E-Monthly Stock Status Tracker (e-MoSST): A Tool to Enhance Universal Health Coverage for PLHIVs through Inventory Control Methods

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Abstract: Universal Health Coverage (UHC), is described as *"people have[ing] access to the full range of quality health services they need, when and where they need them, without financial hardship"*[1] **This is embedded in the UN Sustainable Development Goal (SDG) goal 3, which aims to ensure healthy lives and well-being of all people, and one of the targets, specifically [3.8] considers enhancing access to essential medicines.[2], [3] Antiretroviral medicines (ARV), listed among the essential medicine list, provide effective management for the estimated 30.7 million people currently on the medication, as of December 2023.[4] It is therefore critical that there be unhindered, continuous, and uninterrupted access to the life-saving ARVs hinged on a robust, effective and efficient supply chain system, without which UHC cannot be actualized.[5], [6]**

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I. INTRODUCTION

In Nigeria, USAID-led Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM), in conjunction with the Ministry of Health is directly tasked with the responsibility of ensuring the ARV commodities are procured and distributed via the last mile to all facilities where HIV/AIDS care and treatment is provided. With the additional support of local Non-Governmental Organizations (NGOs), they establish inventory levels based on the min-max, days-of-stock method.[7] The replenishment system adopted is officially described as "pull forced min-max system of inventory control",[8] such that at fixed periods (every two months), reorders are made to bring the inventory level as at the time of reporting (stock on hand) up to the maximum stock, designated as four months of stock.[9] The re-order quantity is calculated based on the historical consumption data, usually the two months preceding the cycle. The expectation here is that facilities should have about 2 months of stock left at the time of resupply.

However, with the increasing emphasis on individualized Patient-Centred care, wherein refills by clients may not always maintain a fairly stable consumption pattern - a key requirement for the success of the min-max method, it is not uncommon to have occasional cases of facilities having stock that fall below the minimum level, and/or overstock. It is therefore necessary to have a real-time status update of inventory levels to enable prompt decision-making and where necessary, immediate intervention, to promote the effectiveness of the system.

Therefore, as part of efforts to address these issues, APIN Public Health Initiatives (APIN), a PEPFAR implementing partner has developed innovations to support facilities in enhancing the value chain and ensuring constant monitoring of inventory levels which are described below. It should be emphasized that this is aimed at complementing and not replacing the currently approved inventory control system, and has the overall aim of improving patients' outcomes for the attainment of UHC.

➢ *Detailed Specification of the Intervention*

The electronic monthly stock status tracker (e-MoSST) is a spread-sheet-based tool designed to monitor antiretroviral drug (ARVs) stock and consumption patterns for inventory management, on a monthly basis. It is developed to routinely

keep track of ARV medication, aiding the effectiveness of logistics management and coordination. The tool is designed to reflect the various medicines available, the batch numbers, expiry date, current stock-on-hand (SOH), monthly consumption, average monthly consumption and Months-of-stock (MoS) available per site. This design helps identify sites that are overstocked, have low consumption and are under-stocked with specific commodities in order to trigger appropriate intervention.

Additionally, the e-tool reveals real-time updates of each facility entry as it involves the use of Google-sheets - which is a user-friendly, cloud-based web application. Multiple persons can work simultaneously on the file, hence, giving room for cross-sectional commodity data visibility for the state. This visibility provides the avenue for timely analysis and, in conjunction with the State Logistics Management and Coordination Units (LMCU), which is part of the State Ministry of Health, to effect interventions that may include redistribution as needed. All these ensure continuous and timely access to ARVs, improving client outcomes, thereby ensuring universal health coverage and preventing interruption in treatment (IIT) - a key metric in evaluating client retention on treatment. It is also a channel to routinely monitor close expiries thereby implementing the first expiry-first out (FEFO) method of dispensing. As a monthly reporting tool, it provides a real-time data collation and analysis for faster interventions.

II. OPERATIONALIZATION

Currently being used in Ondo State, one of the state supported by APIN, the e-MoSST runs on a google sheet document interface consisting of thirty-four (34) sheets; thirty-three (33) for each facility implementing Comprehensive HIV services and a summary page for the state. The template documents data on the following variables; month of report, product description, batch number of product(s), expiration date, pack size, physical stock on hand (SoH), quantity consumed, average monthly consumption (AMC), month of stock (MoS) and reporters name. The column for MoS stock on the tool is automatically generated and colour coded using the colours Red, Green and Yellow to denote understock (MoS less than two 2 months), adequate stock (MoS between two 2 to four 4 months) and Overstock (MoS greater than four 4 months) using excel formula.

Leveraging on the computers provided by APIN, through funding from CDC for implementing the Nigerian Medical Record System Commodity Point of Care (NMRS commodity POC), the tool was deployed to each facility pharmacy and uploaded on the systems. Onsite training on the use of the tool was done for all pharmacy focal persons (FP) across the 27 sites Desktop computers with four (4) facilities utilizing the hardcopy tracker for reportage. Each of the 27 facility FP was granted exclusive access to input and edit on the sheet containing their facility data only, while the APIN PSCM program staff had full access to the whole template. At the end of each reporting month, this data is downloaded and stored in an archiving system to ensure data safety and security. The data is analysed to proffer interventions that will mitigate overstocking, stock out and commodity loss via expiration. A monthly report is generated and shared with the logistics management and coordination unit (LMCU) and state Ministry of Health (SMoH).

➤ *Metrics used to Measure Impact:*

Stock level used in the analysis was obtained from the National Health Logistics Management (NHLMIS) platform. Under the "analytics" section, the "stock out rate" and "months of stock" tabs were used to elicit the indicator export which provides the indicators for measurement. Specific metrics measured include:

- Number of overstock commodities
- Number of out-of-stock commodities

➤ *Project Tracking and Analysis:*

Monthly monitoring and follow-up of updates on the e-MSST at the end of each month was done. Regular feedback from users elicited challenges and proffer remediation. Routine onsite consumption data validation visits were also carried out. A review of the effect of the deployed intervention is being done on a monthly basis.

In August 2023, a total of 116 commodities across the 33 ART implementing sites were recorded as being overstocked. As at May 2024, the number has dropped to 41. Since the deployment of the e-MSST tool in August 2023, a trend analysis of overstock ARVs, as shown in figure 1 below, using the NHLMIS bi-monthly back-end data showed a significant decline in the number of overstock commodities. Also, the number of out-of-stock commodities reduced from 15 as at August when the tool was deployed to 6 as of May. Figure 2 shows a trend on the quantity of out-of-stock commodities between August 2023 and May 2024.
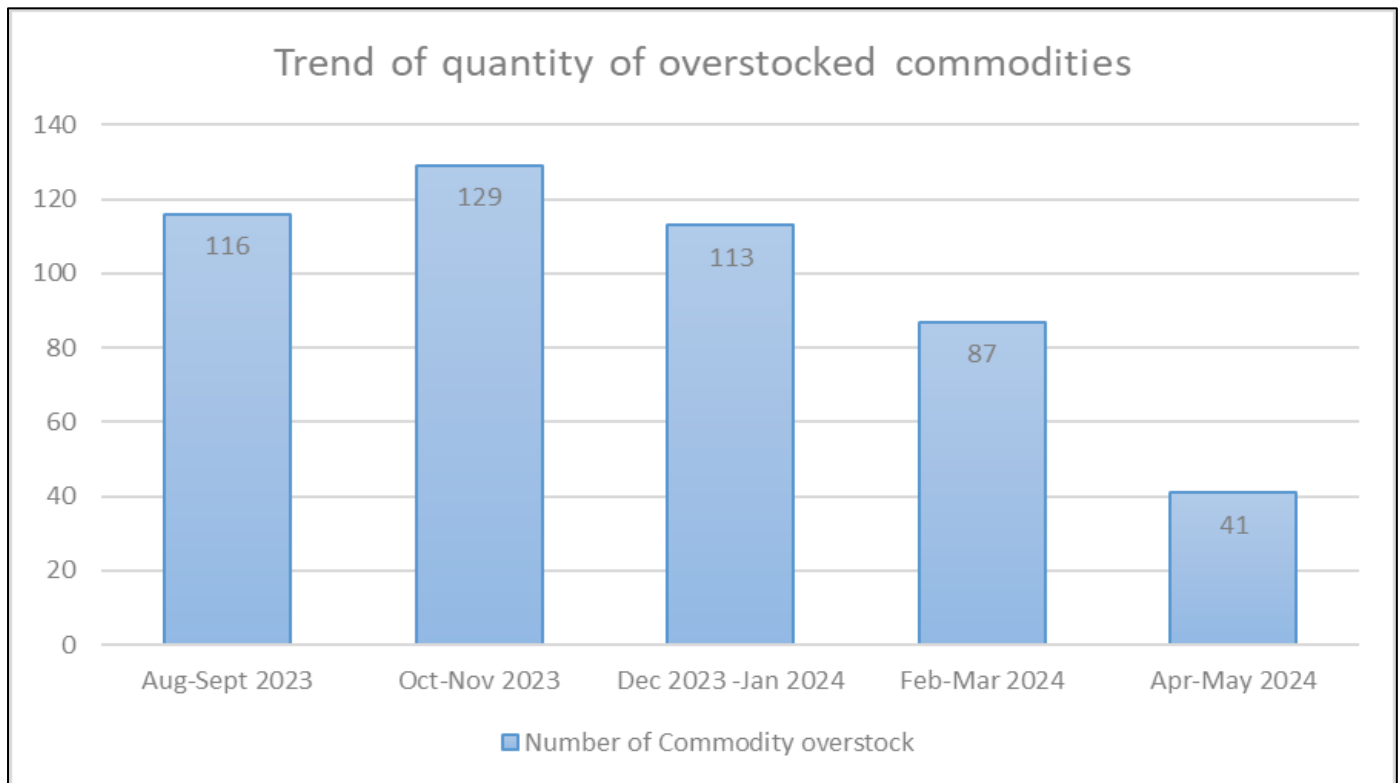
Fig 1 Showing Trend of Quantity of Over Stock Commodity between August 2023 and May 2024
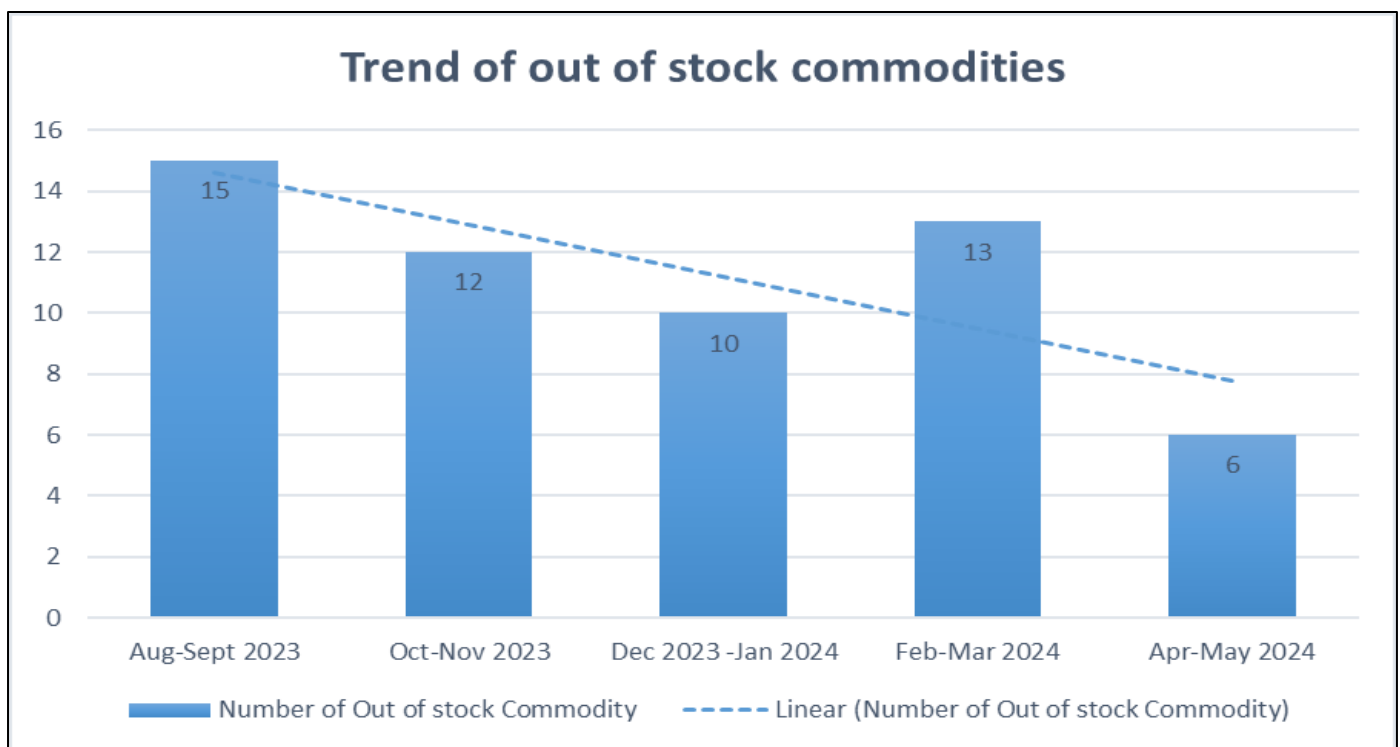

Fig 2 Showing the Trend of Out-of-Stock Commodities between August 2023 and May 2024.

In fig. 1 and 2 above, it can be observed that there has been a reduction in the quantity of overstock and out-of-stock commodities following the deployment of the tool. However, a notable increase in the Oct-Nov data for overstock commodities was observed. On a deep dive analysis, it was discovered that there was a programmatic implementation shift in prioritizing Rifapentin-Isoniazid (3HP) 300/300mg fixed-dose combination for tuberculosis preventive therapy (TPT) over Isoniazid 300mg (INH 300mg). This led to low consumption of INH, consequently leading to an increase in overstock across all sites. This decline in overstock and stock-out commodities shows the positive impact of the e-MSST as an intervention to improve logistics and supply chain management system.

➢ *Challenges Faced and Solutions*

- Ensuring timely reports from FPs. Constant reminders and follow prior to and during the reporting period are being done to mitigate this.
- Some facilities lack computer systems, due to epileptic power supply and lack of security measures in the dispensing unit.

III. KEY ACHIEVEMENTS

- **Reduction in Overstock and Out-of-Stock Commodities:** The deployment of the e-MoSST tool led to a significant reduction in the number of overstocked ARVs from 116 in August 2023 to 41 in May 2024. Similarly, the number of out-of-stock commodities decreased from 15 to 6 in the same period.
- Improved Inventory Management: The tool facilitated real-time tracking and redistribution of ARV stocks across facilities, thereby minimizing wastage due to expiries and ensuring that medications were available where needed.
- Enhanced Client Retention: By preventing interruptions in treatment (IIT), the e-MoSST helped improve patient retention on ART, contributing to better overall health outcomes for PLHIV.

➢ *Sustainability:*

As a key aspect of HIV implementation in Nigeria, the sustainability of interventions is highly encouraged. The e-MSST can serve as a standardized tool to improve logistics and supply chain management systems, especially in the HIV program. Government stakeholders such as SMoH and LMCU in collaboration with IP may drive the process of implementation and coordination of the e-MSST, while proffering interventions using the data generated from it. The role of these stakeholders, that is, SMoH and LMCU will hence be to provide oversight in fully adopting and standardizing this tool as an integral part of logistics and supply chain management data reporting tool to augment the existing logistics tools. This also ensures each facility owns its data and can make informed decisions utilizing same generated via e-MSST. The e-MSST has shown to be an effective yet sustainable technological innovation that improves the systemic processes and quality of logistics and supply chain management.

Plans are also underway to scale up to other APIN supported states before the end of the next FY.

➢ *Future Performance Improvement:*

Increase the months used in calculating the AMC from 2months to 3 months to give a more valid data of consumption pattern.

➢ *Collaboration and Funding*

- APIN Public Health Initiatives
- CDC (Centers for Disease Control and Prevention)
- PEPFAR (President's Emergency Plan for AIDS Relief

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APPENDIX

- *A Pictorial view of One of the Facility Sheets on the e-MSST Tool.*

- *A Pictorial view of the State Summary Page of the e-MSST*