The impact of early warning indicators to prevent stock-out and overstock of antiretroviral, antituberculosis, and antimalarial medicines

2011

National implementation experience from Zimbabwe

World Health Organization

Acronyms

ACT	Artemisinin based combinations
AIDS	Auto immune deficiency syndrome
ART	Antiretroviral Therapy
ARV	Antiretroviral
C/R	Consumption and Requisition
DTTU	Delivery Team Top Up
EWI	Early Warning Indicator
FDC	Fixed Dose Combination
GOZ	Government of Zimbabwe
GPRM	Global Pricing Reporting Mechanism
HIV	Human Immunodeficiency Virus
LMIS	Logistics Management Information System
LSU	Logistics Sub unit
MCAZ	Medicines Control Authority of Zimbabwe
M & E	Monitoring and Evaluation
MOHCW	Ministry of Health and Child Welfare of Zimbabwe
NatPharm	National Pharmaceutical Company of Zimbabwe
PLS	Procurement and Logistics Subcommittee of the ART Partnership Forum
PMTCT	Prevention of Mother to Child Transmission
PSM	Procurement and Supply Management
PSZ	Pharmaceutical Society of Zimbabwe
SDP	Service Delivery Point
SOP	Standard Operating Procedure
STG	Standard Treatment Guideline
TB	Tuberculosis
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
ZIP	Zimbabwe Informed Push System for TB and Malaria Commodities
ZISHAC	Zimbabwe Information System for HIV and AIDS Commodities

Contents

Acronyms **1**

Acknowledgements **2**

1. Introduction **3**

2. National-level implementation activities **7**

2.1 Field-testing 7

2.2 Defining partners and stakeholders 7

2.3 Setting a monitoring plan 8

2.4 Site training and logistics preparations 9

2.5 Data collection and aggregation 9

2.6 Funding 9

2.7 Regular review of indicators 9

2.8 Mechanisms for regular feedback 9

2.9 Assessing impact 11

3. Results **13**

4. Discussion **19**

4.1 Key ARV issues identified by indicators and action taken 19

4.2 Addressing challenges of routine data collection for tuberculosis and malaria 20

4.3 Plans to further strengthen PSM indicator monitoring 20

5. Conclusion: best practices and enabling factors **22**

ANNEX **24**

REFERENCES

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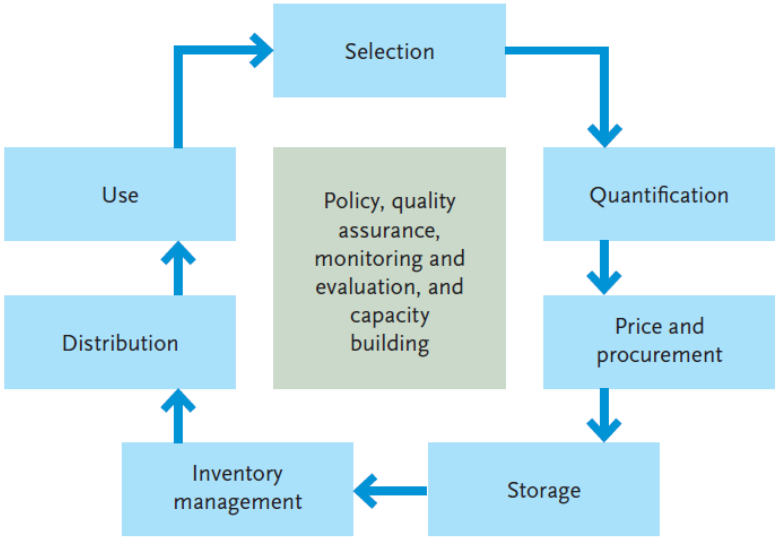
1. Introduction

In 2011 the World Health Organization (WHO) presented 12 core indicators for monitoring and evaluating procurement and supply management (PSM) at national level. The indicators were designed to alert managers to areas in which technical support is required to strengthen the national PSM system, and six of the 12 indicators are designated early-warning indicators of stock-outs and overstocking of medicines. In the context of the PSM indicators and this document, these medicines include antiretroviral agents (ARVs) and medicines to treat tuberculosis and malaria.

Monitoring and evaluation (M&E) are used to assess a system's strengths and weaknesses. Monitoring should cover all components of a PSM system (Figure 1), and monitoring and evaluation should trigger correction of all aspects that do not reach the target. Monitoring can therefore ensure continuous quality assurance of a national PSM system.

Figure 1. The components of the medicine procurement and supply management cycle.



The rationale for the 12 indicators includes the following:

- PSM system performance must be monitored and evaluated regularly, in a timely manner, in order to take corrective actions and to control the quality of PSM data.
- Core PSM indicators are needed that are relevant for all national drug programmes, donors, and institutions. Harmonized indicators highlight the most critical systems issues, avoid duplication of effort, and complement monitoring and evaluation by multiple stakeholders.
- Valuable information about PSM systems is routinely collected and stored but is often not used to analyse a system's performance. The 12 indicators seek to make use of this information without an additional burden on already overwhelmed human resources.

Zimbabwe was one of nine countries that began piloting the PSM indicators in 2009, and this document reports on key national-level activities and results from the implementation experience. The Ministry of Health and Child Welfare and programme managers used the PSM indicators to monitor the management of ARVs[1] retroactively from 2008, and then through the end of 2010, at quarterly national-level stakeholder meetings. There were two important outcomes from the use of PSM indicators.

First, the PSM indicators enabled the Ministry to identify critical issues in supply chain management and collaborate on strategies to address them. These included the following:

- Addressing issues in data quality through data quality workshops and additional trainings to ensure that at least two managers at every facility had been trained in ARV management standard operating procedures;
- Revising buffer levels when it was acknowledged that nearly all facilities were ordering after a product had already reached minimum levels;
- Addressing delays in data transfer by piloting mobile phone solutions for timely reporting to central level, and targeting data sharing gaps between central-level logistics bodies and medical stores;
- Ensuring logistical requirements for operating at scale, which included planning the use of computers in the recording and reporting of data for high volume facilities[2], and restructuring central warehouses to ensure timely order processing;
- Identifying the gap in regularly collected data on malaria and tuberculosis medicines.

As a result of corrective actions taken, the stock-out rate for adult first-line ARVs fell consistently, resulting in no facilities reporting a stock-out from February to December 2010. Additionally the tuberculosis medicine stock-out rate fell from 54% in 2008 to 15% in 2010 following the implementation of an informed push system, which enabled the collection and analysis of PSM indicators (see Annex) and enabled the Ministry to target the primary reason for persistent stock-out, inadequate central procurement.

Second, the PSM indicators highlighted where the country was performing on target, providing an opportunity to pursue even lower targets (e.g. lowering the rate of loss target from 2% to 1%), and highlight best practices (e.g. all products ordered, across partners, met national Standard Treatment Guidelines and product batch quality control testing).

Objectives

PSM indicators alone will not improve national system performance. This paper examines Zimbabwe's implementation experience in an effort to elucidate what good practices facilitate a successful M&E system driven by the PSM indicators, including real-time review with key stakeholders, tools for active management, and continued follow-up with poor-performing facilities.

[1] Due to the lack of data needed to effectively monitor the PSM indicators for tuberculosis and malaria medicines, this report focuses on the implementation of PSM indicators to monitor and evaluate ARV management, and the steps taken to address challenges in routine collection of data on tuberculosis and malaria medicines.

[2] This will be initiated as a pilot in 2011.

The Zimbabwean experience highlights the feasibility of implementing a PSM monitoring and evaluation system that draws from the 12 core PSM indicators, and emphasizes that these indicators have the possibility to:

- Analyse routinely collected data to provide valuable information about the factors associated with stock-outs and overstocking, and provide timely evidence to prevent both issues;
- Enhance information-sharing and problem-solving synergy among various procurement stakeholders and at different levels in the national distribution system;
- Strengthen data quality assurance, regular data reporting, and timely analysis;
- Measure the trends of performance in national PSM systems.

The use of the procurement and supply management (PSM) monitoring indicators highlighted areas with high performance (targets met), areas where more stringent target could be considered (e.g. loss reduced from 2% to 1%(, and areas where continued effort was necessary to meet indicator targets. Coordination with all stakeholders and government leadership and commitment to improve the national procurement and supply system based on measurable indicators contributed greatly to this success.

The experience in Zimbabwe demonstrates that PSM indicators can be implemented successfully when government leadership and commitment in partnership with PSM stakeholders can improve the performance of the PSM system and ultimately result in insignificant stock outs and negligible losses of critical health products. However, although indicators are useful to measure the PSM performance and to prevent the stock outs and overstocks, they will per se improve the PSM system unless corrective actions are timely implemented with the full involvement of all relevant stakeholders and partners.

Table 1. Summary of early-warning and performance indicators for procurement and supply management

No.	PSM stage	Core indicator	Use
1	Product selection	Percentage of medicine items[a] received (procured plus donated) or planned to be received that are in the national standard treatment guidelines	To measure whether items received are in line with national standard treatment guidelines (target, 100%)
2	Prescribing and use	(A) Percentage of patients receiving ARVs and tuberculosis treatment in line with national standard treatment guidelines (B) Percentage of patients initiating ARV treatment on regimens in line with first-line treatments in national standard treatment guidelines (early-warning indicator for HIV drug resistance)	To measure whether treatments (disaggregated by combination) are in line with national standard treatment guidelines (target, 100%)
3★	Forecasting	Proportion of quantities of products actually received (procured plus donated) during a defined period out of total quantities planned for the same period	To measure the extent to which the quantities received are consistent with the quantities planned to be received (target, 100%)
4★	Consumption	Percentage of quantities used out of total quantities available for consumption after deduction of buffer stock (opening balance plus quantities procured plus quantities donated minus buffer stock) during a defined period	To measure how much of the quantity available for consumption is actually consumed (target, 100%)
5	Procurement efficiency	Ratio between median price of products procured and the international median reference value	To measure the efficiency of procurement practices by comparing the median national price with the median international price (target, ≤ 1)
6★	Supplier performance and port clearance	(A★) Percentage of orders delivered in full and on time (as stated in the procurement agreement) per supplier in a defined period (B1★) Percentage of orders to be cleared from port that were cleared before the deadline (B2) Average number of days between arrival at port and date of clearance from port	(A) To measure supplier's performance in complying with agreed delivery time and delivering all quantities ordered (target, 100%) (B) To measure port clearance performance (target for B1, 100%)
7	Quality control	Percentage of product batches tested in past year that met national and international quality control standards	To measure product quality before release for consumption (target, 100%)
8★	Distribution	Percentage of treatment sites that received all orders in full and on time during a defined period	To measure reliability of national distribution system (target, 100%)
9★	Inventory control	Percentage of treatment sites that submitted complete inventory control reports on time, according to an established schedule, during a defined period	To measure regularity of reporting (target, 100%)
10	Loss	Percentage of quantities of each product lost per total quantities available for use (opening stock plus quantities received) in past year	To measure loss of products and causes (e.g. expiry, damage) (target, < 1%)
11★	Minimum stock level and inventory control	Percentage of treatment sites that placed orders during a defined period while the stock in hand of one or more items was below the minimum stock level	To measure effective use of inventory control: ordering to respect the minimum stock level to prevent stock-out (target, 0%)

12	Availability	Percentage of treatment sites that had a stock-out of one or more required medicines during a defined period (universal access and early-warning indicator for HIV drug resistance)	To assess the scale of stock-outs in all facilities (target, 0%)
		If target not reached:	
		(A1) Percentage of available items at each treatment site	(A) To assess the availability of products (target, 100%)
		(A2) Average percentage of items available at all treatment sites	
		(B) Percentage of treatment sites that had stock-out of a particular product during a defined period	(B) To measure stock-out per product (target, 0%)
		(C1) Average duration of stock-outs at each treatment site during a defined period	(C) To assess duration of stock-out (target, 0 days)
		(C2) Average duration of stock-outs at all treatment sites during a defined period (early-warning indicator for HIV drug resistance)	

2. National-level implementation activities

Zimbabwe conducted a number of national-level activities in order to successfully integrate the use of the PSM indicators into the routine data collection, analysis, and feedback mechanisms in the ARV management system (see Annex 1 for structure overview).

2.1 Field-testing

Zimbabwe participated in the PSM indicators field-testing in late 2009[3], which was conducted in three phases. A training workshop was held in Harare, Zimbabwe, in November 2009 to review the indicators and the field-testing method to ensure good understanding of data collection and analysis. Each participating country then conducted collection and analysis of 2008 data, and reported on each indicator to the WHO using a standard reporting format. A workshop was held in Ouagadougou, Burkina Faso, in December 2009 to synthesize the results, validate the indicators, and identify early-warning indicators.

The field test experience emphasized that the indicators were a powerful tool for measuring system performance, especially as the data required was already being collected. Additionally, the indicators provided evidence for where the system was performing well. Zimbabwe's country team presented the field-testing process and results to the Permanent Secretary in the Ministry of Health and Child Welfare, and a feedback report identifying areas in need of strengthening was provided to the Logistics Subunit (LSU) of the AIDS and TB programme, which manages medicine distribution in partnership with the National Pharmaceutical Company of Zimbabwe (NatPharm).

Following the field-testing, Zimbabwe undertook a number of activities to implement the indicators as a national monitoring and evaluation effort.

2.2 Defining partners and stakeholders

A critical component of successful PSM monitoring and evaluation is defining, and formally engaging, PSM stakeholders and partners in order to determine areas for collaboration and exchange of information on PSM. As there are a significant number of actors involved in ARV funding, procurement, storage, distribution, and dispensing, it was important to map all partners (see Annex 2) and determine how their activities will contribute to the monitoring and evaluation efforts. Zimbabwean officials presented the PSM indicators to partners before implementation

[3] The indicators were field-tested in nine countries selected by the WHO Regional Office for Africa in collaboration with three inter-country support teams and WHO representatives. The countries were Burkina Faso, Burundi, Cameroon, Côte d'Ivoire, Guinea, Mozambique, Uganda, the United Republic of Tanzania, and Zimbabwe.

to obtain buy-in, and several partners have funded components of the corrective strategies, discussed later in this paper, for issues highlighted during PSM indicator monitoring and evaluation.[4]

2.3 Setting a monitoring plan

The Ministry and LSU designed a national monitoring plan, which included the following components:

1. **Adapting PSM indicators:** Zimbabwe made minor adaptations on two of the 12 core indicators to clarify country-specific language, and added a thirteenth indicator to measure the Mean Accuracy Percent Error (Table 2). Due to the lack of regularly generated data about tuberculosis and malaria medicine supply chains, the PSM indicators were only used to monitor ARVs at this time.
2. **Determining the required sources of data for each indicator:** programme managers determined that data could be obtained at central level primarily by the Consumption-Requisition (CR) forms[5] submitted every other month by each dispensing facility, and additionally from outputs from the Zimbabwe Information System for HIV and AIDS Commodities (ZISHAC), the specific component of the national Logistics Management Information System (LMIS) that manages ARV data. ZISHAC then generates most reports required to monitor the PSM indicators.
3. **Determining the frequency of monitoring each indicator:** depending on the source of data used for the indicator (Table 2).
4. **Establishing the frequency and forum for reviewing the indicators:** Zimbabwe has formalized a national committee of PSM partners and stakeholders, the Procurement and Logistics Subcommittee (PLS), which meets monthly to review the management of national HIV/AIDS and tuberculosis commodities.[6] A standing agenda includes commodity stock status and addressing problems (e.g. funding gaps, imminent stock-outs, short-dated stocks), results of external stock audits to monitor stock accountability at central warehouse and site level, and partner reports on shipments, stocks they are holding, and patient loads. The monitoring plan mandated that the PSM indicators would be presented every quarter for review with the subcommittee.

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[4] This support includes funding from JSI to fund data quality workshops after data quality was highlighted as an issue, and UNDP support for a national tuberculosis push system roll-out, after field testing highlighted that no regular data was being reported for tuberculosis or malaria medicines.

[5] See Annex 3 for the C/R form. The C/R form reports on the following data each period: number of newly initiated patients, number of patients on a particular regimen, opening stock for each product, amount of each product received during period, amount of each product dispensed to patients during period, losses and adjustments (explained in comments section), closing stock (physical count), expired stocks (explained in comments section), days stocked out, and other comments (e.g. in the case medicines consumed for post-exposure prophylaxis).

[6] The PLS is a sub-committee of the Medicines and Medical Supplies Coordination Team (MMSCT), which oversees all essential medicines and medical supplies in the country, and the ART Partnership Forum. The participants in the PLS monthly meetings include the ART, PMTCT, and TB programmes; Ministry laboratory services; the Directorates of Pharmacy Services from headquarters and the ARV logistics subunit; the central warehouse; Medicines Control Authority of Zimbabwe; National AIDS Council; and partners (e.g. Medicins Sans Frontieres Holland/Spain/Belgium, Clinton Health Access Initiative, Centers for Disease Control, UNICEF, and others)

2.4 Site training and logistics preparations

Treatment sites in Zimbabwe were already reporting the data required for monitoring and evaluating the core PSM indicators, and staff had been trained on data collection tools when the reporting system rolled out in 2007. At that time, all ART dispensing sites had at least two staff members trained in the Standard Operating Procedures, and follow-up trainings were instituted for new sites and turnover of trained staff. Therefore, the decision was made that staff did not require additional training.

Due to challenges in timely reporting—very few reporting health facilities are able to submit reports in real-time (e.g. email, fax)—a partner helped the Ministry procure Expedited Mail Service (EMS) pre-paid envelopes to facilitate quicker delivery of reports to central level. The same delivery service is used with other reports required by the AIDS and TB programme. When functioning normally, the service should deliver all parcels within 48 hours[7].

2.5 Data collection and aggregation

Data collection relied on existing records and reporting structures. At site level, data collection tools include: (a) patient registers (e.g. adult first and second line registers, paediatric ARV register, PMTCT register) that are used to record data on newly initiated patients, numbers on a particular regimen, and amount of medicines dispensed to each patient, and (b) stock management tools, including stock cards and receiving registers. All data collection methods are paper-based. Each dispensing site aggregated this data on the Consumption/Requisition (C/R) form and submitted every other month to the LSU. At the LSU it is aggregated into the centralized, computerized ZISHAC system. The PSM indicators enabled further analysis of the data being collected to ensure data quality issues and validate numbers reported.

2.6 Funding

As data collection relied on existing reporting structures, and did not need a survey or training for staff, there was no additional funding required to implement a monitoring system that utilized the PSM indicators.

2.7 Regular review of indicators

The Ministry and partners began regularly reviewing the PSM indicators at the monthly Procurement and Logistics meetings beginning January 2010. In March 2010, the five PSM indicators reported monthly were reviewed at each monthly meeting. These meetings enabled the Ministry and partners to review indicator results, highlight challenges in the management system, problem-solve around these issues, and provide follow-up during facility-level supervision and continued oversight during the PLS meetings.

2.8 Mechanisms for regular feedback

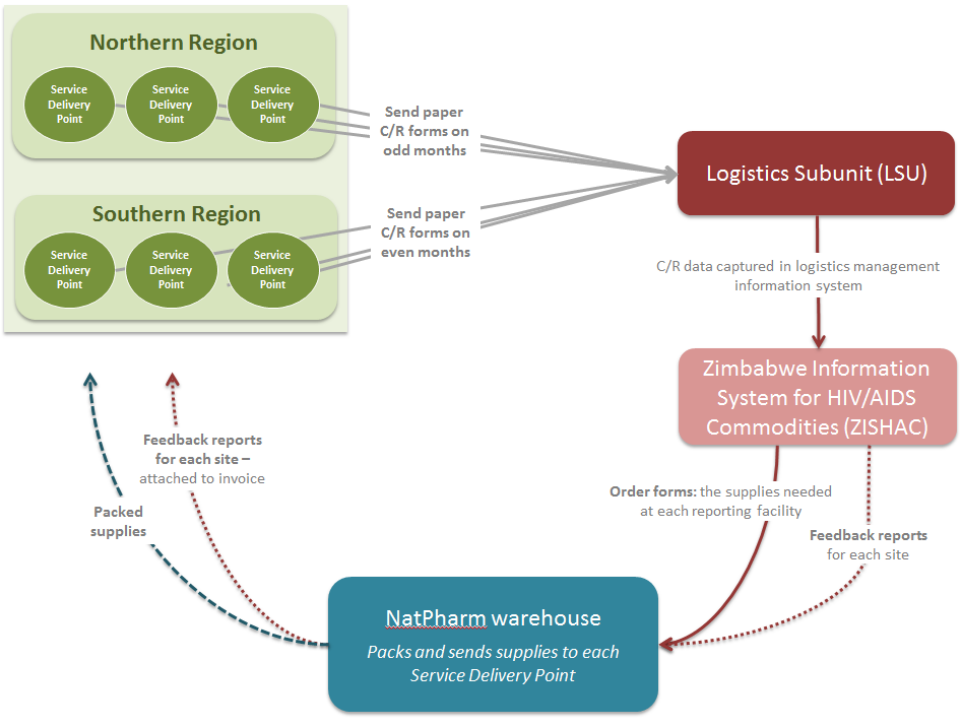
Regular feedback to health services providers and data providers is critical for effective monitoring and evaluation, particularly by clarifying and motivating actors in the importance of data collection, and how analysis can inform facility-level activities. The LSU produces a facility

[7] In a cost analysis, the cost of using EMS is an estimated 18USD per facility, per year.

feedback form from each facility's C/R form submission. The feedback form reports back on: (a) whether or not the report was received on time, (b) the products where the requested quantity had changed, and requests the reasons for the change, and (c) corrective action required by managers[8]. In the course of the PSM pilot, the Ministry has also decided to send regular summary feedback reports to Provincial Pharmacy Managers based on facility data from the catchment area. This report seeks to provide a tool for active management, as dispensing facility staff report directly to these managers.

[8] Central logistics officers were responsible for overseeing corrective action at facility level, but with the creation of feedback reports to Provincial Pharmacy Managers, they will now be responsible to all actions at facilities in their catchment area.

Figure 2. Data management flow for ARVs in Zimbabwe



2.9 Assessing impact

Regular monitoring efforts must be complemented with evaluations that examine outcomes and impact in PSM system performance. At the conclusion of the pilot period, the Ministry reported on the indicators' impact as a tool for early warning to prevent stock-out and overstock, most importantly that no dispensing facilities reported stock-out of any adult standard first line ARVs for 10 months in 2010. Demonstrating impact is critical for recalibrating system performance and monitoring efforts, and sharing successes is an important motivating factor for the numbers of PSM actors engaged in the system.

Table 2: Proposed PSM indicators and monitoring frequency in Zimbabwe pilot

No	Indicator Description	Zimbabwe adaptation of indicator	Monitoring frequency	
			Proposed	*Current*
1	Percentage of ARV, TB, and malaria medicine items received (procured & donated) which are in the national Standard Treatment Guidelines (STGs)		Annual	Annual
2	Percentage of patients on ARV, TB, and malaria treatment regimens that are in line with national Standard Treatment Guidelines		Annual	Annual
3	Percentage of quantities of ARV, TB, and malaria medicines received (procured & donated) and the quantities forecasted for use for the same period		Annual	Annual
4	Percentage of quantities of ARV, TB, and malaria medicines consumed out of total quantities available during a defined period		Annual	Annual
5	Ratio between national median price paid (US$) and the median international prices per ARV treatment, per person per year		Annual	Annual
6	Percentage of orders of ARV, TB, and malaria medicines delivered in full and on time (as stated in the procurement agreement) for each supplier for a defined period	Percentage of ARV, TB, and malaria medicine orders delivered in full and on time (as stated in the supply plan agreed between the LSU and partner)[9]	Annual	Annual
7	Percentage of ARV, TB, and malaria medicine product batches tested that met national and international quality control standards during defined period		Quarterly	Quarterly
8	Percentage of health facilities dispensing ARV, TB, and malaria medicines that received all drug orders in full and on time during a defined period		Quarterly	Monthly[10]
9	Percentage of health facilities that submitted complete ARV, TB, and malaria medicine consumption/requisition (C/R) forms according to an established schedule during a defined period	**9A:** Percentage of health facilities that submitted complete C/R forms for the period. **9B:** Percentage of health facilities that submitted C/R forms on time for the period.	Quarterly	Monthly
10	Proportion between total losses of ARV, TB and malaria medicine items and the total quantities available in a defined period		Quarterly	Monthly
11	Percentages of health facilities that placed orders while an ARV, TB, and malaria medicines' stock on hand was below the minimum stock level during a defined period		Quarterly	Monthly[11]
12	Percentage of health facilities dispensing ARV, TB, and malaria medicines that experienced a stock-out of at least one required		Quarterly	Monthly
NEW		Mean Accuracy Percent Error (MAPE): the absolute difference between the forecasted and actual consumption values, expressed as a percentage of	Semi annually	

[9] The Ministry does not currently enter into contracts with suppliers, but agrees on a shipment plan with NatPharm or partners. It therefore cannot monitor supplier adherence to contractual terms.

[10] Logistics officers are going to be given user rights into Navision so they can view what quantities have been processed for each facility and then compare this with what they approved.

[11] Not yet monitored as planned, as data collection process is being finalised.

the actual values. Target is ≤25%.

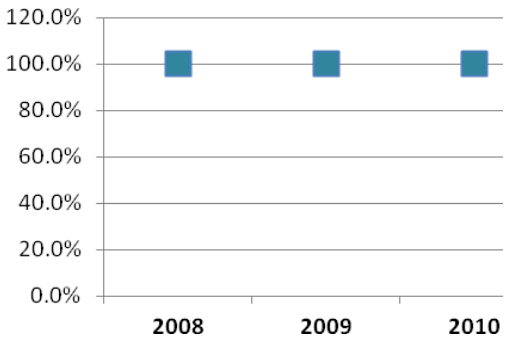
3. Results

Zimbabwe implemented 13 core indicators, and was able to produce data to measure 11 of them for ARV management.

INDICATOR 1
Percentage of ARV, items received (procured & donated) which are in the national Standard Treatment Guidelines

Discussion

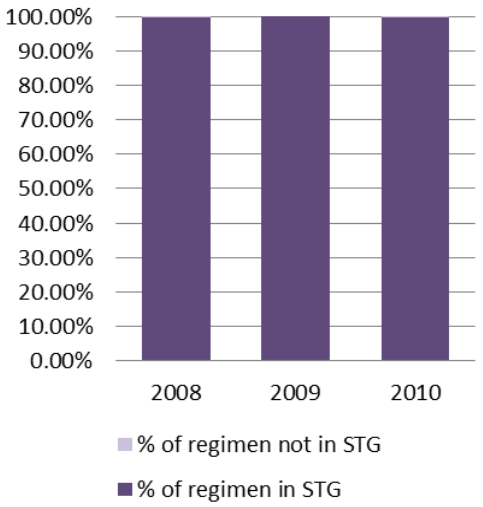
All drugs procured in 2008-2010 were in the STGs. This indicator demonstrates that even multiple partners procure medicines, all are respecting national guidelines.



INDICATOR 2
Percentage of patients on ARV regimens that are in line with national STG

Discussion

Data demonstrates that nearly all patients are on STG recommended ARV regimens, and there have not been significant changes in the course of the pilot. All new patients were put on the recommended treatment regimens.

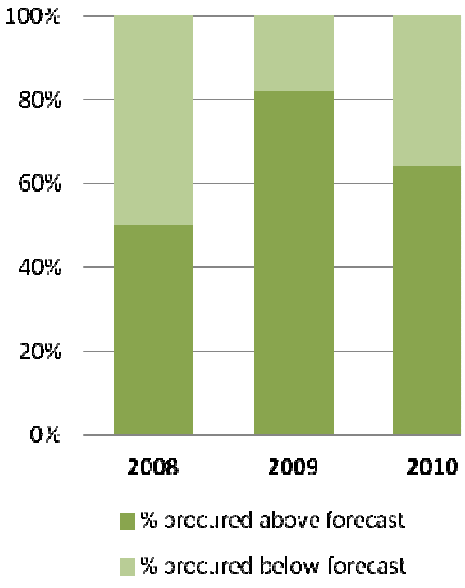


INDICATOR 3
Proportion between quantities received (procured + donated) during a defined period and total quantities forecasted for the same period

Discussion

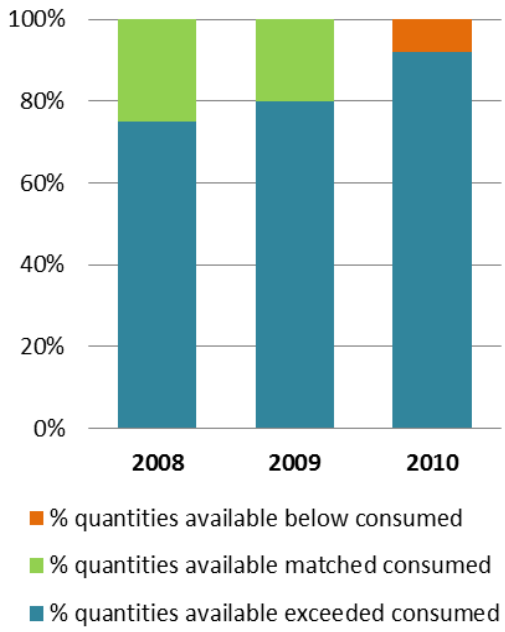
In 2008, most stock on hand was far below the required level, and shipments were planned in order to increase stock. Therefore, the ratio of quantities procured to forecast increased in 2009, and then dropped in 2010. As an example: Efavirenz stock at hand was 3.9 months at the end of 2008, and 7.4 in 2009; similarly Stavudine, Lamivudine, and Nevirapine increased from 5.3 to 7.7 months in the same period.

At times funding also impacted quantities procured; partners might delay a shipment and then bring in multiple shipments planned at different times.



INDICATOR 4

Percentage of quantities consumed out of total quantities available for consumption (opening balance + procured + donated) during a defined period, after deduction of buffer stock.

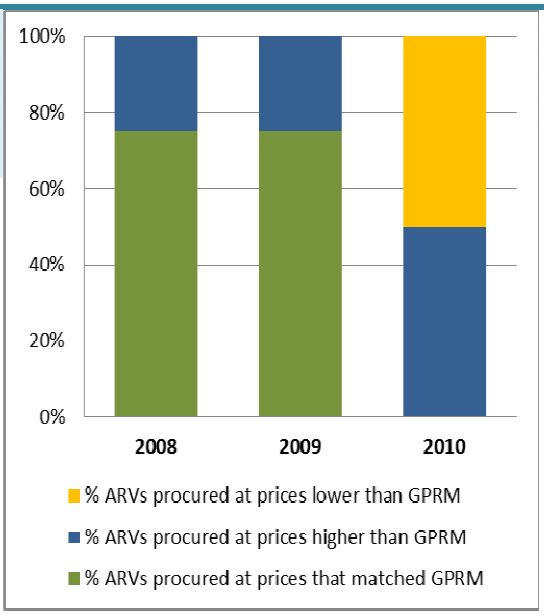


Discussion

There is a significant trend of quantities available exceeding consumption rates, which is due largely to several delayed shipments being delivered at once. The particularly high increase in 2010 of product quantities exceeding those consumed was primarily due to in-country preparations for the 2011 transition to new standard treatment regimens, and the building of stock to ensure treatment roll-out early in the year. The additional stock is closely monitored to minimize expired products.

INDICATOR 5

Ratio between the median price for ARVs procured (US$) last year and the international median reference values, per person per treatment per year.



Discussion

The country has several partners with different procurement procedures and policies; hence, this indicator has not been discussed much as the LSU has no control over prices of procurement. Zimbabwe would like to pursue basket funding, instead of individual partners procuring quantities based on their budgets. The unfavourable prices at which some partners are procuring, as identified in this indicator, is one piece of evidence to be used in justifications for the basket funding approach.

INDICATOR 6 (REVISED IN ZIMBABWE)

Percentage of orders of ATM medicines delivered in full and on time, as stated in the supply plan agreed between LSU and partner

Discussion

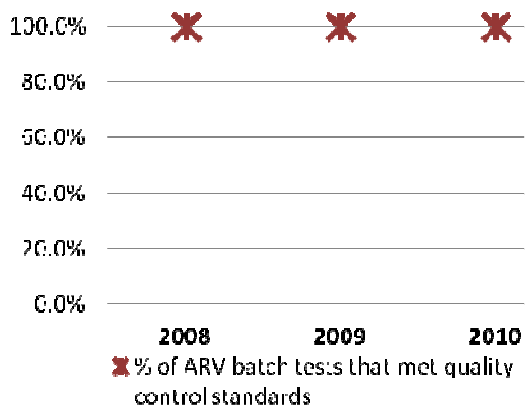
The revised indicator could not be measured, as quantifications updates are done quarterly and a new supply plan is developed each time, which includes new quantities and new delivery dates. This made it difficult to measure compliance by partners to the supply plan. In the future, the agreed supply plan will be a proxy to measuring this indicator, as from the supply plan, partners then enter into contracts with manufacturers.

INDICATOR 7

Percentage of ARV product batches last year that met national and international quality control standards.

Discussion

All medicines tested by the Medicines Control Authority of Zimbabwe during the pilot period conformed to quality standards, indicating that all procured medicines, from all partners, were of the correct quality.



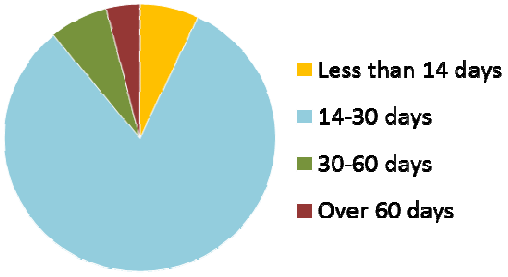
INDICATOR 8

Percentage of treatment sites (ARV) that received drug orders in full and on time during a defined period.

Discussion

This indicator highlights an important gap in data management, as the LSU does not have access to the quantities supplied by the warehouse, and could therefore not calculate the indicator. This will be addressed when logistics officers obtain user rights to the NatPharm warehouse management software and can collect data on the quantities supplied, by verification of complete shipment received.

While Indicator 8 was not reported on, and data on lead times is not readily available, 12 facilities were sampled during site visits to report on lead time.

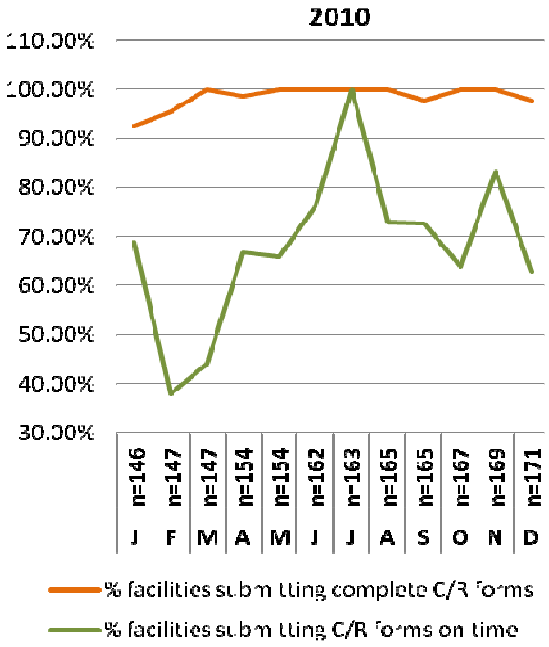


The target lead time is 14 days (maximum 30 days), and 11% of facilities received supplies well beyond the recommended time. This highlights the need for corrective action to avoid stock-out, and access to routine data on lead times.

INDICATOR 9 (REVISED IN ZIMBABWE)

9A: Percentage of health facilities that submitted consumption/requisition forms for the period.

9B: Percentage of health facilities that submitted consumption/requisition forms on time for the period.

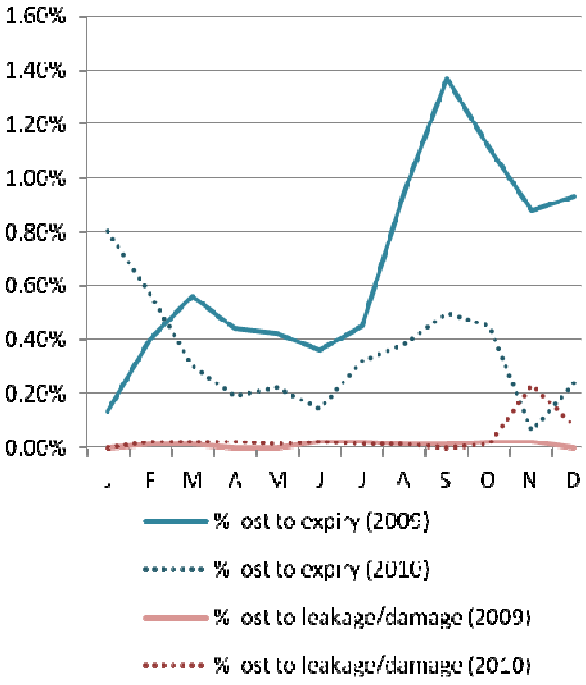


Discussion

This pilot introduced the monitoring of monthly site reporting; as such there is no data from 2008 or 2009. This indicator facilitated active follow-up with non-reporting facilities by logistics officers, helping to maintain satisfactory rates of complete reporting. The indicator also highlighted the poor rates of on-time reporting and identify factors, the primary being the lack of real-time transmission facilities at sites (e.g. email or fax), and courier delays.

INDICATOR 10

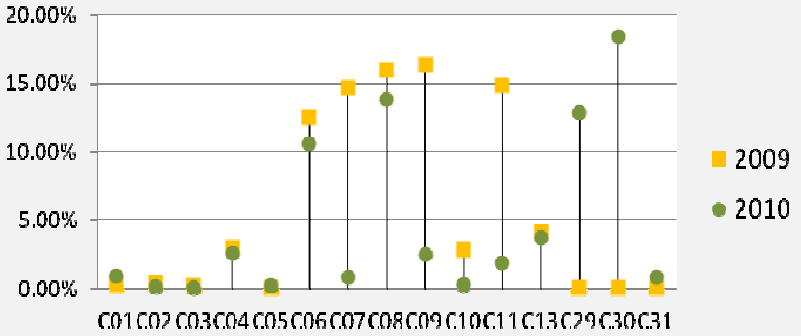
Percentage of losses out of total quantities available



Discussion

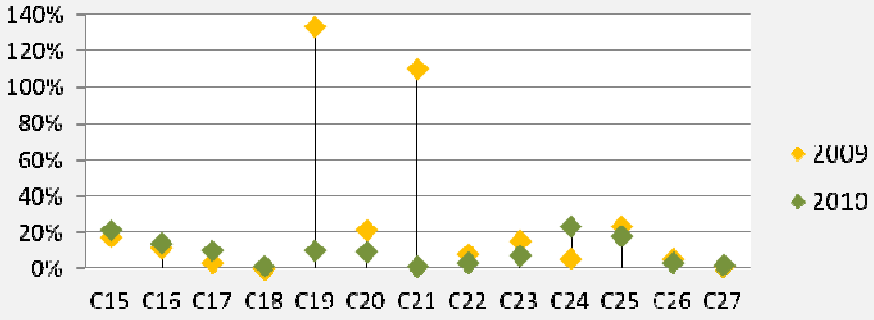
The rate of loss decreased from 2009 to 2010, as monitoring this indicator directed action with those institutions reporting high losses. The indicator also helped managers determine the major sources of loss and devise strategies to address them, including: (a) products discontinuation (e.g. some paediatric ARVs were discontinued after patients transitioned to fixed-dose combinations when made available), and (b) second-line medications where consumption was inconsistent.

Rate of loss: adult first line ARVs in 2009 and 2010



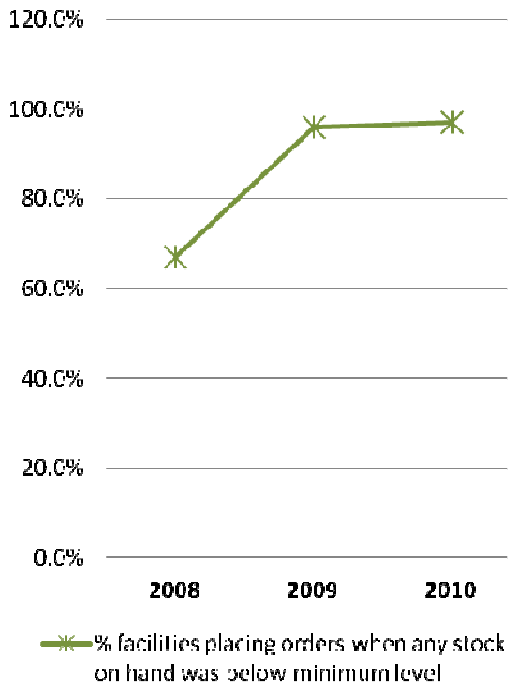
KEY: CO1 D4T/3TC 30/150mg tablets (Bottle of 60), **C02** D4T/3TC/NVP 30/150/200mg tablets (b/o 60), **C03** AZT/3TC/NVP 300/150/200mg tablets(b/o 60), **C04** AZT/3TC 300/150mg tablets (b/o 60), **C05** EFV 600mg tablets (b/o 30), **C06** AZT 300mg tablets (b/o 60), **C07** DDI 250mg capsules (b/o 30), **C08** DDI 400mg capsules (b/o 30), **C09** LPV/r 200/50mg tablets (b/o 120), **C10** TDF/3TC 300/300mg (b/o 30), **C11** ABC 300mg tablets (b/o 60), **C13** NVP 200mg, **C29** AZT/3TC 300/150mg, **C30** AZT/3TC/NVP 300/150/200mg

Rate of loss: paediatric ARVs in 2009 and 2010



KEY: **C15** D4T/3TC 6/30mg, **C16** D4T/3TC 12/60mg, **C17** D4T/3TC/NVP 6/30/50mg, **C18** D4T/3TC/NVP 12/60/100mg, **C19** 3TC SOL, **C20** NVP SOL, **C21** ZDV SOL, **C22** EFV 50mg, **C23** EFV 200mg, **C24** ZDV 100mg, **C25** DDI 25mg, **C26** DDI 50mg, **C27** LPV/R SOL

INDICATOR 11
Percentage of health facilities that placed orders while stock on hand of one or more items was below the minimum stock.



Discussion

First, this indicator enabled managers to highlight that data quality was a serious concern, and workshops were organized in 2010 to address this issue. Managers have also decided to continue comparing reported consumption with patient numbers in order to identify data quality issues and take corrective action at each site. Second, the indicator highlighted that the high rate of consumption—due to dispensing facilities needing to scale up ART coverage in order to meet Global Fund performance targets—may have contributed to high percentage of facilities placing supply orders when stocks were below minimum.

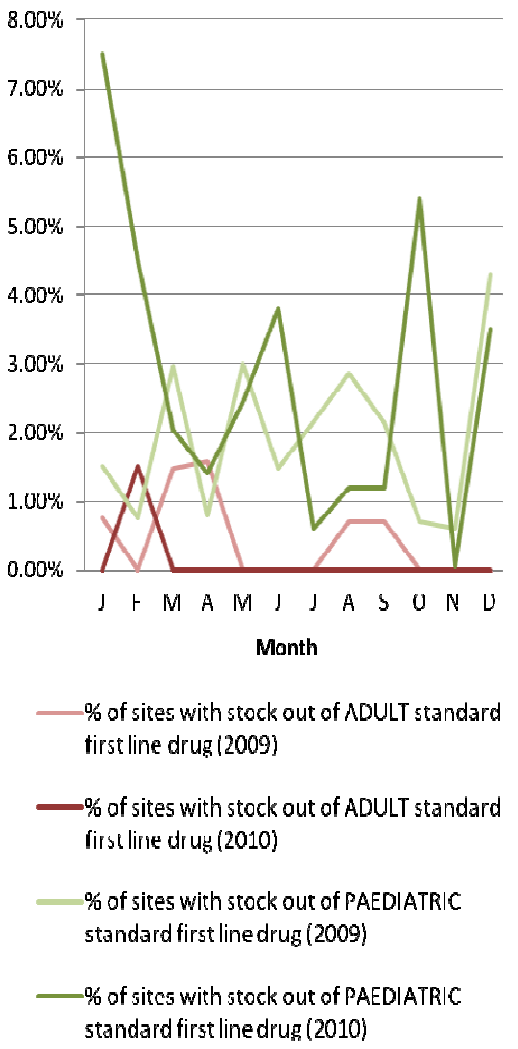
INDICATOR 12

12B: Percentage of treatment sites experiencing a stock out of a particular product during a defined period of time

Discussion

Zimbabwe decided to closely monitor the standard first line ARV regimen (d4T+3TC+NVP), as 90% of adult and paediatric patients were on this regimen and stock-out would have significant implications on the ART programme if patients default and develop resistance. This indicator was monitored with data from the Zimbabwe Information System for HIV and AIDS Commodities.

Adult first-line medications had low levels of stock-out, particularly in 2010. All stock-outs occurred in facilities; the central level never experienced stock-out of these medications. The indicator also enabled managers to target reasons for facility-level stock-outs, which included: (a) data quality issues and incorrect ordering from central level, (b) late submission of reports delaying order processing, and (c) failure to use emergency order procedures, which allows order placement, in between regular report submission, for any items at or below one month supply.



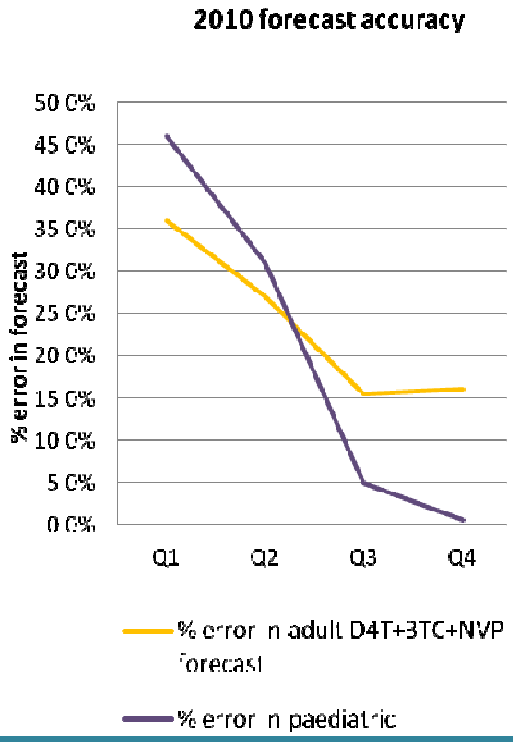
ADDITIONAL INDICATOR IN ZIMBABWE

Mean Accuracy Percent Error (MAPE): the absolute difference between the forecasted and actual consumption values, expressed as a percentage of the actual values.

Discussion

The forecast accuracy determines the percentage of accuracy error between the forecast and actual consumption of a product. The national target ≤25%.

In 2010 the logistics team monitored the ARV products that most adults and children are on, and the MAPE fell over the quarters. This demonstrates two critical outcomes: (a) forecasting is getting increasingly accurate, which should lead to a national situation where stock-outs and overstocks are reduced to a minimum, and (b) efforts to improve data quality during the course of 2010 had an impact, as patient data and scale-up rates inform the assumptions used in



forecasting.

4. Discussion

4.1 Key ARV issues identified by indicators and action taken

PSM indicators helped the Ministry and stakeholders identify a number of challenges requiring correction, and also informed major decisions made in an ARV distribution system review in September 2010. The primary issues identified in the PSM indicator result trends, and the action plans designed, are described below.

- **Due to attrition and rotations, untrained staff members were managing ARVs at some facilities.** Additional, targeted trainings on Standard Operating Procedures were conducted at facilities. Dispensary Assistants were included in the trainings, as they are usually quite stable staff members within the pharmacy department. Facilities with consistently poor reports were targeted for on-the-job training. In most of these cases, it was confirmed that the individual managing the reports had never completed the requisite training. Logistics officers conducted on-the-job training while waiting for the person to be formally trained.[12]

- **Standing issues with data quality were discovered when correlating consumption and stock data.** Workshops were held with all facilities represented to examine the challenges with using the existing data collection tools. The resolutions from these workshops helped inform the 2010 system review process.

- **High-volume sites have difficulty with recording and aggregating data, as highlighted in PSM indicators and data quality workshops.** The Ministry will be piloting computer-based dispensing software for high-volume sites in 2011.

- **Feedback mechanisms are critical for active management and motivation, and were needed at additional levels of management.** In addition to facility-level feedback reports, a summary feedback form will be sent bimonthly to each Provincial Pharmacy Manager to encourage active management of sites facing challenges in ARV management, and those sites performing well can be affirmed and provided motivational packages as possible.

- **Data transmission by ground courier services was too slow, thereby delaying order processing and delivery.** The arranged courier services faced major challenges; the pre-paid envelopes are supposed to reach the LSE within 48 hours, but can take up to two weeks to deliver. While email and fax coverage is still very low, the past two years has seen extensive growth in mobile phone service provider coverage. As such, the Ministry

[12] In an existing support programme, a team of logistics officers visits every dispensing facility once every two months, and can utilize this visit to conduct on-the-job training as identified. If a particular facility is identified for training needs, a visit is added, even if the facility was not on the schedule for that round.

will pilot a system for transferring data to central level by mobile phones; this process will begin with a feasibility assessment in spring 2011.

- **Standard buffer stock levels were set too low to ensure timely ordering.** The majority of facilities placed orders when one or more products was below the established minimum level, highlighting the fact that safety stock levels were not meeting rates of scale-up. Therefore, the buffer stock at all dispensing facilities was increased from one to two months of stock. Facilities will still order once every two months, and target lead times will be 14 to 21 days.

- **The central medical store workload was increasing with ART scale-up, but without commensurate increases in staff levels, which negatively impacted order processing times.** The Ministry decentralized ARV storage and distribution to a second NatPharm branch in Bulawayo[13], which will provide supplies for the southern region of the country, and the Harare store will be responsible for the northern region instead of the entire country. Further plans for this decentralized approach will divide each region into two, so that the number of facilities ordering each month will be lower in order to reduce processing and lead times.

4.2 Addressing challenges of routine data collection for tuberculosis and malaria

A major impact of the PSM indicators was the recognition that data was not being routinely collected about the management of tuberculosis and malaria commodities in Zimbabwe. There was no logistics data reported to central level on the three essential data points[14] because the reporting system was not functioning effectively, and there was an average 30% facility reporting rate. The Ministry piloted and scaled-up an informed push system (see Annex), and quarterly data collected by team leaders of a rolling warehouse will feed into national PSM monitoring efforts.

4.3 Plans to further strengthen PSM indicator monitoring

After piloting the PSM indicators, some indicators' targets were modified to account for practical challenges on the ground, and new targets have been established where Zimbabwe's performance was better than WHO targets (Table 4).

Table 4. Revised PSM indicator targets in Zimbabwe after implementation pilot.

Indicator	WHO target	Zimbabwe target
8: Percentage of health facilities dispensing ARV, TB, and malaria medicines that received all drug orders in full and on time during a defined period	100%	**98%**
9B: Percentage of health facilities that submitted C/R forms on time for the period.	100%	**90%**
10: Proportion between total losses of ARV, TB and malaria medicine items and the total quantities available in a defined period	Less than 2%	**Less than 1%**

Second, additional indicators have been created to monitor and evaluate system operations (Table 5). In addition to revised targets, the country has decided to monitor ARV stock-out rates (Indicator 12) each month, as increasing numbers of patients are being switched to new regimens, and new first line regimens are being introduced in the country.

[13] This was an existing, functional pharmaceutical branch, but had not been exclusively handling ARVs.

[14] These three key data points are: consumption, losses/adjustments, and stock on hand.

Table 5. Additional PSM indicators to be monitored in Zimbabwe.

Indicator	Target	Justification	Measurement
14. The proportion of orders received at NatPharm that are processed on time according to set NatPharm targets.	100%	To isolate bottlenecks in the warehouse for quick corrective action.	Monthly[15]
15. The proportion of ARV initiating and follow-up sites in the last quarter where at least 2 staff members actively managing ARV drugs are trained in ARV standard operation procedures.	100%	To ensure that facilities have adequately trained staff managing ARVs.	Quarterly
16. The proportion of patients treated through outreach sites.[16]	-	To enable the LSU to plan for additional sites that are likely to be upgraded to ART follow-up sites, and would thus start ordering directly from the LSU	Biannual aggregation of data point on C/R form
17. The number of emergency orders submitted by a facility in a given period.	0%	To identify facilities facing challenges with ARV management	Quarterly[17]

[15] Measurement methods will examine the time required for each processing activity by analyzing times between (a) date C/R form is received by Logistics Sub-Unit, (b) date order is sent to warehouse, (c) date order is packed by warehouse, and (d) date order is dispatched to facility.

[16] ART is provided through three different sites: (a) initiating sites, which receive stocks from central level, (b) follow-up sites that manage stable patients, and receive ARVs directly from central level, and (c) outreach sites visited regularly by a team from an initiating site to initiate and follow-up stable patients. These outreach sites do not routinely keep any ARVs and do not receive ARVs from central level.

[17] ZISHAC maintains a log of emergency orders placed.

5. Conclusion: best practices and enabling factors

The Zimbabwean implementation experience provides important lessons for the use of PSM indicators in other countries. The PSM indicators alone will not change system performance, and operational experiences provide valuable information about what factors are behind a successful implementation of the indicators.

Zimbabwe's pilot experience elucidates a number of best practices and enabling factors for implementing a monitoring and evaluation system that utilizes the PSM indicators. These best practices and enabling factors include the following:

Data collection

- Data required for the PSM indicators was already being collected, and the indicators provided a powerful tool for analysis the system gaps. As data was already being collected, a survey was not required, nor was additional training required for staff.
- Zimbabwe phased in PSM indicators during implementation by prioritizing the indicators that can be monitored with minimum resources first, and then adding indicators until all are monitored.
- Exploring technological solutions, like use of mobile phones, for rapid transfer of key data from facilities, and feedback to facilities and managers.
- Continuing situational assessments on capacity needs, including follow-up with poor performing facilities with on-the-job training, regular training structures to combat knowledge loss due to attrition and transfer, and data quality initiatives.

Analysis and action

- The availability of a centralized, computerized logistics management information system enabled for effective and efficient data aggregation for operations and system monitoring.
- Immediately identifying data quality issues early in data collection, and prioritizing targeted corrective action, enabled managers to track the impact of quality assurance efforts.
- Reviewing changes required to indicators (e.g. frequency, data source) during regular evaluation periods enabled real-time adaptation for efficient monitoring.
- Ensuring data continuity between central-level, aggregate data systems (e.g. different software platforms used between Ministries, warehouses, and partners).
- Planning for growth, particularly the data management and processing needs at high-volume sites, warehouses, and other facilities that will particularly experience high burden with rapid treatment scale-up.

Feedback loops

- Defining partners and stakeholders, and engaging all levels of PSM actors in real-time indicator review and action planning. Zimbabwe had existing forums for partner collaboration and review of system performance. Review of PSM indicators with partners provided critical benefits for system performance, and included (a) highlighting issues in national stock status, and when it was required for partners to bring forward stocks in order to avoid rupture, (b) providing an opportunity for partners to advise on shipment status and allow Zimbabwean logistics units to plan accordingly, (c) enabling partners and the Ministry to discuss products likely to expire and organize exchanges to minimize stocks lost.
- Providing tools for active management and motivation among health services providers, data providers, supervisors, and regional managers, particularly visual, easy-to-analyse management software, and feedback reports that can be used in daily decision-making. In Zimbabwe feedback reports are provided to both facilities and provincial managers. The PSM indicators are particularly designed to be used as tools for active management, as 12 concrete indicators that can be visually tracked and analysed, six of which are best used in real-time as early warning indicators to prevent stock-out and overstocking.
- Sharing successes and impact is important for demonstrating why data collection and analysis is necessary, and serves as a motivator for those involved.

The Zimbabwean experience emphasizes that the PSM indicators are operationally feasible and high-yield within a monitoring and evaluation system. Monitoring the PSM indicators enabled the Ministry to identify and address a number of key challenges in ARV supply chain management, which in turned helped achieve ten successive months of no stock-out of standard adult first line ARVs, and a very low stock-out for standard paediatric first line ARVs. The monitoring system has also informed improvements to the management of TB medicines and antimalarials.

This document seeks to elucidate a number of good operational practices and enabling factors highlighted during Zimbabwe's implementation experience in an effort to encourage national PSM managers and stakeholders to utilize harmonized monitoring and evaluation indicators that examine the key components in procurement and supply chain system, and can serve as a high-impact tool for active management.

ANNEX

1. Overview of national procurement and supply management structures

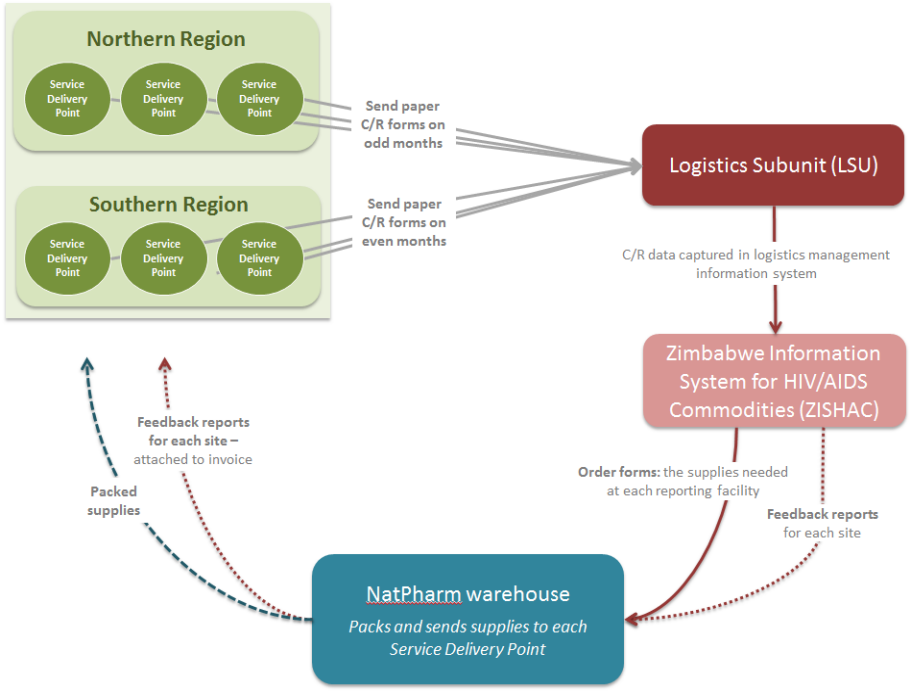
1.1 ARV

The Ministry of Health and Child Welfare (MOHCW) introduced the ART/OI programme in April 2004, and after piloting in five learning sites, the programme was rapidly scaled up to hospitals and selected primary healthcare facilities. The ART programme seeks to expand comprehensive ART services from 7.8% of facilities nationally in 2010, to 15.4% total national facilities by 2015.[3]

In 2006 the Ministry created a Logistics Subunit (LSU) within the AIDS and TB programme to manage medicine distribution in partnership with the National Pharmaceutical Company of Zimbabwe (NatPharm).[18] The unit's primary responsibilities include forecasting[19], supply planning, donor and partner coordination, order initiation, supervision, monitoring and evaluation, facility report review, feedback to facilities, and further training and strategy development to prevent stock outs and overstocking. The LSU had been operating out of a single office, but due to overload, will now decentralize to a second office that concentrates on downstream activities.

The ARV and Fluconazole PSM system is a standalone, forced ordering pull system. The service delivery points in the country have been divided into northern and southern regions, and each region's facilities send their consumption/requisition (C/R) forms every other month to the Logistics Subunit (LSU) (**Figure 1)**.

Figure 1. Ordering and distribution pull system for ARV and Fluconazole in Zimbabwe.



18 The LSU reports to the Directorate of Pharmacy Services since April 2010.

19 The LSU conducts annual quantifications, with quarterly updates, for ARVs, fluconazole, co-trimoxazole for OI prophylaxis, TB medicines, rapid diagnostic testing kits (HIV, malaria, and syphilis), ACTs, quinine formulations, and Sulphadoxine/pyrimethamine.

The system was reviewed in September 2010 and changes made to accommodate the anticipated patient increase due to the 2010 WHO treatment guidelines, including the required increase in facilities to manage ART logistics and the product volume. The review process included field visits to service delivery points, reviewing supervision reports, information gathered during data quality workshops and from facility feedback reports from the C/R form, and a workshop engaging participants from ART sites at all health system levels and stakeholders. The revised system will be implemented nationwide in spring 2011, after the finalization of new standard operation procedures and training curriculum, and the major changes include:

- ARV distribution will be decentralized to a second NatPharm branch, Bulawayo Regional branch, to relieve the Harare branch
- Buffer stock at dispensing facilities will be increased from 1 to 2 months
- C/R forms' data column 'quantity remaining' will be split into into 'quantities available in dispensary' and 'in storeroom', which enables staff conducting supervision visits to cross-check quantities on the stock card at the end of the reporting period with those reported on the C/R form
- Initiating sites will use a separate ART Pharmacy Register for each outreach site
- Stock issued to an outreach from the initiating site will be recorded on a Stock Transfer Voucher; the same voucher will be used when unused stock is returned to the initiating site after outreach has concluded
- A transfer voucher will be used for requesting and supplying drugs between the Pharmacy and the MCH.
- Staff in MCH will use the ART Pharmacy Register to record drugs dispensed and patients.
- Provincial Pharmacy Managers will receive feedback reports that summarize the performance of the facilities in the province.
- The Report Feedback Form and the summary feedback reports will indicate number of emergency orders that have been placed by facility.

ARVs for PMTCT

ARVs for PMTCT are distributed through a Delivery Team Top Up system (DTTU). Team leaders visit the facility quarterly to carry out a physical count, calculate consumption over the last period, adjust for any losses or adjustments, and then top up the facility to six months' supply for each product. The team leaders further consult the PMTCT register to counter check the calculated consumption. This system for distribution was chosen so that there is 100% coverage of sites during each delivery run. All mothers taking ARVs for their own health are recorded as normal ART patients and currently access their medications at ART sites.

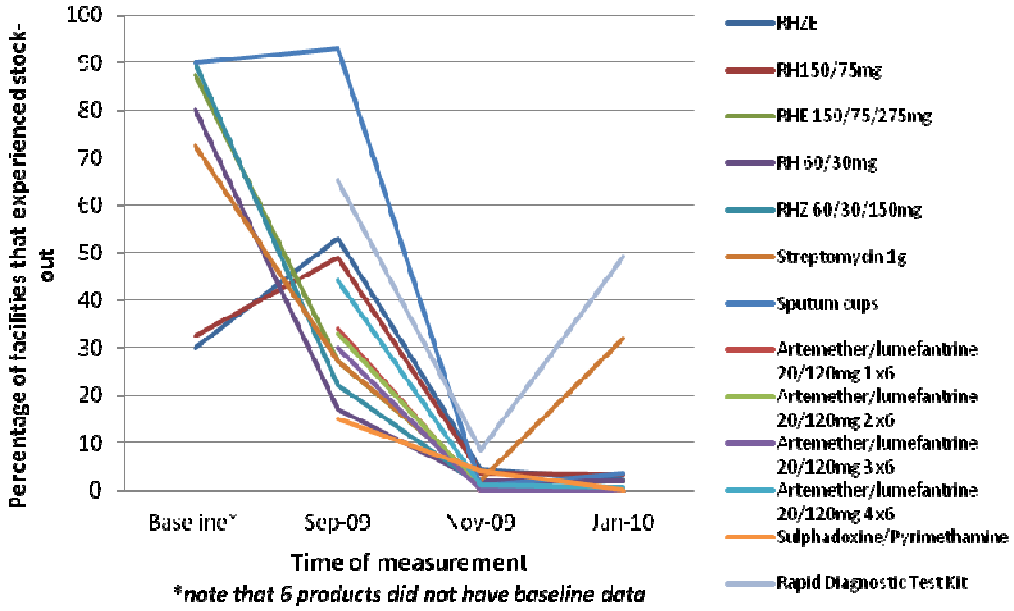
Private sector delivery

The private sector provides ART services to 3.3% of patients in need of ART. Three private hospitals receive commodity support from the Ministry and order routinely from the LSU. Private family practitioners and other private hospitals do not currently receive any product from the public sector. ARV dispending is through retail pharmacies or dispensing physicians. Discussions with the College of Primary Care Physicians of Zimbabwe (CPCPZ) and the Pharmaceutical Society of Zimbabwe (PSZ) to partner government in the provision of ART services under Global Fund supported Round 8 activities are at an advanced stage. All Non-governmental Organisations provide ART services through the already established ART facilities. The Medicines San Frontiere's (MSF) family (Spain, Holland and Belgium) supply full requirements of products or cover any supply gaps at those facilities they are supporting.

1.2 Anti-tuberculosis and malaria medicines

In order to address shortcomings in tuberculosis and malaria medicine reporting, an informed push system for TB and malaria commodities—the Zimbabwe Informed Push (ZIP) system—was piloted in two provinces in 2009 and then rolled out in the country after demonstrating strong results in the first four months of piloting (**Figure 3**).

Figure 3. Percentage of facilities experiencing stock-out of key TB and malaria products during the 2009 ZIP pilot in Midlands province, Zimbabwe



Note: Stock out rates increased when available product expired, or when there was no product to distribute from central level.

In this system, the central level delivers supplies quarterly to the facility with a rolling warehouse, and quantities are calculated on the spot by warehouse team leaders based on consumption data. During site visits, the team leaders conduct the following activities:

- Physically count stocks at the site
- Calculate average monthly consumption
- Assess the stock status for each product and withdraw any excess stocks
- Deliver enough stock to bring the facility to four months' supply
- Note down any stocks expiring within three months, and withdraw any quantities that were likely to expire.
- Record any losses/adjustments
- Conduct on-the-job training at sites on identified matters

The data collected[20] during each visit is used during quantification activities and to guide redistribution of excess stock.

[20] Data collected includes: stock on hand, average monthly consumption, short dated stock (left with 3 months of shelf life), losses and adjustments, stock delivered, closing balance after delivery, and any logistical problems or challenges at facility.

2. Consumption/requisition form from Zimbabwean Ministry of Health and Child Welfare

MOHCW ARV and FLUCONAZOLE CONSUMPTION/REQUISITION FORM

SECTION A: FACILITY IDENTIFIER AND REPORTING PERIOD

REPORTING HEALTH FACILITY:					CODE:	
DISTRICT:					CODE:	
PROVINCE:					CODE:	
REPORTING PERIOD START:	Day:		Month:		Year:	
REPORTING PERIOD END:	Day:		Month:		Year:	

SECTION B: PATIENT DATA

Adult Treatment Regimens			Paediatric Treatment Regimens (Patients on paediatric formulations ONLY)		
TOTAL NUMBER OF NEW ADULTS INITIATED DURING THE REPORTING PERIOD:			TOTAL NUMBER OF NEW PAEDIATRICS INITIATED DURING THE REPORTING PERIOD:		
		No. of patients on this regimen at the end of the reporting period			No. of patients on this regimen at the end of the reporting period
First Line			*First Line*		
B1	Stavudine 30mg + Lamivudine 150mg + Nevirapine 200mg		B10	Stavudine + Lamivudine + Nevirapine	
First Line Alternatives			*First Line Alternatives*		
B2	Stavudine 30mg + Lamivudine 150mg + Efavirenz 600mg		B11	Stavudine + Lamivudine + Efavirenz	
B3	Zidovudine 300mg + Lamivudine 150mg + Nevirapine 200mg		B12	Zidovudine + Lamivudine + Nevirapine	
B4	Zidovudine 300mg + Lamivudine 150mg + Efavirenz 600mg		B13	Zidovudine + Lamivudine + Efavirenz	
Second Line			*Second Line*		
B5	Tenofovir 300mg + Lamivudine 300mg + Lopinovir/ritonavir 200/50mg		B14	Abacavir + Didanosine + Lopinavir/ritonavir	
B6	Abacavir 300mg + Didanosine 250mg + Lopinavir/ritonavir 200/50mg		B15	Zidovudine + Didanosine + Lopinavir/ritonavir	
B7	Abacavir 300mg + Didanosine 400mg + Lopinavir/ritonavir 200/50mg				
B8	Zidovudine 300mg + Didanosine 250mg + Lopinovir/ritonavir 200/50mg				
B9	Zidovudine 300mg + Didanosine 400mg + Lopinovir/ritonavir 200/50mg				

Fluconazole Patients		No. of patients treated during the reporting period
B16	Fluconazole Tablets for Cryptoccocal Meningitis	
B17	Fluconazole Tablets for Oesophageal Candidiasis	
B18	Fluconazole Suspension for Cryptoccocal Meningitis	
B19	Fluconazole Suspension for Oesophageal Candidiasis	
B20	Fluconazole Injection for Cryptoccocal Meningitis	
B21	Fluconazole Injection for Oesophageal Candidiasis	

SECTION C: Consumption/Requisition

		A Remaining qty from last report period	B Qty received during reporting period	C Qty dispensed during reporting period	D Losses and Adjustments			E Qty remaining *(Physical count)*	F Qty requested (Cx2)-E	G Qty approved
					Damaged/ lost	Expired	Transferred In(+)/Out(-)			*(For official use)*
Adult ARV Drugs *(Report by bottle)*										
C1	Stavudine/Lamivudine 30/150mg tablets (Bottle of 60)									
C2	Stavudine/Lamivudine/Nevirapine 30/150/200mg tablets (Bottle of 60)									
C3	Zidovudine/Lamivudine/Nevirapine 300/150/200mg tablets (Bottle of 60)									
C4	Zidovudine/Lamivudine 300/150mg tablets (Bottle of 60)									
C5	Efavirenz 600mg tablets (Bottle of 30)									
C6	Zidovudine 300mg tablets (Bottle of 60)									
C7	Didanosine 250mg capsules (Bottle of 30)									
C8	Didanosine 400mg capsules (Bottle of 30)									
C9	Lopinavir/ritonavir 200/50mg tablets (Bottle of 120)									
C10	Tenofovir/Lamivudine 300/300mg (Bottle of 30)									
C11	Abacavir 300mg tablets (Bottle of 60)									
C12										
C13										
C14										
Paediatric ARV Drugs *(Report by bottle)*										
C15	Stavudine/Lamivudine 6/30mg tablets (Bottle of 60)									
C16	Stavudine/Lamivudine 12/60mg tablets (Bottle of 60)									
C17	Stavudine/Lamivudine/Nevirapine 6/30/50mg tablets (Bottle of 60)									
C18	Stavudine/Lamivudine/Nevirapine 12/60/100mg tablets (Bottle of 60)									
C19	Lamivudine solution 50mg/5ml (100ml Bottle)									
C20	Nevirapine solution 50mg/5ml (100ml Bottle)									
C21	Zidovudine solution 50mg/5ml (100ml Bottle)									
C22	Efavirenz 50mg capsules (Bottle of 30)									
C23	Efavirenz 200mg capsules (Bottle of 30)									
C24	Zidovudine 100mg tablets (Bottle of 100)									
C25	Didanosine 25mg tablets (Bottle of 60)									
C26	Didanosine 50mg tablets (Bottle of 60)									
C27	Lopinavir/ritonavir solution 20/80 mg/ml (300ml Bottle)									
C28	Abacavir solution 20mg/ml (240ml Bottle)									
C29										
C30										
C31										
Fluconazole *(Report by bottle)*										
C32	Fluconazole 200mg tablets (Bottle of 28)									
C33	Fluconazole 50mg/5ml suspension (100ml Bottle)									
C34	Fluconazole 2mg/ml Injection (Vial)									
C35										
C36										

SECTION D: STOCK OUTS

Line Code	Description	Duration (Days)

SECTION E: COMMENTS

SECTION F: SIGNATURES

Compiled by:	Name & Title:	Date:
	Signature:	
Approved by:	Name and Title of Supervisor/ Head of Institution:	Date:
	Signature:	

Facility Stamp:

Received at Provincial office by ……**Date**……/……/……

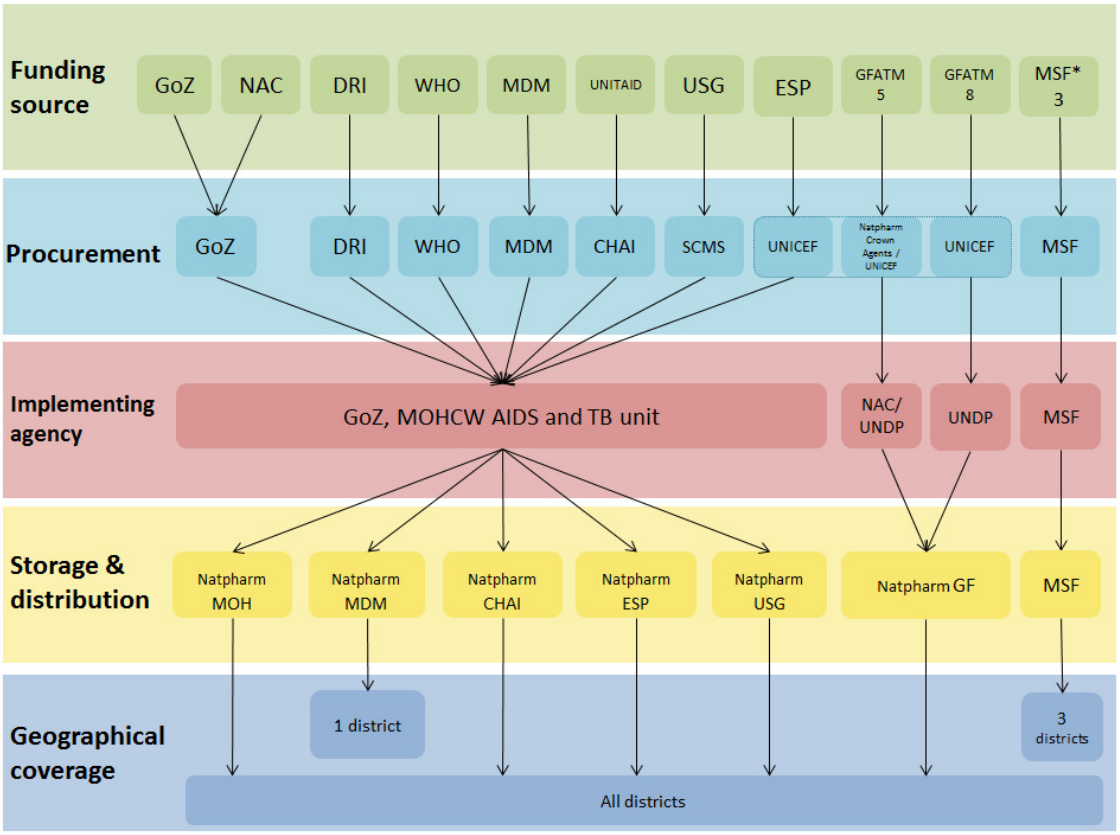
Received at Logistics Sub-Unit by……**Date**……/……/……

Approved at Logistics Sub-Unit by ……**Date**……/……/……

Sent to NatPharm by……**Date**……/……/……

3. ARV supply pipeline

FIGURE 4. ARV drug supply chain in Zimbabwe 2011.



CHAI	Clinton Health Access Initiative
DRI	Direct Relief International
ESP	Expanded Support Programme
GFATM	Global Fund for AIDS, TB and Malaria
GLC	Green Light Committee
GOZ	Government of Zimbabwe
MDM	Medicine du Monde
MOHCW	Ministry of Health and Child Welfare of Zimbabwe
MSF	Medicines San Frontieres
NAC	National AIDS Council
NatPharm	National Pharmaceutical Company of Zimbabwe
PSZ	Pharmaceutical Society of Zimbabwe
SCMS	Supply Chain Management Systems
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
USG	United States Government
WHO	World Health Organisation

References:

1. **Harmonized monitoring and evaluation indicators for procurement and supply management systems - Early warning indicators to prevent stock-outs and overstocking of antiretroviral, antituberculosis and antimalarial medicines, WHO, 2011 .**

2. **National Logistic Management Information System Tools e.g. Consumption and Requisition Form from Zimbabwean Ministry of Health and Child Welfare**