# USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

# Enhancing Malaria Supply Chain Data Quality and Visibility Using an Automated Consumption Anomaly Detection Tool in Zambia

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## Problem Statement:

Zambia's Ministry of Health (MOH) oversees over 3,000 health facilities managing over 5,000 different commodities, making it difficult to detect consumption anomalies of malaria medicines using electronic logistic management information system (eLMIS).

Previously, when the MOH was required to conduct on-the-spot checks of commodities in health facilities to investigate data quality issues—including commodities needed to prevent and treat malaria—it was done manually over three days. This was a time-intensive and error-prone process, and the MOH often missed facilities with consumption anomalies. Some of these undetected anomalies were due to data quality issues and pilferage, leading to inaccurate re-supply decisions that in turn often left patients without malaria test kits and medicines.

## Methods:

In 2019, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project developed an automated data analysis process for detecting consumption anomalies and establishing the causes of data errors using Python and Applied Statistical Process Control (SPC).

This tool uses eLMIS data over a period of 24 months to determine the average (moving average) consumption over a set threshold and then uses the result to detect monthly anomalies.

### Flagged Product Consumption History
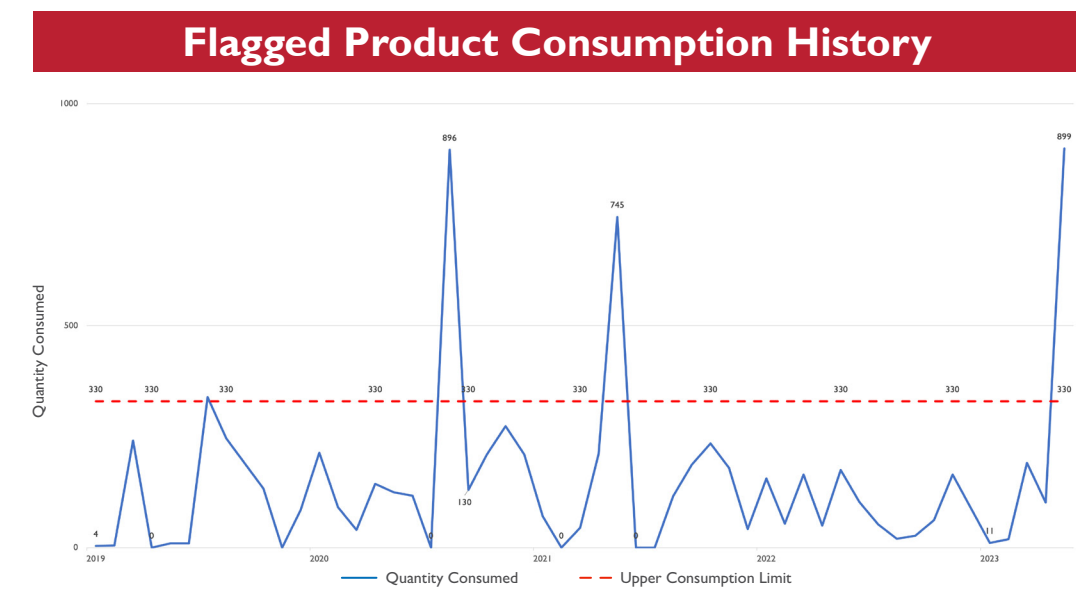


*The tool has a data model that uses a built-in logic to identify commodities that have been consumed above a set threshold.*

## Results:

- Process time reduced from 3 days to about 25 minutes.
- Speedy availability of a list of all anomalies used to conduct targeted on-the-spot checks for over 3,000 facilities and over 5,000 commodities monthly.
- Improved data quality and decision-making for malaria commodities.
- Substantial decrease in malaria commodity anomalies, from an average of 108 between Jan and Dec 2020.
- Between January 2021 and June 2023, anomalies reduced to an average of 30, indicating an improvement in data quality.
- There was also an increase in pilferage case findings between January 2020 and April 2023.
- The tool was used to identify 70 cases related to theft of medications, including Malaria test kits, with 35 convictions, out of which 26 are health workers.

### Malaria Commodities Consumption Anomalies
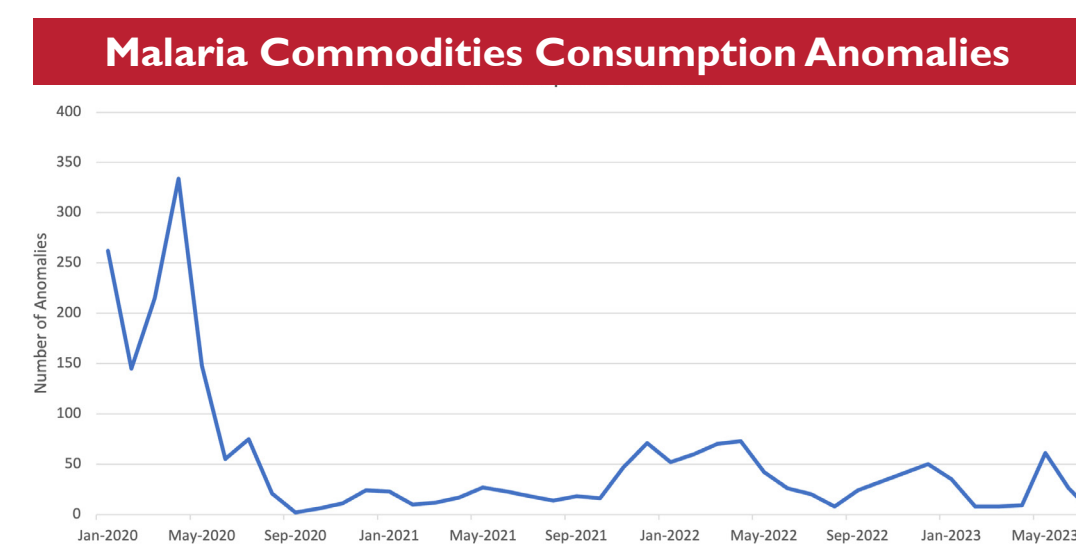


## Data-Driven Actions:

Since October 2019, GHSC-PSM has supported the MOH by using this tool to investigate pilferage, and identify and correct several data quality issues, contributing to improved confidence in data used for quantifying malaria commodities.

The Central Pharmacy Unit of the MOH and the Chief Provincial Pharmacists have been using the anomaly report to investigate and address data quality issues.

The National Drug Theft Task Force (NDTTF) and provincial task forces have been using the report to investigate consumption-related anomalies that are not linked to incorrect data entry through on-the-spot checks at service delivery points (SDPs).
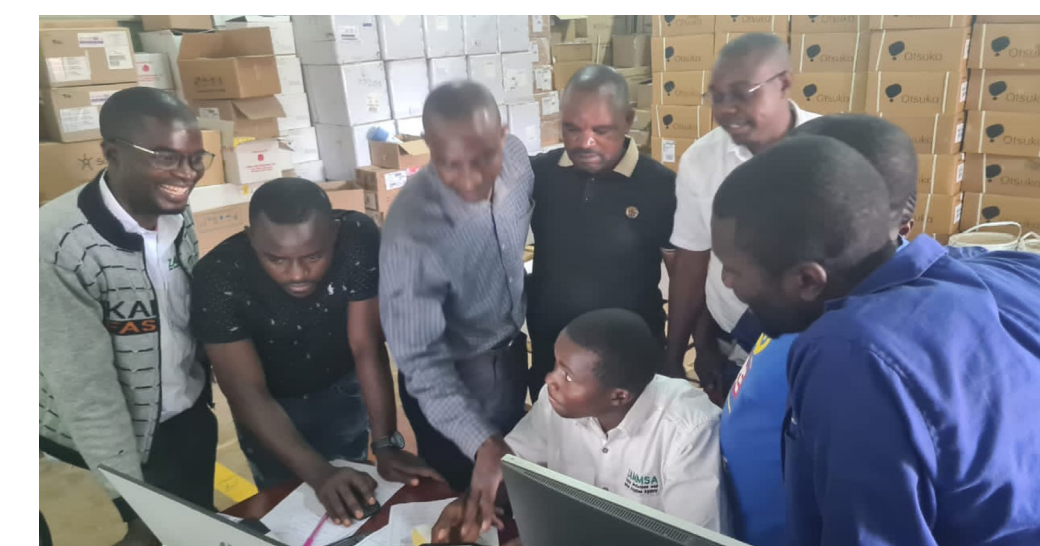


*MOH staff conducting on-the-spot checks using data generated by the consumption anomaly detection tool.*

## Conclusion:

The anomaly detection tool is open-sourced and developed using Python (easily adoptable by other countries) and replaced a time-consuming manual process. It improved effectiveness (as evidenced by the reduced anomalies) and improved efficiency by reducing the time that would otherwise be taken to produce anomalies. This demonstrated that using appropriate tools helps improve data quality and visibility, allowing supply chain actors to investigate pilferage and correct data quality issues quickly, and accordingly adjust supply plans.

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