Nigeria

Tracing insecticide-treated bed nets to the last mile using global GS1 standards

Challenge

Nigeria has the highest malaria burden globally, with insecticide-treated nets (ITNs) being crucial in reducing transmission. However, traditional manual data collection methods for ITN distribution were prone to errors and lacked real-time tracking, leading to inefficiencies and accountability issues in ensuring nets reached intended households without being lost, stolen or diverted.

Approach

In 2023, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project, funded by the U.S. President's Malaria Initiative, collaborated with Nigeria's National Malaria Elimination Programme to pilot the use of GS1 standards in Calabar Municipality. GS1 barcodes were printed on ITNs and households were issued e-netcards. This digital system tracked nets efficiently via the Ipolongo platform, ensuring accurate distribution and enhanced visibility, delivering significant improvements over the manual methods used previously.

Introduction

In 2023, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project, funded by the U.S. President's Malaria Initiative (PMI), supported Nigeria's National Malaria Elimination Programme (NMEP) to launch a pilot project to test the use of GS1 standards in mass campaign distribution of insecticide-treated nets (ITNs) for malaria prevention. Targeting the Calabar Municipality in Nigeria's Cross River State, the pilot aimed to improve the distribution and traceability of bed nets by moving away from manual, error-prone data collection methods to a barcode-based digital system that tracked nets more efficiently and improved accountability.

Out of 149,994 ITNs distributed in the pilot area, 110,445 net serial numbers were successfully scanned and verified across 65 distribution points. The pilot demonstrated the potential of GS1 standards in ensuring ITNs reach their intended recipients and laid the groundwork for scaling these practices to other areas in future campaigns.

The role of GS1 standards in supply chain visibility

As the country with the highest malaria burden globally, Nigeria accounts for a quarter of the world's malaria cases. ITNs have proven highly effective at reducing transmission and have become a core component of Nigeria's malaria elimination efforts.

For ITN programs, traceability is crucial in driving accountability by ensuring nets reach their intended households and are not lost, stolen or diverted elsewhere. Motivated to address this issue, in 2023, Nigeria's NMEP partnered with GHSC-PSM to pilot the use of GS1 standards to barcode ITNs.

The pilot aimed to demonstrate how GS1 standards, recognised as core customer requirements by GHSC-PSM, PMI and the TraceNet Working Group Guidance, could be used to optimise distribution to the last mile in Calabar Municipal Local Government Area of Cross River State, Nigeria.

"Global standards allow us to connect a lot of different disparate systems that are typically identifying products, identifying locations and exchanging data of products in a non-standard way."

Jackson Moser,
Former Global Standards Analyst and Contractor for GHSC-PSM

Implementing GS1 barcodes on ITNs

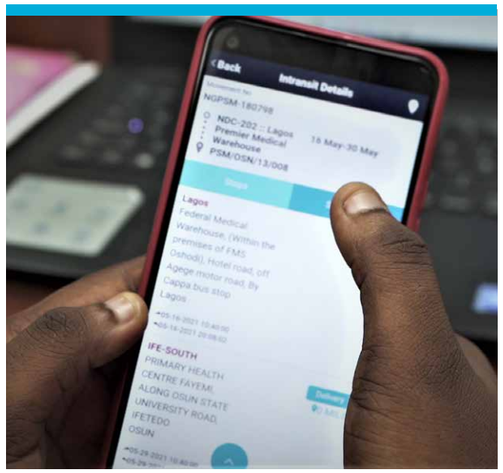
For USAID, incorporating GS1 standards into its processes and operations has been a strategic priority since 2017. Doing so is viewed as key to improving end-to-end visibility and connectivity in the global health supply chain.

"What GS1 standards allow us to do is to identify products, people and locations with a standard language," says Jackson Moser, Former Global Standards Analyst and Contractor for GHSC-PSM. "By speaking the same language and exchanging the same identifiers, we are more efficient in how we transact."

For the pilot, GS1 barcodes containing a unique Global Trade Item Number® (GTIN®) and serial number were printed on tags that were applied to individual nets during manufacturing.

Households in the pilot area were issued an e-netcard. When this e-netcard was redeemed at a distribution point in return for a mosquito net, the net's serial number was paired with their unique household identifier via a cloud-based system called Ipolongo. This allowed government officials running the statewide campaign to ensure nets reached their intended recipients and were not diverted or misallocated.

Linking individual nets and households also strengthened accountability, explains Ogoza Anne Ugye, GHSC-PSM's Malaria Program Director in Nigeria. As such, the system would flag the



discrepancy if a household attempted to claim more than their allotted number of nets – a maximum of four per household.

"We wanted to be sure that those nets got to households and that they were in the locality where they were meant to be," says Ugye. "It really improved visibility, helped with accountability and helped with managing the commodities."

Ipolongo provided instant data, making it easier to update distribution plans quickly and keep accurate track of stock. This drove a significant improvement over manual methods used in the past – typically pen and paper or Microsoft Excel spreadsheets – which often contained inaccuracies that required extensive cleaning. As a result, where traditional ITN distribution campaigns took seven days, the pilot was completed in just five.

"Imagine if we had done this across the State – we would have shortened the timeline tremendously. There wouldn't have been nearly as much time needed to process and clean up data," says Ugye.

"The GTIN allows us to identify the brand or manufacturer supplying the product, but that's insufficient for last mile visibility. When we use the GTIN and serial number and pair that with a unique household identifier, we can track exactly which GTIN went to which household, providing us with complete visibility."

Violet Ketani,
Former Global Standards and Traceability Lead, GHSC-PSM

Challenges in new tech adoption

The pilot exposed technical challenges, some of which were mitigated in the short term, while others require longer-term strategies.

For example, training operators on proper scanning techniques helped to improve the accuracy and efficiency of barcode scanning. At the same time, laser-equipped POS devices addressed issues with scanning nets in low-light conditions, compared to mobile devices that relied on sunlight or indoor light to pick up barcodes.

Duplicate scans also indicated that some operators reused net barcodes to sidestep scanning difficulties, highlighting a need for a system for flagging previously scanned nets. However, these challenges also served as a valuable learning opportunity. As Nigeria moves towards broader implementation of pharmaceutical barcoding, the lessons learned from the pilot will help to identify areas for improvement.

Crucially, the pilot demonstrated the need for education, awareness and change management beyond mere skills training. According to Ugye, clear communication about the purpose of tech-driven initiatives is vital for those moving from manual to digital processes. “We found that the operators needed to know why they were doing what they were doing, and how important it is to get [the barcodes] scanned correctly,” she says. This communication not only helps resolve technical challenges, but also ensures the long-term success of future campaigns.

Moser notes that this challenge is not just inherent to the work being done in Nigeria. “It’s difficult to instill advocacy for global standards locally in any country when new technology and a new process must be adopted, especially when results aren’t immediately visible upstream or downstream,” he says. “This is something we try to work to achieve as a team… developing the resources needed to empower localised upskilling.”

Human-centric challenges aside, the pilot uncovered additional technical issues around label quality. Net barcodes were small, measuring just 8x8mm, and were sometimes obscured or stitched directly onto the fabric in ways that prevented effective scanning. It was therefore recommended that the 2D GS1 DataMatrix barcode be incorporated into the care label for easier scanning in the future.

These technical challenges will inform best practices around label placement, and GHSC-PSM has recently revised the TraceNet guidelines based on lessons learned from operationalised GS1 implementation across the larger global health community.

Growing momentum behind serialisation

While Nigeria’s ITN barcoding pilot has ended, GS1 standards continue to be discussed extensively in Nigeria by their stakeholders – including the local industry – under the leadership of the National Agency for Food and Drug Administration and Control (NAFDAC), Nigeria’s drug regulatory body.

In 2021, NAFDAC took significant steps towards enhancing the traceability of health commodities. This effort began with the publication of draft regulations mandating the unique identification of all pharmaceuticals using global standards, followed by the release of a draft guideline on product master data in May 2022 – a critical component for ensuring the safety and efficacy of pharmaceutical products.

Collectively, these actions reflect NAFDAC’s commitment to establishing a comprehensive traceability system, underscoring the agency’s dedication to public health and safety standards.

Violet Ketani, Global Standards and Traceability Lead, GHSC-PSM, says Nigeria’s GS1 pilot found key takeaways similar to those of the initiatives led by partners like eGov Foundation, and that these shared lessons – along with feedback on best practices for tracking malaria transmission – are informing guidelines for barcoding in the ITN industry.

Continued pilots will further strengthen understanding of practical challenges to scale up best practices. “We’re going to leverage lessons from this pilot, including similar past projects, and come up with lessons learned that we can share back with the industry,” Ketani adds.

Broad stakeholder collaboration is key to all of this work. After all, without the collective involvement of organisations, government bodies and community participation, it would be impossible to achieve the level of traceability and accountability needed to ensure the long-term success of ITN campaigns.

For Moser, the ITN traceability trial in Nigeria serves as an example of collaborative problem-solving on a global scale. “The successful implementation of global standards allows you to mitigate risks that are typically present in the supply chain – whether that be mitigation against substandard or falsified products, diversion and theft, or any other risk of leakage or shrinkage or product damage,” he says.

“Importantly, through sharing the results of a large-scale pilot like this, the impact of GS1 standards is more digestible for the global health community. There are so many initiatives constantly launching in this space, so it is key to take a step back and ensure the work being done is interpreted and disseminated effectively. That is exactly what standards help do.”

Next steps

Following the successful pilot in Calabar Municipality, the next steps involve scaling the use of GS1 standards across Nigeria’s ITN distribution campaigns. This expansion will include additional training for operators and addressing technological challenges identified during the pilot. Collaboration with NAFDAC will continue to ensure alignment with national regulations and standards. Plans are underway to implement the lessons learned from this pilot in other health commodity supply chains, aiming to improve overall traceability and accountability within Nigeria’s healthcare system.

Conclusion

The implementation of GS1 standards in Nigeria has demonstrated significant improvements in the efficiency, traceability and accountability of ITN distribution efforts. By moving from manual to digital processes, distribution times were reduced and nets reached the intended households, addressing a critical challenge in malaria prevention efforts. The success of this initiative highlights the importance of global standards in enhancing supply chain visibility and sets a precedent for future health interventions. Continued efforts will focus on scaling these practices nationwide, ultimately contributing to Nigeria’s goal of eliminating malaria and improving public health outcomes.

Go Beyond the Story: Watch the ‘From Supply Chain to Saving Lives’ video

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Dr. Grace Adeya is a public health physician who currently serves as the Malaria Task Order Director for GHSC-PSM. Grace holds a MPH, MBA, and MBChB in Medicine and Surgery and has more than 25 years of professional experience, including 15 years managing multi-country programs related to global health. Throughout her career, Grace has provided leadership and technical direction to improve health systems with a focus on supply chain management and commodity security, specifically as it relates to antimalarials and maternal, newborn, and child health products at the regional, country, and global levels. Her experience spans across Sub-Saharan Africa, Asia, and Latin America.

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Ms. Violet Ketani is the former Global Standards & Traceability Team Led under GHSC-PSM where she leads a full range of programmatic and technical processes that supports the adoption and implementation GS1 Healthcare Standards on the program and supported countries. Violet brings over 15 years of experience leading cross-functional teams to successfully deliver projects for a range of federal agencies including USAID, CDC, PEPFAR, DOD, and private partners with a technical focus of health systems strengthening, strategic information management systems, digital transformation, supply chain management, global standards, and traceability. She brings a global perspective to any project, drawing on professional experience in Botswana, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Zambia, and Zimbabwe. A thought leader, Ms. Ketani has participated as an expert panelist, presented, and moderated at multiple conferences in the US and overseas.

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Mr. Jackson Moser is a supply chain Healthcare Global Standards Analyst, formerly responsible for supporting GHSC-PSM in establishing a strategic vision, developing relevant tools, and providing operational support for implementation of GS1 standards with GHSC-PSM country programs. As a GS1 standards subject matter expert, he directly project managed dozens of the world's largest pharmaceutical and medical device suppliers and manufacturers in their implementation of standards-based product identification, package labeling, and master data exchange for GHSC-PSM-procured product. In this strategic role, Mr. Moser supported the creation of technical tools and resources for country staff to leverage in their supply chain digitization endeavors, while also supporting staff in trainings and the development of standard operating procedures (SOPs). Mr. Moser holds a Bachelor of Science in Environmental Science and Public Policy from the University of Virginia.

About the organisation

The USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project provides commodity procurement and logistics services, strengthens supply chain systems, and promotes commodity security, supporting USAID programs and presidential initiatives in Africa, Asia, Latin America, and the Caribbean, focusing on HIV/AIDS, malaria, and population and reproductive health commodities.

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