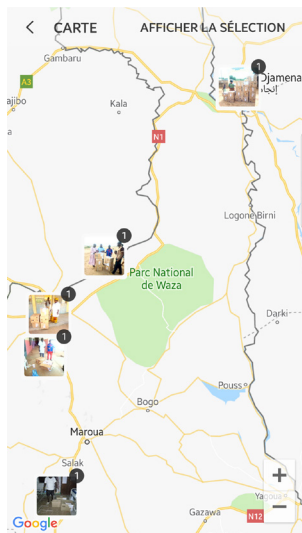


TECHNICAL BRIEF

# MAPPING SUCCESS:

Geographic information system (GIS) supports effective distribution of commodities during the seasonal malaria chemoprevention (SMC) 2018 campaign in the Far North & North regions of Cameroon

## BACKGROUND



In 2005, the U.S. President's Malaria Initiative (PMI) was launched to reduce malaria-related mortality by 50 percent across 15 high-burden countries in sub-Saharan Africa through various prevention, diagnosis and treatment strategies. These strategies included a long-term vision for malaria control in which sustained high coverage with malaria prevention and treatment interventions would progressively lead to malaria-free zones in Africa, with the ultimate goal of worldwide malaria eradication by 2040-2050.

The SMC campaign used innovative mapping and photos to verify delivery of medicines.  
Image: GHSC-PSM

The estimated mortality rate of malaria (116/1,000) in Cameroon surpasses those of the African region (104/1,000), as well as

neighboring countries such as the Central African Republic<sup>1</sup>. The Far North and North regions of Cameroon have a disproportionately higher number of malaria cases and deaths compared to those in other regions. According to Cameroon's 2015 National Malaria Control Program (NMCP) annual report, although less than 30 percent of the population is concentrated in the North and Far North, over 60 percent of deaths among children under five were recorded in these two regions. Reducing morbidity and mortality caused by malaria remains a major challenge for the Ministry of Public Health. The overall goal of the National Malaria Strategy 2014 – 2018 (NMS) is to reduce mortality and morbidity from malaria by 75 percent compared to 2000 (41 percent of total morbidity). The NMS includes seasonal malaria chemo-prevention (SMC), which is a specific preventive intervention for children aged 3 to 59 months by the intermittent administration of full-treatment courses of sulphadoxine-pyrimethamine and amodiaquine (SPAQ) during the malaria season. Initiated in 2016, the SMC campaign had three cycles, then four cycles in 2017, protecting an average of 85.6 percent and 94.5 percent of children under-five respectively in both regions.<sup>2,3,4</sup> Faced with numerous health systems challenges, Cameroon was selected as a PMI focus country in Fiscal Year 2017. Starting in

October 2017, PMI supports the North and Far North regions for procurement and supply of malaria commodities through the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project.

## SUPPLY CHAIN CHALLENGES

In Cameroon, the health information system faces challenges, which at times complicates accurate forecasting of health commodity needs to meet the requirements at national, regional, district and health facility (HF) levels. Data is still mainly reported manually from remote health facilities to the district and regional level to feed into various electronic logistics management information systems (LMIS). This data is frequently incomplete or arrives at the district level very late.

There are also storage and inventory challenges in Cameroon. Lack of sufficient storage space in the central and regional warehouses<sup>5</sup>, absence of stock management tools and non-conformity to processes and SOPs were major concerns. Key performance indicators are rarely measured to gauge performance of the warehouse and identify areas of improvement. As a result, poor storage and inventory management is a chronic problem, with high stockouts of key commodities and high wastage rates.

Transportation from regional to HF levels is more challenging, especially for the growing number of health facilities to serve, and some of their geographic locations are in very remote areas where road access is difficult. Logistics become very difficult during the rainy season as some roads became inaccessible, which unfortunately coincides with a sharp increase in malaria cases in the North and Far North regions.

The 2016 and 2017 post SMC campaign reports highlighted poor information on stock delivery status and lack of visibility prior to the beginning of the campaign. At times, commodities did not reach health facilities on time, and sometimes not until the end of the campaign. As a result, some health facilities were concluding their campaigns as others were just starting, which impacted coordination, supervision, and reporting.

## Cameroon's GHSC-PSM distribution by the numbers

2 working groups at central and regional levels of the supply chain

8 million blister packs of sulphadoxine-pyrimethamine and amodiaquine 1&2 procured<sup>6</sup>

Multiple means of transportation: trucks, motorcycles, camels, donkeys, and people on foot

41 photos taken of deliveries

34 deliveries verified by GIS (100% accuracy) to 487 health facilities

> 7.5 million full therapeutic courses dispatched

**1.6 MILLION CHILDREN PROTECTED FROM MALARIA**

## INTERVENTION AND RESULTS

The 2018 SMC campaign had four cycles in four months (July to October). Cameroon's government led the planning and implementation of the campaign through national and regional working groups (see Table 1). To ensure that commodities would be available in both regions ahead of the 2018 campaign, GHSC-PSM participated in both groups, aiming to fulfill the following responsibilities:

1. Organize and coordinate international procurement, storage of commodities at the national level and distribution of commodities to health facilities within the regions. The project also provided technical support to the NMCP to conduct a forecast for the 2018 SMC needed commodities.
2. Support Regional Funds for Health Promotion (RFHP)<sup>7</sup> to improve their storage, distribution and transportation. Working with Regional Delegates for Public Health, NMCP, and Malaria-Regional Technical Group (RTG), GHSC-PSM helped streamline distribution arrangements by using a third-party logistics (3PL) service provider to reduce duplications and inefficiencies.
3. Support the NMCP and Malaria-RTG to monitor data collection, validation and reporting, and conduct analysis for the SMC campaign.
4. Collaborate with different supply chain stakeholders at district and regional levels to implement reverse logistics of unused SPAQ to the warehouses of the RFHP.

The NMCP, with the support of GHSC-PSM, developed a strategy for transporting and delivering SMC commodities to health facilities. Once the procured commodities arrived at the point of entry in Douala, they were transported in temperature-controlled trucks to the Far North and North regions according to distribution plans that accounted for the security levels of health districts within each region and district.

Table 1: The two working groups that managed Cameroon's SMC campaign

MEMBERS	ROLES AND RESPONSIBILITIES
<b>NATIONAL</b> <ul style="list-style-type: none"> <li>• NMCP</li> <li>• PMI</li> <li>• GHSC-PSM</li> <li>• 3PL</li> <li>• WHO</li> </ul>	<ul style="list-style-type: none"> <li>• Quantify and procure commodities for the 2018 campaign</li> <li>• Source funding to procure commodities</li> <li>• Supervise and support distribution in collaboration with RTG and District teams at health facilities</li> <li>• Develop contract between GHSC-PSM and third-party logistics company</li> <li>• Build consensus with RTG and other stakeholders on the SMC campaign modalities and timeline</li> <li>• Develop and share tools for distribution planning and implementation with RTG</li> <li>• Identify warehouse to stock commodities</li> <li>• Develop distribution plans</li> </ul>
<b>REGIONAL</b> <ul style="list-style-type: none"> <li>• RTG for Malaria Control Program</li> <li>• RFHP</li> <li>• GHSC-PSM</li> <li>• 3PL</li> </ul>	<ul style="list-style-type: none"> <li>• Develop an itinerary for distribution</li> <li>• Implement and monitor the regional action plan</li> <li>• Support delivery of commodities to all health facilities</li> <li>• Implement the use of GIS and tracking delivery system to monitor deliveries and ensure last mile deliveries</li> <li>• Review and monitor consumption data in health facilities and provide immediate response by supplying needed stock</li> <li>• Track performance of 3PLs and provide technical and operational guidance/ support on planning and implementation</li> <li>• Collaborate with RTG to ensure that health facilities have proper temporary storage space for SMC commodities</li> <li>• Support RTG to create awareness about distribution procedures, inventory, record keeping, documentation and reporting requirements for health staff (Supervisors at district and health facility levels)</li> <li>• Supervise and monitor distribution from Maroua<sup>8</sup> to health facilities and resolve bottlenecks</li> <li>• Work with Malaria-RTG to plan and implement post-campaign reverse logistics, as well as storage at the RFHP warehouse</li> <li>• Share approved distribution plan with District teams, 3PLs and health facilities</li> </ul>

<sup>1</sup>The World Bank. (2016, April 12). *International Development Association Project Appraisal Document on a Proposed Credit in the Amount of \$100 million and a Proposed Grant from the Multi Donor Trust Fund for the Global Financing Facility in the Amount of \$27 million to the Republic of Cameroon for a Health System Performance Reinforcement Project*

<sup>2</sup>SMC 2017 campaign in the Far north: General report, NMCP, 2018

<sup>3</sup>First SMC Campaign in Cameroon: Synthetic report for Far North and North, NMCP, 2017

<sup>4</sup>SMC 2017 campaign in the North: General report, NMCP, 2018

<sup>5</sup>Eghan, Kwesi and Daniel, Gabriel. December 2011. *Assessment of the Pharmaceutical Management System in Cameroon*. Submitted to the US Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

<sup>6</sup>Sulphadoxine-Pyrimethamine and Amodiaquine 1 = SP 250/12.5mg tab/1 +AQ 75mg tab/3

Sulphadoxine-Pyrimethamine and Amodiaquine 2 = SP 500/25mg tab/1 +AQ 150mg tab/3

<sup>7</sup>RFHP is responsible for storage and management of health commodities at the regional level

<sup>8</sup>Maroua is the capital of the Far North Region.

GHSC-PSM installed GIS systems to track and guarantee last-mile deliveries (see Diagram 1). To obtain GIS data, GHSC-PSM required the 3PL provider to purchase:

- SIM cards from the mobile network carrier covering the region (NEXTEL)
- Six inexpensive smart phones from the local market with minimum features, including a minimum eight megapixel camera with geo-localization and the Gmail app.

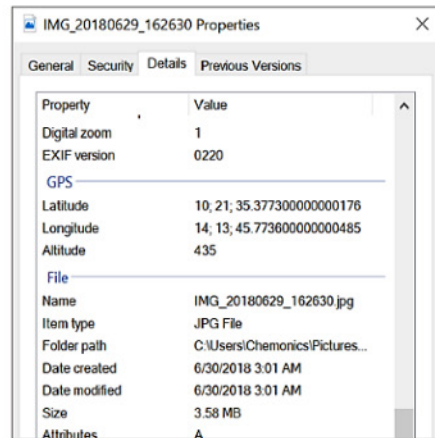
GHSC-PSM staff set up the smart phones for the purpose of the campaign and briefed 3PL staff on how to take pictures and share via Gmail. 3PL staff then performed a test in the warehouse and sent pictures to a GHSC-PSM e-mail addresses to verify quality and ability to include the required information. Diagram 1 below shows a description of the GIS process.

Diagram 1: GIS step-by-step proces

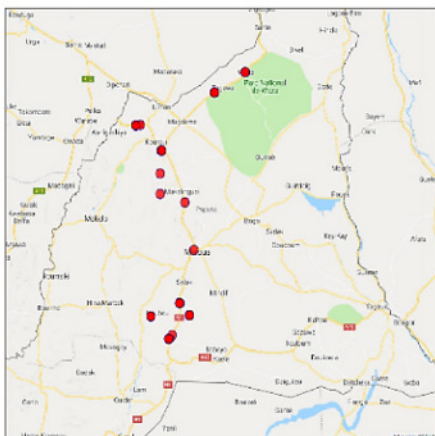
Picture taken at health area and shared with GHSC-PSM



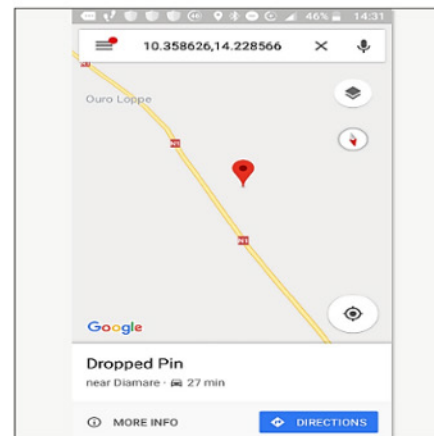
GPS coordinates are collected from image properties



A few health areas identified on Google Maps



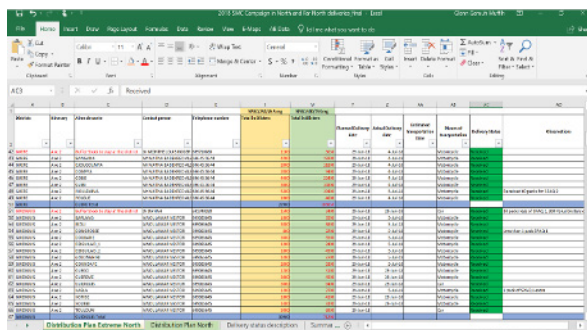
Coordinates entered in Google maps



To monitor shipments, GHSC-PSM staff developed a delivery tracking tool that included a simple Excel dashboard (see Diagram 2) with information about each health facility, the quantities allocated, itinerary, health facility contact, and delivery status. During a working session with the 3PL, partners agreed to a distribution plan for all 487 health facilities (327 in the Far North and 160 in the North), finalized itineraries, and prepared all delivery notes and other documents. The 3PL staff were briefed on the categories of the delivery status (out for delivery, information received, in transit, pending delivery, failed attempt, exception, delivered, received) to be updated daily after delivery. GHSC-PSM then supervised the packaging and labelling of commodities for each delivery.

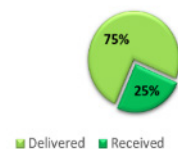
Once packaging was completed, the commodities for distribution and one functioning smartphone were issued to 3PL staff. At each delivery point (health facility or district), 3PL staff were required to take pictures of the delivery and share with GHSC-PSM staff via e-mail. Finally, 3PL staff were also required to update GHSC-PSM on the status of delivery at the end of each day. All required information was extracted to a database and used for confirmation of delivery.

Diagram 1: GIS step-by-step process



Transportation means	Far North	
	# deliveries	% deliveries
Canoe	2	0.6%
Car	108	32.7%
Motorcycle	179	54.2%
On foot	0	0.0%
Tricycle	19	5.8%
Wheelbarrow	0	0.0%
<b>Total</b>	<b>308</b>	<b>93%</b>

Delivery status on 04 Sept 2018  
Far North Region



**This is a significant improvement over the 2017 campaign, where deliveries only took place to the district level (45 health districts), with health facilities then required to pick up their needed commodities.**

The combination of GIS and tracking tool were used to monitor and confirm last-mile delivery to all 487 health facilities during the campaign. In 20 days, more than 5.3 million full therapeutic courses were dispatched during the first shipment, covering two

to four cycles depending on the districts (three to four cycles for hard-to-reach and unsecured districts, and two cycles for the rest). The remaining 2.2 million full therapeutic courses were dispatched during the second and third shipment. The deliveries covered a surface area of 34,263 km<sup>2</sup> in the Far North and 66,090 km<sup>2</sup> in the North region. This is a significant improvement over the 2017 campaign, where deliveries only took place to the district level (45 health districts), with health facilities then required to pick up their needed commodities. This effort led to more than 1.6 million children in the Far North and North regions of Cameroon receiving SMC commodities, representing a 93 percent coverage rate.



3PL staff confirming directions to a health facility to conduct a delivery. Photo credit: GHSC-PSM

## CHALLENGES FACED DURING THE CAMPAIGN

Despite meticulous planning, the post-campaign evaluation identified several areas for improvement in upcoming campaigns. Challenges specific to the GIS strategy included:

- Limited network connectivity in some health facilities made it difficult to the 3PL to provide immediate updates.
- Multiple pictures (more than 300 received) taken for the same delivery required some cleanup before GIS analysis.
- Poor manipulation of the devices resulted in some poor-quality photos and some without GPS coordinates.
- A cumbersome process of receiving pictures, downloading and checking GPS coordinates delayed verification and analysis.
- The campaign team was unfamiliar with the use of GIS for mapping in a health setting, resulting in some difficulties in implementation.

Other challenges included:

- Security concerns made some health facilities difficult to access, requiring different strategies for deliveries.
- Health facility personnel were not always available at the planned time and date of distribution.
- Inaccessibility by roads to some health facilities.
- Discrepancies of population data between distribution plans and actual population because of poor microplanning.
- Other health activities and local events overlapping with the campaign.
- Differences in consumption data between the actual and forecasted needs during the four-cycled campaign (due to population movement for a major holiday season in the same time frame) led to difficulty adjusting the needs for the following cycles.



- 3PL's lack of commitment to schedules led to late delivery of commodities to some HFs.
- Lack of involvement of district teams during supervisions.
- Illicit sale of SPAQ in the local market.

## RECOMMENDATIONS FOR FUTURE SMC CAMPAIGNS

Despite the challenges mentioned above, the campaign was recognized as a great success in helping Cameroon's NMCP and northern regions reduce mortality due to malaria. The Cameroonian government's commitment to putting together financial, human and local resources was a key factor for success.

The final evaluation provided recommendations from the northern regions that can be used for future campaigns and easily adapted for other countries and contexts:

### Optimize GIS tracking deliveries to increase efficiency of the system

- Provide more thorough training to GHSC-PSM staff, government staff and stakeholders on GIS and its use in health programs.
- Apply the Transformation Information Tool (TranIT) to simplify the process of collecting and mapping GIS information. TranIT uses an Android mobile application that allows drivers to upload shipment information and a GPS stamp of their location. An electronic proof of delivery application confirms delivery through receipts that are signed and archived electronically.



3PL staff ensuring a health worker signs the delivery note to complete a successful delivery of commodities at Lopere health facility. Photo credit: GHSC-PSM

### Plan and prepare to ensure all stakeholders are prepared for the campaign

- Prepare and provide orientation to all participants well in advance of the campaign and actual distribution.
- Inform all health facilities to prepare temporary storage space and inventory management tools.
- Share schedules and delivery plans with personnel in district and health facilities and with other partners involved in the campaign.
- Conduct microplanning activities from the regional level to health facilities.

### Ensure data accuracy to avoid stock shortages and overages

- Conduct an exhaustive quantitative needs evaluation with data during microplanning.
- Use the most up-to-date data in planning distribution sites.
- Train district teams on data management to improve data quality.

### Engage with communities and recipients to ensure full participation and support

- Strengthen and maximize community engagement, especially in areas inaccessible by road, to ensure delivery and confirm receipt.
- Adopt the culture of sharing best practices to facilitate experience sharing.
- Sensitize populations on the illicit sale of commodities in the black market.

### Provide ongoing and adaptable management, monitoring and support to solve problems

- Conduct robust monitoring and evaluation at the end of each cycle to quickly identify and resolve challenges.
- Engage stakeholders to share updates, challenges, and action plans to strengthen decision making.
- Retain and strengthen mechanisms for flexibility and adaptation. These mechanisms can help address unforeseen challenges and mobilize resources to redistribute commodities between health facilities.
- GHSC-PSM and other implementing partners continue to provide comprehensive support, focusing on strengthening the Ministry of Public Health and supply chain management systems.

### Review, analyze and share lessons learned to ensure success in future campaigns

- Share lessons learned between regions implementing campaigns and stakeholders.
- Conduct evaluation meetings at the end of each cycle to:
  - Review campaign performance.
  - Determine what to do with excess SMC commodities at health facilities.
  - Agree on how to finalize distribution in health facilities.

Efficient delivery of commodities ensured that children in the Northern regions of Cameroon were protected from malaria. Photo credit:

