better understand the steps to undertake and consider before being able to fully digitalize their campaigns. This handbook is not meant to act as a 'how-to' guide, but rather as a shared resource with key considerations and recommendations in the operationalization of large-scale campaigns.

Every country and campaign is different, and the processes, people, and technology will continue to change throughout the COVID-19 pandemic and beyond. That's why this is being published under a Creative Commons license. Our hope is that this will be supplemented going forward as well-

executed campaign digitalization drives more efficient health systems management.

But primarily this handbook is possible due to the staff and partners who shared their time and insights to be included in this resource, in keeping with CRS guiding principles to help those closer to the problem solve them more effectively with an emphasis on country ownership.

This handbook is divided into three main sections: People, Process, and Technology. The "People" section covers the personnel, policies, and training considerations to implement at scale. The "Process" section outlines general considerations for both SMC and ITN campaigns, device management, and warehouse assessment. Finally, the "Technology" section discusses hardware procurement and management, application selection, and other key considerations. Each section includes links to resources, considerations from past implementations, and a brief list of recommendations from our field staff.

THE FIGHT AGAINST MALARIA

Despite great progress in the fight against malaria over the last 20 years, the disease remains one of the most serious challenges and burdens in global health. The World Health Organization (WHO) **estimates 3.4 billion people in 92 countries are at risk of malaria infection**, and the 2022 World Malaria Report estimated 247 million cases of malaria and 619,000 deaths – most of them children under the age of five in Africa.

A few facts about malaria:

Only **Anopheles mosquitoes can transmit malaria** and they must have been infected through a previous blood meal taken from an infected person.

Climate heavily influenced by seasonality affects malaria transmission through life cycles of mosquitoes and parasites.

95% of total cases were in Africa in 2021 (234 million), followed by WHO South-East Asia region (2%).

To learn more,
visit the WHO website:

In 2022, CRS implemented malaria programming through 18 projects in 15 countries. CRS has supported insecticide-treated net (ITN) distribution since 2007, including supporting National Malaria Programs (NMPs) vector control strategies resulting in the distribution of over **200 million insecticide-treated nets** in Cambodia, Ghana, Guinea, Madagascar, Niger, Nigeria, Senegal, and The Gambia. CRS has supported seasonal malaria chemoprevention (SMC) campaigns since 2014, supporting NMPs in nine countries (Benin, Burkina Faso, Cameroon, Guinea, Mali, Niger, Nigeria, Senegal, and The Gambia) in the scale-up of campaigns. As of the end of 2022, CRS has supported the distribution of SMC to 63 million children under five.

WHAT ARE INSECTICIDE-TREATED NETS (ITNs)?

Insecticide-treated nets

physically block mosquitoes when they are most likely to bite and kill mosquitoes that land on them.

High use of nets also reduce the number of malaria infections in a community.

When enough people use nets in a community, the population of malaria-transmitting mosquitoes is greatly reduced and so is the risk of malaria infections even among those not sleeping under a net.

Are ITNs the same as LLINs ?

No. All long-lasting insecticidal nets (LLINs) are insecticide-treated nets (ITNs), but not all ITNs are LLINs. In 2019 the arrival of new types of nets prompted the term "insecticide-treated nets" (ITNs) to be reintroduced by the Global Malaria Programme as the umbrella term for all nets treated with an insecticide, insect-growth regulator, and/or synergist.

The term LLIN is only being used for ITN classes for which physical and chemical durability have been comprehensively demonstrated against the WHO thresholds of 20 washes and three years of use in the field. In practice, this means that only nets treated with a pyrethroid insecticide alone are presently referred to as LLINs in the WHO Guidelines for malaria vector control and companion documents. (WHO)

WHAT IS SEASONAL MALARIA CHEMOPREVENTION (SMC)?

Seasonal Malaria Chemoprevention

protects children under five in areas of intensely seasonal malaria transmission by maintaining protective levels of anti-malarial drug concentrations in the blood during the period of greatest malarial risk. (SMC Alliance)

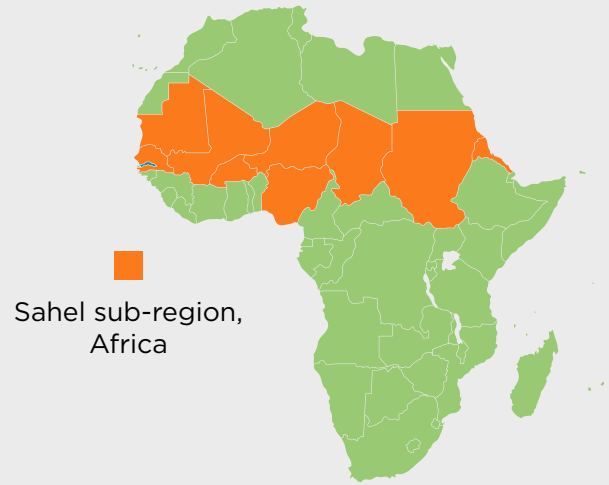
In 2012, the World Health Organization recommended the use of SMC based on findings from clinical trials and large-scale studies, that showed that SMC is a protective strategy that can reduce malaria morbidity and mortality in children at high risk of severe malaria.

According to OPT-SMC:

In the **Sahel sub-region of Africa,** over **60% of all malaria cases occur during the rainy season**, between July and November

During this period, **Seasonal Malaria Chemoprevention (SMC)**, a WHO-recommended strategy, is used to protect children at high risk of severe malaria

The intervention **requires the administration of doses of a child-friendly medicine** once every 28 days, over a three-day period, for the duration of the seasonal malaria transmission season



Sahel sub-region, Africa

WHAT IS DIGITALIZATION?

Digitalize or Digitize? Often used interchangeably, a paper form is "digitized" when changed to a digital format but a "digitalized" campaign updates the delivery model through integrating processes, people, and technology to realize new opportunities and value. This handbook focuses on digitalization, in recognition that many excellent resources already exist to move from analog to digital systems as applicable to health campaigns – which are referenced throughout.

WHY DIGITALIZE CAMPAIGNS?

Approximately **82% percent of CRS' malaria programs use mobile technology** to improve speed and accuracy of data collection, enable simple analysis and use of complex data, or increase adherence to malaria treatment guidelines. A complement to routine services, health campaigns often achieve high coverage of high-impact interventions. Digital tools present a key opportunity to maximize the impact of health campaigns.

According to *Digitizing Health Campaigns: Here's What It Takes* (CRS), benefits include:

- Better or More Rapid Decision Making
- Investment Returned at Scale
- More Accountability and Efficiency

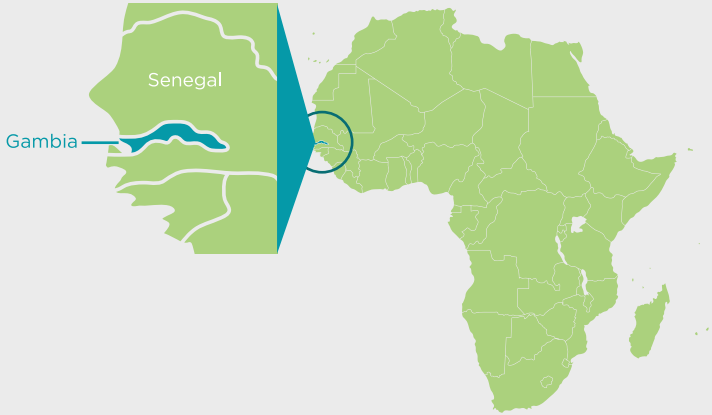
To learn more,
read the full CRS report:

This technology is critical, as health campaigns are **only effective when they can achieve high coverage, at scale**, which is extremely difficult to achieve and verify with paper-based records. According to The Incalculable Value of Digital Health Campaigns: Perspectives from Benin (**CRS**), helping implementers achieve campaign results can also offer "spillover" benefits that strengthen health systems implementation. This goes beyond single campaign cost-benefit analysis.

EXPERIENCE FROM THE GAMBIA

Surrounded almost completely by Senegal, The Gambia is Africa's smallest mainland country and home to more than 1.9 million people. Malaria is endemic across The Gambia. The peak season for transmission is the rainy period from August to November. CRS is one of the few international organizations in The Gambia, where much of the work focus is on malaria prevention.

CRS continues to work with the NMP to scale up access to and use of insecticide-treated nets through both routine and mass distribution channels, indoor residual spraying, ntermittent preventive therapy for pregnant women, and SMC. Here's how the technology works.



2011 - Paper

Paper-based process required 12 filing cabinets to store 36,000 paper forms
No electronic vouchers
Six months needed to transfer the information to an electronic database
Employed 2,700 teams working for 13 days (35,100 team days)
70% coverage for nets

VS

2014 - Start of Digitalization

Electronic forms used offline and synced to online database when connection available
Unique bar-coded vouchers (one per net) to improve accountability
Monitor distribution in real-time, alter daily workplans and strategies as needed.
Employed 100 teams working for 112 days (11,200 team days)
941,821 LLIN nets distributed. 94% coverage for nets

BARRIERS TO INTRODUCING TECHNOLOGY

So, what's stopping the digitalization of malaria campaigns?

A cross-sectional survey in April 2022 of NMP Coordinators of 13 countries participating in **Optimizing SMC (known as Opt-SMC)** project in West and Central Africa listed their barriers to introducing digital health technologies.

The number one barrier is the cost of roll-out activities, such as training.

But countries are not all the same size. In large populations, the cost of the large number of devices, consultations with end users, and data connectivity all increase dramatically and becomes a more major barrier than in a smaller population.

Another factor could be termed the resistance to change, which could be quite prominent in some geographies as the intended users of the technology may have certain reservations towards moving from the paper-based approach to an entirely new digital system. Over the years, targeted advocacy measures have been employed to aid acceptance and adoption of digital tools for health campaigns.

Top Four Barriers (% by country)

70%	**Cost of roll-out activities (training)**
63%	**Lack of reliable connectivity**
55%	**Lack of consultations with end user**
55%	**Cost of tools**

To learn more,
watch the full event at the ICT4D Malaria Elimination Conference

This handbook will show how digitalization can improve efficiency and scale of campaign delivery, which can offset the campaign costs as well as support health system strengthening.

People

- Who is needed for a digitalized campaign?
- Training
- Household enumeration and distribution model
- Personnel: door-to-door
- Recommendations

WHO IS NEEDED FOR A DIGITALIZED CAMPAIGN?

Implementation of malaria campaigns is typically done in partnership with the NMP and Ministry of Health of each country alongside other partners and depending on the district or region the campaign is implemented, the relevant staff required for each aspect of the campaign is provided by the relevant implementers of the campaign at the various administrative units. Each digital campaign has two main components; (1) Operational component refers to activities needed to enable the day-to-day process of the manual operations of the campaign (2) Digital component refers to the activities related to the technology aspects/operations of the campaign. Thus, the staff are also engaged in like manner (i.e operational and digitalization staff).

The operational staff usually consists of the ITN campaign experts, technical advisors, health and district supervisors, logisticians, health communicators, thousands of teams of Community Health Workers (CHWs) at the ward/community level--either as volunteer workforce receiving a stipend or as paid campaign distributors, all working in coordinated teams enabled by mobile devices at scale. Ensuring campaign success requires multiple roles to ensure efficiency and quality control across country and campaign context. The digital staff are usually categorized into tier 1, 2, 3 level support who are designated to provide training and technical support on the use of the digital tools at the various administrative levels.

The number of staff designated at each administrative level is a function of the target population and the number of days required for the campaign. For example; if district A has 5,000 households and the household enumeration of the campaign is planned for 10 days, each enumeration team can achieve a maximum of 35 households per day. This automatically implies that about 15 household enumeration teams would be required to reach all the households in district A. In the same vein, if a health supervisor is estimated to supervise about a maximum of five teams during the period of a campaign, this also implies that a total of three health supervisors would be designated to district A. These series of estimations are made across all administrative units and finally collated to determine the total number of human and material resources needed for the campaign, which is usually identified during the microplan. The next page provides a visual of how the staff needed for a campaign is allocated across the various administrative units.

WHO IS NEEDED FOR A DIGITALIZED CAMPAIGN?

National Level

10-15 persons

- Full-time staff
- Enterprise-level tech supervisors (Tier 2,3)
- Provide technical oversight
- Contract vendors
- Set policies
- Oversee trainings

State/District Level

100-300 persons

- Includes state/district-level supervisors, as well as ICT4D support (Tier 1)
- Assignments by campaign
- Conduct trainings
- Monitor and supervise campaign
- Manages mobile devices

Ward/Community Level

100-10,000 persons

- Participant-facing
- Often volunteer or seasonal
- Engage with participants
- Distribute nets and drugs

For each campaign, the required personnel is a function of the capacities/competencies needed to complete each task/activity of the campaign. Every level of effort thus needs to be carefully estimated to determine the competences required. These competencies then constitute a selection criteria which is established as a basis for selecting/recruiting campaign staff. An example of a criteria for selecting/recruiting household enumerators includes but not limited to the following:

What is needed for campaign personnel?

?

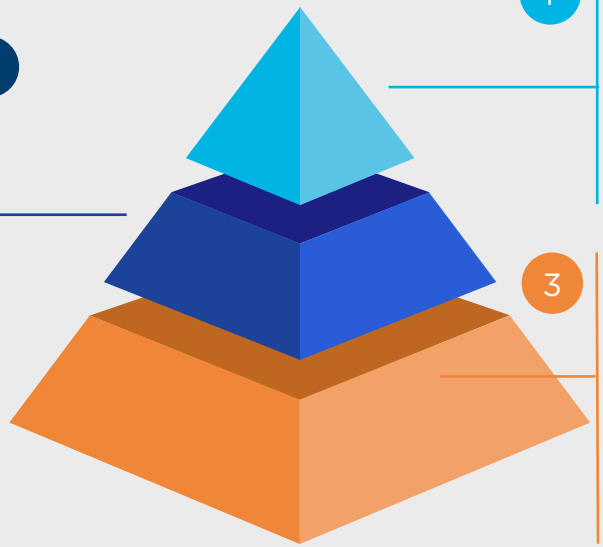
- Must be willing to work for the full intervention (all cycles for SMC and throughout ITN campaign)
- Must reside in and be part of the community being served in the campaign
- Familiarity with Android devices preferred
- Verified and validated functioning bank account number (where electronic payment is required) and mobile number (where payments are done via mobile money)
- Must be eligible to work based on age, criminal record, and other criteria
- Guarantor may be required to guarantee good conduct of the staff and enable designation of digital tools and other campaign materials

TRAINING

Scaling any campaign requires training for each role, as well as orientation to the hardware and software required for a digitalized campaign. Depending on the novelty of the digitalization or capacity of the available human resources in the implementing area, a cascade training may not be considered. The first-level trainers could directly train the campaign staff across the various administrative units to prevent knowledge loss down the chain. This can be achieved through a series of cascading training, each with specific teams working to prepare for mobilization and distribution. Below are a list of of trainings, roles, role descriptions, and estimated number of days required.

ICT4D Support Training
(3 days)

ICT4D support personnel is responsible for user support and issue resolution



Training of Trainers (TOT)
(4 days)

Training of Trainers (TOT) is for the state/district and national teams responsible for cascading the training to the district level

Cascade Trainings

These focus on the three following roles:

1. Commune or sub-district supervisors
2. Distribution point supervisors
3. Mobilization and distribution teams

*Not shown are additional trainings for Campaign Monitoring Team, as well as technical requirements for training. These are covered in a following section.

TRAINING

The content for each training varies, but an example from digitalized net campaigns in Nigeria and Benin supported by CRS may include:

Training of Trainers → **ICT4D Support Training** → **Cascade Training**

Typically at state/district level
1 mobile device per
4 participants

Software
- How to take stock
- How to distribute nets

Consumables/Vouchers
- How to scan a net card
- Nets per net card (by household or individual)

Forms and Analysis
- Net movement form

Typically at the district level
1 mobile device per 1 participant

User Management
- Assurance and support
- Issue resolution during household mobilization/ distribution

Cascade Training Management
- Villages/areas for training
- Pick up training material
- Receive personnel badges
- Manuals and flip charts
- Cluster supervisor checklist

Typically at the community level
1 mobile device per team of
2-3 participants

1. Community/Sub-district
- Supervisory responsibilities, includes monitoring of 3-4 distribution hubs

2. Distribution Hub/Point Supervisor
- Three participants to one training device
- Monitors distribution hub under their cluster

3. Mobilization and Distribution Teams
- Often divided into two batches because of size
- Assigned to each distribution hub -- one per team

TRAINING

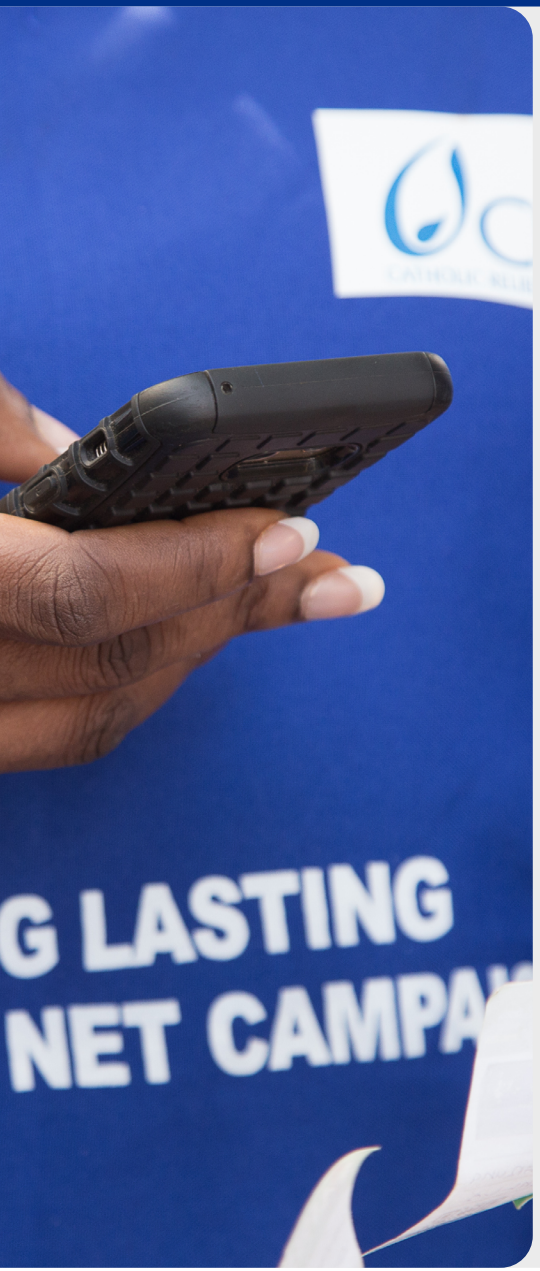
For trainings to be successful, the Nigeria and Benin campaigns (for ITN as well as SMC) also considered the following:

Training Requirements and Preparation

- Ensure training materials such as manuals, staff badges, contract (where applicable), and guarantors form are properly quantified and distributed to each trainer.
- Digital/manual pre- and post-test for trainees are prepared, pre-tested, and ready.
- Ensure training net cards (for ITN campaign) and drug stock (for SMC campaign) are properly loaded and assigned in the platform prior the training.
- The training or demo mobile application profile needs to be completely synchronized on each participant phone.
- A planning day should be allowed before each level of training within the campaign timeline to allow for pre-synchronization to be sure devices and other tools are ready for distribution and use for the training.

Training Follow-Up and Monitoring

- Digital/manual attendance needs to be verified and checked daily throughout the training to identify defaulter and latecomers
- Pre- and post-tests must be utilized to determine strength of trainees and ensure a supportive supervision plan



Campaign Monitoring Teams (CMTs)

These independent teams are responsible for doing the monitoring throughout the campaign, including for trainings. Following the cascade trainings, there is a one-day training where CMTs are issued their devices and trained on the following:

- Digitized monitoring tools
- Quality control processes

Quality Control Processes

- Net distribution (for ITN) and drug distribution (for SMC) guidelines are included in all training agenda to ensure clarity in the campaign protocol at all levels to both actual devices users and supervisors.
- Develop indicative dashboards or manual KML files to monitor household enumeration and distribution.
- Timing review for each process is established (e.g., if nets are distributed to a household in under five minutes this can indicate quality control issues).
- Ensure all devices are pretested during the training and any faulty device identified is replaced before deployment.
- Ensure retrieval of all training coupons and materials and that the demo data is wiped and the profile of the application is switched to the live instance after the training to prepare the application for the actual enumeration or distribution activity.

HOUSEHOLD ENUMERATION AND DISTRIBUTION MODEL

There's no one way to mobilize campaigns, but generally they fall into one of two strategies: Creating a stationary point for distribution, or distributing door-to-door at each household. In each strategy, there is usually a household enumeration prior to the distribution to determine the number of commodities to be distributed. The enumeration is mostly done from door-to-door prior to the distribution. Some campaigns do not perform a direct enumeration to enable distribution but utilize the enumeration data collected from another campaign and only update the information of newborns and death. However, for the distribution strategies, the general considerations and tradeoffs include:

Fixed-point distribution		Door-to-door distribution
Fewer teams needed in order to distribute the same number of nets or SMC drugs as these are stationary.	VS	**More teams needed.** Teams are smaller and cover wider area beyond storage point.
Larger teams. Seven-person team that includes a crowd controller, security, distributor, and recorder.		**Smaller teams.** Three-person team that includes a household mobilizer/health educator in a dual role, security, and distributor/waste manager.
Single phase sometimes used if area is not secure, where nets or SMC drugs are handed out to those who come to the station.		**Single phase** involves registering, scanning net or SMC cards, and handing out nets or administering SMC drugs at the door in one visit to minimize contact and crowds.
Dual phase includes going door-to-door to hand out vouchers or SMC cards and register recipients prior to distribution at the fixed point.		**Dual phase** includes going door-to-door to hand out vouchers or SMC cards and register recipients prior to door-to-door distribution.

These strategies may vary by implementation and additional factors. For example, based on country decisions, CRS supported the switch from dual-phase fixed-point ITN distribution to single-phase door-to-door distribution to minimize exposure to COVID-19 during the pandemic. Results have found door-to-door teams are often more effective in achieving higher coverage for both ITN and SMC campaigns, allowing time for distributor to explain and for caregivers to ask questions.

PERSONNEL: DOOR-TO-DOOR

SMC - 2 Persons

Each team consists of one Community Health Worker (CHW)--the administrator of the SMC dose--and one data collector who records data using an Android tablet equipped with the digital application platform.

Community Health Worker

Responsible for either administering the SMC dose to the parent/ caregiver of the child, or explaining to the caregiver how to administer the first dose to the child under the observation of the CHW. The CHW also manages drug stocks.

Data Collector

Responsible for health talk messages to the household and records data on Android tablet with digital application.

ITN - 3 Persons

Each team consists of a Household Mobilizer/Health Educator who manages an Android phone equipped with the selected digital application, as well as the Distributor/Waste Manager who distributes nets. The security personnel is responsible for the safety of the team.

Household Enumerator

Dual role. Collects campaign-related data about the household including number of nets distributed. Before distribution gives education on what to do with the net, as well as info about COVID-19.

Distributor/ Waste Manager

Dual role. Distributes nets and manages waste.

Security

Provides security for the nets.

Please note *that the campaign implementation context would determine the kind and number of personnel to be utilized per campaign. The example above was derived from CRS experience.*

RECOMMENDATIONS

All considerations of people and staffing will change to fit the strategy, such as the number of people needed for a campaign, the training required, the technology used, and more. But there are some insights that may apply more generally.

1. **Data quality starts with the people.** Most of the data quality challenges regarding data input, redundant information, and data relevance can be traced directly to the users of the devices, not the devices themselves.

2. **Prioritize personnel selection and recruitment.** Adhering to selection criteria will ensure the right staff are operating in the correct role and optimal activity.

3. **Adequate training is critical.** From using the devices to scaling technical support for common issues, trainings will result in either campaign success or failure.

4. **Build partner capacity.** Building the capacity of the government partners to utilize the rich ICT4D features for campaign implementation will promote state ownership, which is a positive step towards sustainability.

5. **Communicate early and often**. If data doesn't make sense, or a team member's request is confusing, just call or text to clarify. Leveraging WhatsApp, SMS, or even short video meetings keeps large teams in sync.

6. **Safety first**. Not just limited to COVID-19, but all epidemic and pandemic preparedness. Using the WHO standard with COVID-19 protocol for trainings will mitigate the spread of COVID-19 and ensure an effective training with maximum concentration from participants.

7. **Leverage in-country capacity as much as possible** to gain buy-in, save costs, and reinforce a sense of ownership.

8. **Build a feedback loop** so data collectors can see how the data was used during the next year's training, and show the collated data they collected and how it was useful. Get feedback from the distributors and consider adjustments to improve the usability of the software.

Process

- How does a campaign work?
- Technology components of a malaria campaign
- Technology vendor management
- Example of digitalized process for ITN campaigns: warehouse assessment
- Device management process
- Recommendations

HOW DOES A CAMPAIGN WORK?

While **both ITN and SMC feature prevention, campaign-style interventions** targeting malaria, SMC and ITN campaigns are very different. Here are guidelines for understanding the process of each campaign.

Seasonal Malaria Chemoprevention (SMC)

- **Each treatment prevents malaria infection** by maintaining therapeutic drug concentrations for up to 28 days
- **Seasonal.** Treatments repeated at 28-day intervals during peak malaria transmission season to children at high risk of severe malaria
- **Every year.** Malaria transmission is highly seasonal based on rainfall patterns
- **Focus on children** at risk of severe malaria during seasonal surges

VS

Insecticide-Treated Nets (ITNs)

- **Prevent mosquito bites.** Brings down community transmission
- **Year-round.** Includes year-round routine distribution, as well as a three-year cycle for campaigns
- **Scheduled campaign timing.** Nets degrade with time from normal usage
- **Focus on households.** Number of people or sleeping spaces are primary consideration

TECHNOLOGY COMPONENTS OF A MALARIA CAMPAIGN

The major steps that constitute the process of malaria campaigns are as shown in the image below.

For many countries, the data collected, analyzed, utilized, and transmitted during each step of the campaign listed above were formerly done via a paper/paper-based approach and this has now been transformed to the use of mobile phones, laptops, dashboards within these process. One or more digital tools or software may be employed during the various steps of this campaign to achieve the desired result/output for each step of the campaign.

An example could be the use of Grid3, ArcGIS, and Power BI for the microplanning process and the use of software for the household enumeration and distribution of the health commodity. Over the years, we have observed that each digital tool has customized suitable functionalities that improve the experience of the campaign and it is very unlikely to have one single digital software that provides the same level of experience from using a combination of different tools. This integration or standardization of the data inputs and outputs ensures data can easily be linked and cross referenced across all the tools.

TECHNOLOGY COMPONENTS OF A MALARIA CAMPAIGN

What does it look like to integrate these tools across a single campaign? Below is an example of how various components of an ITN or SMC campaign may be integrated into technology solutions.

Macroplanning	Compare data from previous campaigns to DHIS2 data to estimate the number of ITNs or SMC drugs needed based on large-scale population estimates.
Microplanning	Facilitate and generate the detailed plan in order to add details on district and sub-district level and determine requirements for activities. May include GIS mapping to find missed populations.
Supply Chain	Leverage digital tools to assess warehouse size, track nets at the different storage levels, and conduct inventory management. Stock taking and taking note of distributed quantities at all levels as well as reverse logistics can also be digitalized.
Training	Leverage digital solutions to manage training attendance and pay stipends for training completion. For SMC campaigns, refresher trainings can be done with videos (link to videos) and child cards. Pre- and post-tests can also be done on devices to facilitate learning evaluation.
Communication	Integrate mobile applications for one-way messaging to target households for Social Behavior Change (SBC) initiatives, provide reminders to campaign personnel to communicate key messages, and inform targeted households of distribution activities. Includes payment processing, end process assessment.
Registration	Register households and provide coupons (or vouchers) to use when picking up ITNs, which are provided in advance. For SMC, register households and provide SMC child cards at the time of SMC drugs administration, which can be registered on a mobile device.
Distribution	Either with teams that go door-to-door or at fixed distribution points. In single-phase, registration and distribution may happen simultaneously by scanning net cards via QR codes on a phone.
Monitoring & Evaluation	Tracking against performance targets, coverage goals, any accountability metrics assigned to distribution teams, and independent monitoring.

*To learn more about this process, visit the AMP resource on The use of digital tools to improve the operational efficiency of ITN campaigns

TECHNOLOGY VENDOR MANAGEMENT

Vendor management varies by vendor and organization. A health intervention may include purchasing Android mobile devices, paying to store supplies in a private warehouse, engaging with a specialized vendor integrating with DHIS2, and hiring local partners to manage a DHIS2 Tracker instance. These have been central to CRS campaign digitalization. It's important to ensure a clear scope of work is developed to include the expected list of functionalities from the application and web-based platform and also technical support needed to support the platform roll-out and stability.

CommCare
CommCare is an open source platform used to build Android-based mobile applications for low-resource settings. The mobile applications can be used as a case management tool for tracking participants through a lifecycle of services, in addition to streamlining data collection. (Website)

RedRose Cash and Asset Transfer (CAT) Platform
An end-to-end software solution that supports program teams to collect, analyze, and manage data during each phase of a program during each phase of a campaign: tracking participant registration and monitoring data, in-kind distribution reception, cash and voucher transactions, mobile money disbursements, and activity attendance. (CRS)

DHIS2
DHIS2 is an open source platform and the University of Oslo (UiO) works in collaboration with a global network of groups and trusted regional partners to provide DHIS2 implementation support, local customization and configuration, and in-country and regional capacity building through the DHIS2 Academy program, and to promote DHIS2 as a global public good. (Website)

EXAMPLE OF DIGITALIZED PROCESS FOR ITN CAMPAIGNS: WAREHOUSE ASSESSMENT

In order for an ITN campaign to succeed, storage space is needed at different levels of the supply chain to store the nets prior to delivery to the distribution points.

Measure Space. Use the specialized "Warehouse Assessment Form" by CRS in to calculate the measurements for the warehouse required for net storage. Can detect if storage volume is sufficient to store the required quantity of nets allocated, and flag and inform campaign personnel to take appropriate action in informing government partners.

Map Location. By including geocoordinates in the form, an updated map of all warehouses can be assessed for distance from distribution points. This means logistics microplanning can be more accurate during mobilization phase, including through KML layers.

Offline Sync. Using either the mobile app or web app, the forms and submissions are synced as soon as there is a connection. This means that all offline data is updated as soon as a connection is made.

Track Communication. Teams use ODK form to record what is sent to all levels of government staff, meaning constant alignment as to responsibilities.

Export. Track data for more detailed analysis in Excel, Power BI, or R, as well as in live-updating dashboards.

DEVICE MANAGEMENT PROCESS

In every campaign cycle, **mobile devices go through forward and reverse logistics** to be retrieved from storage in a warehouse, be prepared for the campaign, be fully deployed, and then returned to the warehouse. The chart below assumes that devices have been purchased and identification of device storage locations has been made alongside government partners. Here's what that process requires:

1. Retrieve phone from warehouse. Phones are stored by private warehouse between campaigns.

2. Mobile Device Management (MDM). Install a MDM solution to set up the device.

3. Phones charged to full power and battery life checked.

4. SIM Card inserted with local number and data plan.

5. Application updates for all relevant campaign applications, such as DHIS2 Tracker, RedRose, or CommCare.

6. Distribute to mobilizer/ distributor with appropriate settings during training.

7. Pre-sync device on completion of training. Usually done by ICT4D support personnel alongside the mobilizer/distributor.

8. Return phone to warehouse. Following completion of the campaign, the devices are retrieved from field personnel and then returned to the warehouse to prepare for the next cycle.

RECOMMENDATIONS

Digitalizing campaigns is an exciting field that many organizations are exploring and refining. These are some methods of improving chances of success, but there are many more variations and details than have been included in this section. Here are some ways to continue to improve:

1. **Does this need to be digitalized?** Picture yourself as the implementers of this project so you can explain to those in the organization who have worked for years on processes and systems that did not involve digitalization. "What makes this better than what I've always used?"

2. **How does this align with National Health Strategies?** Prioritize the government's current strategy, if there is one. Begin with the understanding that this campaign will need to be understood and eventually run by the government or an actor of the government's choosing.

3. **What is the existing process?** Chart your current processes to better understand where there may be potential for applying technology solutions. Share information and consider scenario planning.

4. **Have you mapped the existing systems?** The experts who can help you do the mapping first – BEFORE you make any big expensive tech purchases. How do these systems integrate? Can campaign data be fed into a compatible HMIS?

5. **Who are you engaging for relationship management?** Your organization is probably not the only actor, and most supply chains are controlled at the Ministry of Health level. How do you address questions of data ownership, data privacy, and server storage for sustainable programming?

6. **Have you piloted the solution prior to scaling?** One way to test and scale is to find "model health facilities" that are willing and able to do everything they want to be replicated across other health facilities.

7. **Have you considered the existing in-country digitalization ecosystem?** What are key indicators such as private data center, government-owned data center, IT local market, and maintenance support? What are the legal issues regarding data access and storage should be taken into account?

Technology

- What technology is needed?
- Hardware: procurement and management
- Software: choosing the right application
- Open source or proprietary?
- Mobile device management
- Experience from Benin

WHAT TECHNOLOGY IS NEEDED?

It's important to note that there can be important differences between how campaigns are executed, which can impact the features needed from a digital tool. Features change over time, partner experiences vary across contexts, and legacy decisions influence future decisions on technology applications.

Hardware. How many devices are needed? What are the requirements of the device? Will you provide and store them or ask CHWs to bring their own? Are you going to set up or rely on a local infrastructure (servers, Internet link, LAN/WAN etc...) or a cloud one?

Software. What operating system (probably Android v.6 and above)? What mobile applications will CHWs use to implement a campaign? Are you going to use off-the-shelf software or develop it?

Participant Data. What data will you collect? How will it be stored? How does this integrate with existing datasets? Is there a personal data policy in place to comply with? How will data privacy be managed?

Dashboards. How will this be turned into data-driven decisions? What data is needed to improve malaria outcomes?

Consumables. A consumable is intended for consumption during the malaria campaign. These could include vouchers for nets, limited data plans, and more.

HARDWARE: PROCUREMENT AND MANAGEMENT

What type of mobile device is appropriate for your campaign? How many do you need? Generally, hardware falls into two approaches:

Standardized phone fleets.

CRS determines phones to be used for a campaign following the result of a functionality test to determine the suitability of the phone to meet the needs of the campaign context. For example, if a campaign required the distribution of smart cards to households, one of the functionalities to be considered in selecting the phone would be the ability to read near-field communication (NFC) thus the phone must possess an NFC feature. A phone that meets the minimum list of requirements becomes the standard model for the campaign.

In this example, CRS pre-purchases a standardized phone fleet which are the same make and model so that charging, syncing, data plans, and interface are all standardized. These phones are then stored in private warehouses in between campaigns, where they are updated and managed via a mobile device management (MDM) solution. This typically involves a higher investment, but a more streamlined process.

Bring Your Own Device (BYOD).

Nigerian government partners have piloted and scaled SMC campaigns by asking CHWs to bring their personal Android device as part of the recruitment criteria. The ICT4D team then installs a mobile app on the devices in order to standardize the workflow. This typically requires a lower initial investment, but requires more oversight for quality control and can raise important issues of privacy and security risks.

Clear operational guidelines and best safety measures need to be put in place to ensure there is no room for devices to be stolen or lost during transportation and use during the campaign activities. This may have a major impact on the campaign as any stolen device needs to be replaced. This may bring the campaign to a pause as you require time to procure, configure, and deploy a new phone, especially in cases where the buffer stock of phones is depleted.

HARDWARE: PROCUREMENT AND MANAGEMENT

When handling thousands of mobile devices, insurance is a critical early investment, especially if you are purchasing the phone fleet. Consider the following:

- When assigning phones, ask personnel to complete a "Guarantor's Form" and "Device Collections Form"
- When device goes missing, inform the security manager
- Complete an incident report form and get a police report
- Follow internal processes to replace device

Remember to buy insurance on every mobile device! The process for completing a Guarantor's Form and submitting to insurance is only relevant if you have insurance.

SOFTWARE: CHOOSING THE RIGHT APPLICATION

The Alliance for Malaria Prevention (AMP) provides a helpful guide for leveraging digital tools in campaigns (2021). An example of what this looks like in the context of malaria interventions, along with accompanying feature sets, can help assist in decision making. In reality, campaigns may use multiple tools throughout at different stages.

	RedRose	CommCare	ODK	DHIS2 Tracker
Model	Proprietary	Open Source	Open Source	Open Source
Platform	Android, iOS	Android, iOS	Android	Android
Supply Chain	✓	Potential	*Not available*	Potential
Training	✓	Potential	*Not available*	*Not available*
Communication	Potential	Potential	*Not available*	*Not available*
Application Use by Country (by CRS)	Nigeria, Benin	Guinea (SMC), The Gambia (ITN)	Multiple	Burkina Faso, Guinea (ITN), The Gambia (SMC)

It's important to note that this is not a comprehensive list of tools. A critical distinction is that the more people that have to use a given solution, the simpler it should be. It may be necessary for an ICT4D specialist to understand dozens of solutions and their tradeoffs, but scaling that across thousands of frontline workers and dozens of technology solutions can be costly, time-consuming, and impossible to implement.

OPEN SOURCE OR PROPRIETARY?

One of the first questions for technology interventions is whether to pursue open source or proprietary solutions. Open source doesn't necessarily mean the implementation is free – you will likely have to manage complex workflows and pay technical staff or even global vendors in order to achieve campaign success. While it's not quite this simple, general considerations of selecting a path forward may include:

Proprietary		Open Source
Fee-based costs. May involve vendor charging fees according to pricing model.	VS	**Effort-based costs.** May require technical skills and substantial time investment to use.
Source code is proprietary. Cannot be modified by you or the community.		**Source code is shared.** Can be updated to fit your use case.
Examples include: iOS, Windows, CommCare, ArcGIS		**Examples include:** Android OS, Linux, ODK, DHIS2, QGIS.

MOBILE DEVICE MANAGEMENT

Individually managing dozens of mobile devices can be difficult. Managing the thousands required for a malaria campaign can appear impossible. Fortunately, Mobile Device Management (MDM) is a device lifecycle management technology that enables organizations to deploy, configure, manage, support, and secure mobile devices through MDM profiles installed on the devices. (CRS)

Here's how it supports a malaria campaign:

Device Inventory and Management. Provides a unified platform to see all device users, locations, and list of software and configurations deployed on the device.

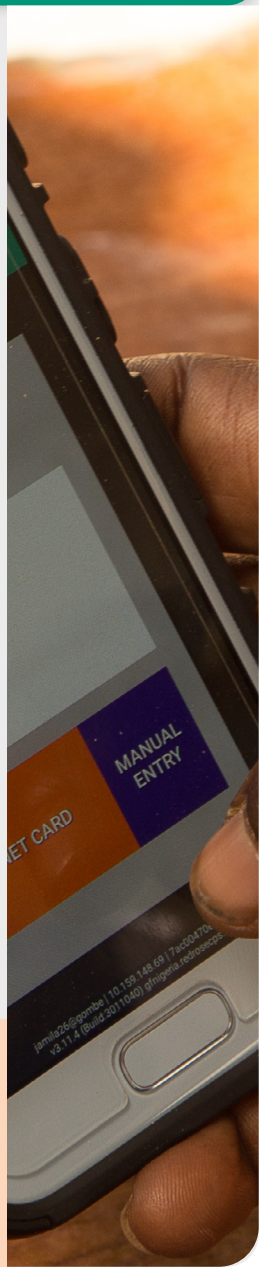
Define or Disable Phone Plans. Define and manage phone plans to alert users and admins on reaching pre-set usage levels.

Device Security and Restrictions. Identify compromised devices or a security breach, set or disable passcodes on devices, or lock and unlock remotely. It also allows you to define certain restrictions on the devices to limit misuse.

Manage Software Applications. Install and uninstall software applications and updates remotely, as well as limit visibility, access, and functionality to specific applications both at the home screen and within the background processes.

Alerts and Messages. Push messages out to devices that are in your project fleet for data collection or engagement with mobile workers.

Tracking Device Location, Theft/Loss Prevention. In addition to tracking solutions provided on mobile application, MDM can geolocate devices for workforce oversight or loss prevention.



Note that the recommended settings may vary by campaign and use case. Generally, best practice is to lock all applications that are not directly being used by the campaign to streamline processes and preserve both data plans and battery life.

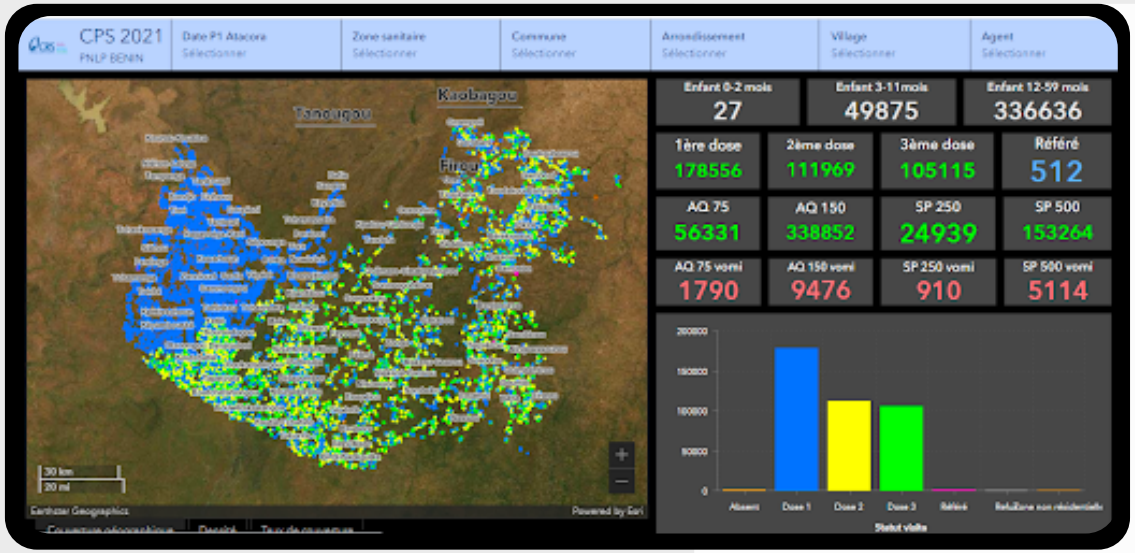
MDM settings also vary by options available, with AirWatch and Intune being two of the most commonly used solutions. Consider cost and support model in addition to the functionality listed.

EXPERIENCE FROM BENIN - A MORE SUSTAINABLE HEALTH CAMPAIGN APPROACH IN THE WORKS

When the Republic of Benin began its first health campaign digitalization in 2019, the standard practice was for each health campaign to set up a separate digital platform instance in order to perform the household enumeration and distribution. The data generated from this standalone campaign is usually used only for the purposes of the specific campaign and may not be used for any other health campaign.

The CRS country program in Benin collaborated with the Ministry of Health to determine and explore opportunities to reuse the investment in one health campaign in an integrated manner by developing a robust digital system called Health Campaign Management System (HCMS). This tool provided the ability to leverage data across campaigns, by registering and updating information on individuals and households during each visit in a central database, as well as designating health commodity to the household or its members.

The HCMS platform was used to successfully enumerate the entire country population in 2020 during the ITN campaign and this data was reused as enumeration data for the 2020, 2021, and 2022 SMC campaigns. The same platform and updated population data from the SMC campaigns was used to implement the 2021 and 2022 river blindness campaigns. This approach also enabled the Ministry of Health to have more in-depth, cross-campaign coverage data to better understand the impact of malaria prevention intervention by household.



To read more about CRS digital support to Benin's campaigns, visit:

APPENDIX

- Full list of contributing experts
- References

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