



# USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM

## TECHNICAL ASSISTANCE, NATIONAL SUPPLY CHAIN ASSESSMENT TASK ORDER

### Key Performance Indicators

NSCA 2.0



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## KEY PERFORMANCE INDICATOR LISTING AND DATA DICTIONARY

The following key performance indicators (KPIs) are designed to provide a comprehensive picture of supply chain performance.

The KPIs herein are divided into Core KPIs, recommended for all NSCAs, and Optional KPIs that may be appropriate for the assessment of more developed systems, or to provide more detailed analysis of specific performance areas. Countries may wish to redefine the KPIs to meet their own custom and practice, but to support cross-country comparison each NSCA must calculate all Core KPIs as defined herein. Optional KPIs may be adapted to country custom and practice, if desired. For example; if temperature control is a concern, or if vaccines are included in the tracer commodities used in an NSCA it is recommended that Optional KPI 3.7 is used. In a high capability maturity (advanced or state of the art), or in a fast-moving supply chain Optional KPIs 1.3, 3.8 and 3.10 should also be considered for inclusion in the NSCA.

In addition to supporting the NSCA process by assessing performance at the time of the assessment as a counterpoint to the capability measured in the CMM modules, these KPIs can be used as essential management tools for ongoing strategic and tactical management by in-country supply chain managers.

Not all KPIs need constant management, for example the forecast accuracy measure is normally only conducted annually, but vendor on time and in full performance should be managed monthly. Management teams will want to make their own judgments on the frequency of review of KPIs, but it is recommended that the following KPIs be kept under regular review to identify adverse trends and support prompt corrective measures:

- 2.1 – Vendor on-time and in full delivery rate
- 3.1 – Stocked according to plan
- 3.2 – Stock out rate by tracer commodity by level of the system
- 3.4 – Order fill rate
- 4.1 – On time delivery to facility
- 4.2 – Percentage of orders placed by health facilities as emergency orders
- 6.1 – Facility reporting rates on time

The remaining indicators may be reviewed quarterly, semi-annually or annually as appropriate and as resources and data availability allow.

NSCA 2.0 is not primarily a financial assessment; but use of operational funds, and total costs of operations may be an appropriate measure of effectiveness. If operational cost data is readily available, or the cost of operation is a focus or objective in conducting a NSCA, the optional KPIs #3.6 and 4.3 may be appropriate to use.

Stakeholders requiring more indicators, including process-specific indicators, may reference any of the following publications that detail health supply chain KPIs:

World Health Organization (WHO)

*Harmonized Monitoring & Evaluation Indicators for Procurement and Supply Management*

[http://www.who.int/hiv/pub/amds/monitoring\\_evaluation/en/](http://www.who.int/hiv/pub/amds/monitoring_evaluation/en/)

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*Measuring Supply Chain Performance: Guide to Key Performance Indicators for Public Health Managers*

<http://www.jsi.com/JSIInternet/Resources/publication/display.cfm?txtGeoArea=INTL&id=11153&thisSection=Resources>

UN Commission

*Recommended Indicators to Address In-Country Supply*

*Chain Barriers; Developed for the UN Commission on Life-Saving Commodities for Women and Children, Supply and Awareness Technical Reference*

Team

[http://jsi.com/JSIInternet/Inc/Common/download\\_pub.cfm?id=14834&lid=3](http://jsi.com/JSIInternet/Inc/Common/download_pub.cfm?id=14834&lid=3)

Stakeholders which are establishing a culture of monitoring may refer to the link below for basic metrics which are recognized by the Interagency Supply Chain Group, composed of global supply chain donors (WHO, UNICEF, USAID, Gates, Global Fund, GAVI, etc.).

*Interagency Supply Chain Group – Harmonization of Key Performance Indicators*

<http://www.lifesavingcommodities.org/wp-content/uploads/2016/04/KPI-brochurefinal-Jan2016.pdf>

## NATIONAL SUPPLY CHAIN ASSESSMENT 2.0 - KEY PERFORMANCE INDICATORS

TABLE I. CORE KPIS				
CATEGORY	LEVEL *	NUMBER	TITLE	PURPOSE
Forecasting	C	1.1	Forecast accuracy	Compares actual demand to that forecast, to assess quality of forecasting
	C	1.2	Source of funds	Sustainability measure that indicates source of funding, e.g. international donors, domestic government funding, user fees
Procurement	C (W)	2.1	Vendor on-time and in full delivery rate	Enables procurement team to assess vendor adherence to contractual delivery requirements, to identify risks of delay, and to require vendor performance improvement
	C (W)	2.2	Percent of international reference price paid	Assesses value for money in procurement by comparing prices achieved to international norms.
Warehousing and inventory management	W, H, SDP	3.1	Stocked according to plan	This is a positive measure of stocking that asks the question: is the system stocked as per the system design?
	W, H, SDP	3.2	Stockout rate by tracer commodity by level in the system	Measures extent of stockouts per tracer commodity throughout the system.
	W, H, SDP	3.3	Stock accuracy	Compares actual stock count to stock record
	W, H, SDP	3.4	Order fill rate	Assesses how well warehouse is meeting order demand from hospitals and SDPs, including frequency that distribution orders from health facilities are amended
	W, H, SDP	3.5	Wastage from damage, theft and expiry	A measure of operational efficiency and value for money
Distribution	W, H, SDP	4.1	On-time delivery to facility	Assesses reliability of delivery, delays will impact availability and service to patients at health facilities
	W, H, SDP	4.2	Percentage of orders placed by health facilities as emergency orders	Measures the efficiency of the internal ordering and supply process, and how often emergency orders are placed
Human Resources	C (W, H, SDP)	5.1	Staff turnover rate	Measures the rate of supply chain staff turnover, increased levels are a risk to operational effectiveness
Data and information	C	6.1	Facility reporting rates on-time	Timely submission of data to the central level is essential to supply chain operational efficiency. This measure will show areas having difficulty with data management.

\* Level at which to implement. C – Central. W – Warehouse. H – Hospital. SDP – Service Delivery Point. Parentheses refer to levels where this may be appropriate to implement in some countries, either because this data is not available at the higher level or because this level also performs these activities.

**TABLE 2. OPTIONAL KPIS**

CATEGORY	LEVEL	NUMBER	TITLE	PURPOSE
Forecasting	C (W)	1.3	Supply plan accuracy	Compares actual orders to supply plan to assess accuracy of the plan
	C (W)	2.3	Percentage of orders placed as emergency orders	Measures the efficiency of the procurement and forecasting processes, to show how often emergency orders are required.
	C (W)	2.4	Supplier fill rate	A complementary measure to KPI 2.1 to assess degree of supply shortfall
Procurement	C (W)	2.5	Procurement methods employed	Complement to KPI 2.3: a more comprehensive measure of the efficiency of the procurement process.
	C	2.6	Percentage of health products procured listed on the National Essential Medicines List or similar document for other health products	Shows adherence to policy, and identifies purchases of non-optimal products
	C	2.7	Customs clearance time	Measures days taken for international orders to clear customs and if this is causing delays in the system.
Warehousing and inventory management	W	3.6	Stock turn per annum	Standard measure of warehouse efficiency is product moving through the system to the client quickly.
	W, H, SDP	3.7	Number and duration of temperature excursions in cold storage facility	Assesses operational efficiency and quality risk to products that must be kept within a temperature range
	W, H, SDP	3.8	Stockout rates of one or more tracer products by facility	Measures extent of stock outs throughout the supply chain, and potential patient impact
	W (H, SDP)	3.9	Cost of warehousing operation	Measures value for money in warehousing
	W	3.10	Order turnaround time	Measures how many days/hours taken for orders to be filled and dispatched by the warehouse. Delays or excessive time will impact availability at health facilities
	W	3.11	Percentage of incoming batches tested for quality	Assesses the frequency and regularity of quality assurance for products delivered
	W	3.12	Percentage of product batches tested that meet quality standards	Assesses quality of supplies received and reliability of supplier performance
Distribution	W	4.3	Cost of distribution operation	Measures value for money in managing the distribution of product within the system
Human Resources	C (W, H, SDP)	5.2	Percent of supply chain positions vacant	Indicates the areas impacted by supply chain vacancies which will affect performance
Data and Information	C	6.2	Facility reporting rates – complete reports	Complement to 6.1. Complete data is essential to supply chain operational efficiency. This measure will show areas having difficulty with data management.



# CORE INDICATORS

## FORECASTING INDICATORS

I.1 FORECAST ACCURACY	
Definition	This indicator measures how accurate forecasts of demand are compared with the actual consumption (or issues) of the product by patients.
Formula	$(1 - ((\text{forecasted consumption} - \text{actual consumption}) / (\text{Actual consumption}))) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Forecasts (for each product group being considered)</li> <li>• Consumption/issues data of products that are forecasted</li> <li>• Identifying data: product type</li> </ul>
Data sources	<p>Forecasts</p> <ul style="list-style-type: none"> <li>• Unit responsible for forecasts</li> <li>• Programs supported by donors</li> </ul> <p>Consumption/issues</p> <ul style="list-style-type: none"> <li>• Logistics management information system (LMIS) reports (issues), health management information system (HMIS) reports (consumption)</li> <li>• Issues data from warehouses warehouse management system (WMS)/inventory management tools</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• This indicator requires 12 months of data to be calculated.</li> <li>• Assessment teams may need to adjust the list of tracer commodities used for this KPI based on available consumption data. The focus should be on available data for each product group and may be shaped by the LMIS.</li> <li>• Consumption or issues data should be extracted from the supply chain level closest to the patient where data is available.</li> <li>• Make sure to calculate the numerator as an absolute value.</li> <li>• This indicator should be calculated on a product-by-product basis. Averaging across different product groups is not recommended. To report overall performance, it is recommended to show the range of variance (e.g. -5% to +15%) for the commodities assessed, and draw attention to outliers.</li> </ul>
Reference performance level	Target deviations for demand forecasts are context dependent, and highly dependent on the quality, timeliness and accuracy of data used in the forecast. It is recommended that Ministries should aim for a deviation of +/- 25% of the volume forecast.
Related indicators	I.3 Supply plan accuracy
Level at which to implement	Central level

## 1.2 SOURCES OF FUNDS

Definition	This indicator measures where the funding for commodities originates, and is a measure of system sustainability.
Formula	$((\text{Value of each source of funds}) / (\text{Total value of commodities})) \times 100$
Required data	<ul style="list-style-type: none"> <li>Aggregate commodity forecasts showing sources of funds</li> <li>Commodity budgets</li> </ul>
Data sources	<p>Forecasts</p> <ul style="list-style-type: none"> <li>Unit responsible for forecasts</li> <li>Programs supported by donors</li> </ul> <p>Budgets</p> <ul style="list-style-type: none"> <li>Ministry of Health</li> <li>Ministry of Finance/Treasury</li> <li>Donors</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>This indicator is calculated at a country level.</li> <li>This indicator should be calculated based on annual data.</li> <li>Report for each major source of funds; minor sources of funds (for example, less than 5% of total value) may be combined. The extent of the Government as a source of funds must always be shown and not combined with other sources, even if it is below 5%.</li> </ul>
Reference performance level	There is no absolute target for this measure as the result is dependent on historical donor support, and government budgeting. Over time the percentage of donor support should decline relative to government funding and other sources.
Related indicators	<p>1.1 Forecast accuracy</p> <p>3.8 &amp; 4.3 Cost of warehouse and distribution operations</p>
Level at which to implement	Central level.

## PROCUREMENT INDICATORS

2.1 VENDOR ON-TIME AND IN FULL DELIVERY RATE	
Definition	This indicator measures the percentage of orders that vendors delivered within the agreed-upon delivery window, and in full.
Formula	$\left( \frac{\text{Number of orders delivered according to the contract agreement with supplier(s)}}{\text{Total number of orders delivered in the period}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Promised delivery dates</li> <li>• Actual delivery dates</li> <li>• Quantity of products ordered</li> <li>• Quantity of products delivered</li> </ul>
Data sources	<p>Promised delivery date and quantity</p> <ul style="list-style-type: none"> <li>• Historical data: purchase orders, vendor contracts, other order documentation</li> <li>• Secondary data: procurement unit tracking records (paper, Excel or automated)</li> </ul> <p>Actual delivery date and quantity</p> <ul style="list-style-type: none"> <li>• Historical data: delivery notes</li> <li>• Secondary data: procurement unit tracking records (paper, Excel or automated)</li> </ul> <p>Identifying information helpful for further analyses: product type, order month</p>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• The denominator is the number of orders delivered in the period.</li> <li>• If using procurement unit tracking records, data collection teams should validate the quality of the data provided by spot-checking the dates listed on the tracking sheet and the primary records where the data can be found.</li> <li>• Data collectors should include product type and order time period for each order to facilitate analysis, comparing performance by product type or at each time period (usually months).</li> <li>• The concept of on-time <u>and</u> in full, is relatively new to country systems, and may present data collection challenges, but is an important concept for well-performing systems. In full meaning that the total quantity ordered was received on or before the contractual delivery date.</li> <li>• Analysis may require an agreed-to delivery window, many purchasers allow a margin beyond the stated delivery date, before a delivery is consider late, e.g., within five days of agreed-to date.</li> <li>• If data is limited, recommend measuring “in full” for tracer commodities only, unless there is an advanced WMS/ERP that captures data for all deliveries.</li> <li>• To report average, total together the results from application of the formula, and divide that total by the number of calculations made.</li> </ul>
Reference performance level	<p>&gt;85% International suppliers</p> <p>&gt;90% Local suppliers</p> <p>These rates accord with commercial sector expectations in developing countries and are in line with Global Fund targets</p>
Related indicators	2.4 Supplier fill rate
Level at which to implement	<p>Central-level procurement entity</p> <p>Intermediate-level warehouses conducting procurement (i.e., tendering, purchase orders directly with non-CMS suppliers)</p>

## 2.2 PERCENTAGE OF INTERNATIONAL REFERENCE PRICE PAID

Definition	This indicator measures the percentage of the international reference prices paid for each product line procured
Formula	$\left( \frac{\text{Average price paid for a product}}{\text{International reference price of the same product}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>Unit price paid for procurement of Stringent Regulatory Authorities (SRA) (e.g. US FDA, European Pharmacopoeia etc.), WHO pre-qualified products, or similar internationally recognized standards</li> <li>International reference prices (Global Price Reporting Mechanism for Antiretrovirals and Management Sciences for Health (MSH) International Drug Price Indicator Guide for all other commodities)</li> </ul>
Data sources	<p>Price paid for procurements</p> <ul style="list-style-type: none"> <li>Historical data: purchase orders, vendor contracts</li> <li>Secondary data: procurement unit tracking records (paper, Excel or automated), units versus pack sizes, sampling methodology</li> </ul> <p>International reference price paid</p> <ul style="list-style-type: none"> <li>MSH International Drug Price Indicator Guide</li> <li>WHO Global Price Reporting Mechanism</li> </ul> <p>Identifying information: product type, order month</p>
Collection and analysis tips	<ul style="list-style-type: none"> <li>The assessment team should adjust the list of tracer commodities used for this KPI based on available data. Assessment teams should include the core tracer commodities used throughout the assessment, but should collect data on up to 30 commodities in total; the additional commodities should be selected at random from the list of commodities procured in the year prior to the assessment.</li> <li>If using procurement unit tracking records, data collection teams should validate the quality of the data provided by spot-checking the dates listed in the tracking sheet and the primary records where the data can be found.</li> <li>Assessment teams may find that the way products are described in records of orders and the reference guides differs.</li> <li>Make sure to capture the data in units, or if the data is presented in packs, then also collect information on the pack size. Liquid presentations will need to be compared to the reference price by single milliliter.</li> <li>It is important to be certain that one is comparing like-for-like. Lower cost options may not be of equivalent quality, thus the reference to SRA approved or WHO pre-qualified products.</li> <li>For this indicator, only prices for procurements conducted by national or sub-national authorities, or their contractors (if procurement is outsourced) should be included. Procurements for commodities donated to the Government by donors or UN agencies should not be included.</li> <li>It is not recommended to strike an average across the commodities assessed as this can be misleading as to overall performance. To report overall price performance, it is recommended to show the range of variance (e.g. -5% to +15% of reference prices) from international reference prices for the commodities assessed and draw attention to outliers.</li> </ul>
Reference performance level	WHO recommends that prices should be at or below international norms, however, this may not always be achievable due to volumes purchased and short-term supply market constraints. Suggested level is no more than 105% of international reference price.
Related indicators	N/A
Level at which to implement	Central-level procurement entity. Intermediate-level warehouses conducting procurement (i.e., tendering, purchase orders directly with non-CMS suppliers)

## WAREHOUSING AND INVENTORY INDICATORS

### 3.1 STOCKED ACCORDING TO PLAN

Definition	This indicator measures the percentage of tracer commodities between the established minimum and maximum stock levels at each assessed facility.
Formula	$((\text{Number of tracer commodity observations with months of stock between established minimum and maximum stock levels}) / (\text{Total number of tracer commodity observations})) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Months of Stock on hand at a point in time for each month of the reporting period</li> <li>• Established minimum/maximum levels for each facility type visited</li> <li>• Identifying information: product type, geographic area, facility type, facility name</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• <i>Months of Stock on hand</i>: day of visit: physical stock count, historical: stock cards</li> <li>• <i>Minimum/maximum levels</i>: Ministry of Health</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• Stock-on-hand data will be the total units of stock at the point in time determined by the assessment team. Assessment teams should ensure that teams are collecting stock-on-hand data at the same point each month, often the beginning or end of each month.</li> <li>• Months of stock (MOS) will be calculated using stock on hand and consumption. MOS should be the value considered when determining whether a facility is between the minimum and maximum levels. Data collection forms should automatically calculate this data point.</li> <li>• Results should be shown at facility level (e.g. referral hospitals). It is not recommended to strike an average across the system by averaging the results by level. The range of deviation may be reported, this approach will avoid distortion due to different volumes. For further analysis, stocked according to plan should be calculated by tracer commodity for each level of the health system.</li> </ul>
Reference performance level	WHO recommended target is that 100% of stocks should be within the max/min tolerance. This would be exceptional performance, in practice 90% or above would be a good performance.
Related indicators	3.2 Stockout rate by tracer commodity by level in the system, 3.3 Stock accuracy, and 2.1 Vendor on time and in full delivery rates
Level at which to implement	All warehouses and health facilities that are part of the site-visit sample

### 3.2 STOCKOUT RATES BY TRACER COMMODITY BY LEVEL IN THE SYSTEM

Definition	This indicator measures the percentage of tracer commodity observations with a stockout during the reporting period and on the day of visit.
Formula	$\frac{((\text{Number of tracer commodity stock observations experiencing a stockout on the day of visit}) / (\text{Total number of tracer commodity stock observations})) \times 100}{((\text{Number of days of tracer commodity stock observations experiencing a stockout during the reporting period}) / (\text{Total number of days of tracer commodity stock observations during the reporting period})) \times 100}$
Required data	<ul style="list-style-type: none"> <li>• Stockout occurrence (yes/no)</li> <li>• Number of days for a stockout (for calculating sub-indicator)</li> <li>• Stock status on day of visit</li> <li>• Identifying information: product type, geographic area, facility type, facility name</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• <i>Day of visit:</i> physical inspection/stock count</li> <li>• <i>Historical:</i> stock cards/inventory management system</li> <li>• <i>Secondary data:</i> LMIS reports</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• For this KPI, calculate and report the stockout rate BOTH on the day of visit and during the reporting period. Data on stockouts on the day of visit are likely available from most, if not all, sites visited, whereas stockout data across a longer period provides a more complete picture of the frequency of stockouts.</li> <li>• Historical data should be taken from stock cards. Assessment teams should look at all stock cards for each tracer commodity for the time period in question. Most tracer commodities will have their own stock card and, depending on the reporting period, multiple stock cards may encompass the whole timeframe. Stockouts will be indicated by zero quantity on the stock cards.</li> <li>• The reporting period should be 6 months, but may need to be reduced depending on data availability.</li> <li>• Number of days of stockout may be measured as a “sub-indicator” by counting the number of days when stock quantity was zero at the end of the business day as recorded on the stock card. This requires collecting additional data on the number of days for each stockout.</li> <li>• If the scope of the assessment is such that facility visits are not undertaken, exceptionally stockout data can come from a secondary data source. Assessment teams can use LMIS reports if they capture stockouts. Data quality of this secondary source should be considered if assessment teams use this option.</li> <li>• Calculate indicators for each tracer commodity for each facility, then average across facilities. Then, average across tracer commodities.</li> </ul>
Reference performance level	Obviously, the ideal is no stock outs, but in line with the expectation that 90% of stocks should be within the max/min tolerances, the reference performance level for this measure is <5%, on the assumption that being outside the max/min tolerance will not mean a stock out in every case.
Related indicators	3.8 Stockout rates of one or more tracer products by facility
Level at which to implement	All warehouses and health facilities that are part of the site-visit sample

### 3.3 STOCK ACCURACY

Definition	This indicator compares the stock quantity on a stock card and/or in an inventory management software with the quantity of a physical inventory conducted during a site visit.
Formula	$\left( \frac{\text{Total quantity of product on stock card or inventory management software}}{\text{Total quantity of the same product from physical inventory conducted during a site visit}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Stock card quantity (or LMIS quantity)</li> <li>• Quantity counted during physical inventory</li> </ul>
Data sources	<p>Stock card or LMIS quantity</p> <ul style="list-style-type: none"> <li>• Day of visit: stock cards</li> <li>• Historical: stock cards/automated inventory management system (collected from the system on site)</li> <li>• Secondary: LMIS forms (submitted to a higher supply chain entity)</li> </ul> <p>Physical inventory quantity</p> <ul style="list-style-type: none"> <li>• Day of visit: stock count</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• Be careful to ensure that you are comparing unit quantities to unit quantities or pack quantities to pack quantities. Either is sufficient for this indicator but unit quantity is preferred.</li> <li>• Averaging across different product groups is not recommended. To report overall performance, it is recommended to show the range of inaccuracy (e.g. -5% to +15%) for the commodities assessed and draw attention to outliers.</li> </ul>
Reference performance level	100% as recommended by WHO
Related indicators	N/A
Level at which to implement	All warehouses and health facilities that are part of the site-visit sample

### 3.4 ORDER FILL RATE

Definition	This indicator compares the quantity in accepted orders to the quantity delivered, including frequency that distribution orders from health facilities are amended.
Formula	$((\text{Total quantity issued/received}) / (\text{Total quantity of product ordered})) \times 100$
Required data	<ul style="list-style-type: none"> <li>Quantity ordered</li> <li>Quantity issued (or received)</li> <li>Identifying information: product type, month of receipt or order</li> <li>Number of orders that are amended at the warehouse, and reasons for the changes</li> </ul>
Data sources	<p>Quantity ordered:</p> <ul style="list-style-type: none"> <li>Historical data: orders or requisitions</li> </ul> <p>Quantity issued:</p> <ul style="list-style-type: none"> <li>Historical data: delivery notes (receiving or issuing facility). Other data sources such as picking/packing lists could be substituted but delivery notes at receiving facility are preferable.</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Accepted order is the quantity that the warehouse has agreed with the orderer that they will supply. This takes account of the tendency by some facilities to over-order, or to request unrealistic quantities.</li> <li>Data on both the order quantity and receipt quantity between each level of the supply chain being analyzed is required.</li> <li>Comparisons can be made for specific commodities or aggregated for all commodities.</li> <li>Capturing quantity ordered and quantity received for each product in an order is preferable, but total quantity ordered versus received can be calculated, as this is often more feasible.</li> <li>Ensure teams are collecting data in the same units (either units or packs).</li> <li>Provide a standard sampling methodology to select orders for analysis to ensure that this indicator is feasible to collect. It is recommended to select 10 orders at intermediate warehouses and 20 orders at central warehouses. Please use systematic sampling. For example, take every 5<sup>th</sup> order if you need to sample 10 orders and have 53 orders in total.</li> <li>Overfilling an order will lead to an order fill rate percentage above 100%.</li> <li>From the data collected on each product, an average of the percentage deviation should be struck by totaling the percentage deviations from the formula, and dividing this total by the number of records.</li> </ul>
Reference performance level	In line with supply plan accuracy, target 90% of all distribution orders should be filled in full, and less than 10% should require amendment
Related indicators	I.3 Supply plan accuracy
Level at which to implement	Central and intermediary warehouses that supply hospitals and SDPs, and the hospitals and SDPs raising orders for distribution. Warehouses will report on the orders they fill, but hospitals and other health facilities will report on orders they placed and received.





### 3.5 WASTAGE FROM DAMAGE, THEFT AND EXPIRY

Definition	This indicator compares the damaged, lost and expired stock to the total stock during the reporting period. It can be looked at by the quantity or value of the stock.
Formula	<p>Quantity: <math>((\text{Total quantity of product unusable due to loss, damage or expiry}) / (\text{Total quantity of product available during the reporting period})) \times 100</math></p> <p>Value: <math>((\text{Total value of product unusable due to loss, damage or expiry}) / (\text{Total value of product available during the reporting period})) \times 100</math></p>
Required data	<p>Product:</p> <ul style="list-style-type: none"> <li>• Name</li> <li>• Form</li> <li>• Pack size</li> <li>• Batch number</li> <li>• Date of expiry</li> <li>• Unit quantity expired</li> </ul> <p>Value lost, damaged or expired</p>
Data sources	<p>Quantity and/or value of lost, damaged or expired product</p> <ul style="list-style-type: none"> <li>• Day of visit: count of expired or damaged product</li> <li>• Historical: stock cards/automated inventory management system or WMS</li> <li>• Secondary: LMIS forms</li> </ul> <p>Opening stock balance</p> <p>Historical: stock cards/automated inventory management system or WMS</p>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• The NSCA is not an audit. However, for USG-procured commodities that are damaged, lost, or expired, the assessment implementing partner (if hired by USAID) will need to work with USAID to report this to the USAID Office of Inspector General (OIG).</li> <li>• Be sure to consider any confidentiality issues with in-country stakeholders when implementing this indicator. This is particularly important regarding theft, where law enforcement authorities are involved.</li> <li>• Poor storage practices at health facilities may complicate data collection for this indicator. Even if expired stock is countable, records may not indicate the date of expiry, which is required to calculate this indicator.</li> <li>• Only collect product expired, lost or damage in the period under assessment.</li> <li>• If data collectors cannot attain a comparative quantity of product available, it is still possible to report on the volume and value of expiry throughout the system.</li> <li>• The three categories of loss, damage or expiry may also be considered and reported separately if desired.</li> <li>• Wastage data should be aggregated by value or quantity for each of the products measured for each entity, averaged across entities, and then averaged across products. Wastage data should be reported separately for each level. However, a limited number of high unit value expiries, damage or loss may distort the results. In this case, data may be reported separately by product, using either quantity or value.</li> </ul>
Reference performance level	Overall target for losses <2% of turnover, with target of 0% for theft, and <1.5% for expiry, and 0.5% damage.
Related indicators	N/A
Level at which to implement	All warehouses and health facilities that are part of the site-visit sample. Feasibility within the country specific context should be carefully considered when choosing where to implement this indicator.

## DISTRIBUTION INDICATORS

### 4.1 ON-TIME DELIVERY TO FACILITY

Definition	This indicator measures the percentage of orders that arrive on or before the scheduled delivery date.
Formula	$((\text{Number of orders delivered within the time window specified in the distribution plan}) / (\text{Total number of deliveries})) \times 100$
Required data	<ul style="list-style-type: none"> <li>Scheduled delivery date</li> <li>Actual delivery date</li> <li>Identifying information: month of receipt of order</li> </ul>
Data sources	<p>Scheduled delivery date:</p> <ul style="list-style-type: none"> <li>Delivery schedule</li> </ul> <p>Actual delivery date:</p> <ul style="list-style-type: none"> <li>Delivery notes, often in the stamp or next to the signature</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Data can be collected only in systems where an issuing facility delivers to its receiving facilities and a delivery schedule is in place.</li> <li>Actual delivery dates may vary from the expected dates printed on delivery notes. Refer to signatures and stamps to look for the actual delivery date.</li> <li>Be careful to consider if the scheduled delivery date falls on a weekend or public holiday.</li> <li>Analysis may require an agreed-to delivery window, many systems allow a margin beyond the stated delivery date, before a delivery is considered late, e.g. within five days of agreed-to date.</li> <li>Provide a standard sampling methodology to select orders for analysis to ensure that this indicator is feasible to collect. Up to 20 orders should be selected over the last 6 months (or 1 year if at SDP or referral hospital). If more than 20 orders are available in the time period of interest, use systematic sampling. For example, take every 2nd order if you need to sample 20 orders and have 53 orders in total.</li> <li>Calculate for each entity first, and then average across entities. Report results separately for each level of the health system.</li> </ul>
Reference performance level	The majority of deliveries are made to a pre-agreed schedule; therefore, the target should be 95% of orders are received on or before the promised date (after allowing for any margin- see above).
Related indicators	3.10 Order turnaround time
Level at which to implement	Hospital and SDPs. (Central level or warehouses may also hold records to retrieve data for orders delivered to health facilities)

## 4.2 PERCENTAGE OF ORDERS PLACED BY HEALTH FACILITIES AS EMERGENCY ORDERS

Definition	This indicator measures the percentage of orders placed by health facilities on a warehouse during the reporting period that were emergency orders.
Formula	$\left( \frac{\text{Number of emergency orders placed in the reporting period}}{\text{Total number of orders placed in the reporting period}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of orders placed</li> <li>Number of orders categorized as emergencies</li> </ul>
Data sources	<p>List of procurements</p> <ul style="list-style-type: none"> <li>Procurement unit tracking records (paper, Excel or automated)</li> <li>Purchase orders</li> </ul> <p>Identifying information: Product type, order month, supplier information</p>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Emergency orders are defined as orders that cannot be fulfilled in the normal timeframe and require exceptional action to meet the delivery date</li> <li>Data collection should include a total of all orders, and the number of those orders recorded as emergency orders that cannot be satisfied by normal distribution mechanisms for on time delivery. In most circumstances emergency orders will be to correct or avert a stockout, and/or to respond to unexpectedly high demand.</li> <li>Results from application of the formula may be reported at facility level (e.g. health center, regional hospital) to assess any differences, or hot spots.</li> </ul>
Reference performance level	<10%
Related indicators	N/A
Level at which to implement	Central and intermediate-level warehouses, hospitals and SDPs.

## HUMAN RESOURCES INDICATORS

### 5.1 STAFF TURNOVER RATE

Definition	This indicator measures the percentage of supply-chain-specific staff leaving their posts during the reporting period.
Formula	$\left( \frac{\text{Number of supply chain staff who vacated their position during the reporting period}}{\text{Total number of supply chain staff employed by the organization in the reporting period}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Number of employees with supply chain roles vacating their posts</li> <li>• Total number of employees with supply chain roles</li> <li>• Identifying information: facility name, facility type, geographic location</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• Interview</li> <li>• Human resources (HR) records</li> </ul>
Collection & analysis tips	<ul style="list-style-type: none"> <li>• A simple interview with a health facility manager or HR department can be sufficient for data collection of this indicator. In larger facilities, data collection teams may verify these results by looking at HR forms. Be mindful of any political sensitivities in accessing these records.</li> <li>• Any manager or staff member for whom 50% of their activity is supply chain related be included in the total number of employees with supply chain roles.</li> <li>• Calculate using the formula for each entity, and then average for each level of the health system. Report separately for each level of the health system.</li> </ul>
Reference performance level	Rates of staff turnover vary according to market and level of post, but HR institutes in UK and USA suggest that a rate of 15% turnover per annum is “healthy”.
Related indicators	5.2 Percentage of supply chain positions vacant
Level at which to implement	Central level, if they maintain records of supply chain posts and vacancies throughout the organization, otherwise data will need to be collected at each location with employees with supply chain roles posts.

## DATA AND INFORMATION INDICATORS

### 6.1 FACILITY REPORTING RATES ON-TIME

Definition	This indicator measures the percentage of facilities submitting their LMIS reports to the receiving facility (central or intermediary e.g. district) on time.
Formula	$((\text{Number of facilities submitting report on time}) / (\text{Total number of facilities required to report})) \times 100$
Required data	<ul style="list-style-type: none"> <li>Scheduled report submission date</li> <li>Actual report submission date</li> <li>Identifying information: facility name, facility type, geographic location (product type in nonintegrated LMIS)</li> </ul>
Data sources	<p>Scheduled report submission date:</p> <ul style="list-style-type: none"> <li>Reporting schedule</li> </ul> <p>Actual report submission date:</p> <ul style="list-style-type: none"> <li>Historical data: submitted LMIS forms with sign/stamp, electronic LMIS system</li> <li>Secondary data: LMIS submission tracking sheet</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Data can be collected from a tracking sheet or original submitted LMIS forms. If using a tracking sheet, be sure to spot-check with actual records to validate data quality.</li> <li>If LMIS is not integrated, data collection forms should note the product type of the LMIS report being evaluated.</li> <li>Data on this indicator could be collected at the issuing and receiving facility.</li> </ul>
Reference performance level	100% as recommended by WHO, SCMS, JSI and others
Related indicators	6.2 Facilities reporting rates – complete reports
Level at which to implement	Central

## OPTIONAL INDICATORS

### OPTIONAL FORECASTING INDICATORS

#### 1.3 SUPPLY PLAN ACCURACY

Definition	This indicator measures how closely the commodity quantity in orders placed on suppliers match the supply plan for the product category under review.
Formula	$(1 - ((\text{planned quantity of orders} - \text{actual quantity}) / (\text{Actual quantity}))) \times 100$
Required data	<ul style="list-style-type: none"> <li>Planned quantity of commodity to be ordered in the period (for each product category being considered)</li> <li>Order quantity placed in the period under review</li> <li>Identifying data: product type</li> </ul>
Data sources	<p>Forecasts/procurement</p> <ul style="list-style-type: none"> <li>Unit responsible for supply plan</li> <li>Programs supported by donors</li> </ul> <p>List of procurements</p> <ul style="list-style-type: none"> <li>Procurement unit tracking records (paper, Excel or automated)</li> <li>Purchase orders</li> <li>Identifying information: Product type, order month, supplier information</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>This indicator requires a complete set of data for the period under review.</li> <li>The review period should match those in the supply plan, e.g. orders issued in a quarter. This will show if both timing and volume of orders are in line with the plan</li> <li>The assessment team may need to adjust the list of tracer commodities used for this KPI based on available data. The focus should be on available data for each product group and may be shaped by the LMIS.</li> <li>Make sure to calculate the numerator as an absolute value.</li> <li>This indicator should be calculated on a product-by-product basis and then averaged across products in the same product group. Do not average across product groups. To report overall performance, it is recommended to show the range of variance (e.g. -5% to +15%) for the commodities assessed and draw attention to outliers.</li> </ul>
Reference performance level	Subject to available funding to meet the supply plan volumes, adhering to the supply plan volumes should be under management control. Deviation from the target should be +/- 10%.
Related indicators	1.1 Forecast accuracy
Level at which to implement	<p>Central-level procurement entity</p> <p>Intermediate-level warehouses conducting procurement (i.e., tendering, purchase orders directly)</p>

## OPTIONAL PROCUREMENT INDICATORS

### 2.3 PERCENTAGE OF ORDERS PLACED AS EMERGENCY ORDERS

Definition	This indicator measures the percentage of procurement orders placed on vendors during the reporting period that were emergency orders.
Formula	$\left( \frac{\text{((Number of emergency orders placed in the reporting period) / (Total number of orders placed in the reporting period))}{1} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of orders placed</li> </ul> Classification of orders to identify emergency orders
Data sources	List of procurements <ul style="list-style-type: none"> <li>Procurement unit tracking records (paper, Excel or automated)</li> <li>Purchase orders</li> </ul> Identifying information: Product type, order month, supplier information
Collection and analysis tips	<ul style="list-style-type: none"> <li>Emergency orders are defined as orders that cannot be fulfilled in the normal timeframe and require exceptional action to meet the delivery date.</li> <li>Where available, in addition to basic data on total number of orders, and emergency order within that total, data collected may include further details of order type, e.g. routine, planned, unplanned and emergency, with clear definitions for these categories. Planned orders are in supply plans; unplanned are not in supply plans but can be satisfied by normal procurement mechanisms and delivered by the requested date; emergency orders are by definition unplanned, are usually to avert or correct stockouts.</li> <li>Collecting data on product type and order time period for each order will facilitate deeper analysis if needed, comparing performance by product type or at each time period (usually months).</li> <li>Supplier information helps determine sources for emergency order needs versus planned order needs and can be useful for in-depth analysis.</li> <li>Report results separately for each health system level assessed; calculate first per entity and then average across entities (if there are multiple entities included for one level of the health system).</li> </ul>
Reference performance level	5% of total orders.
Related indicators	N/A
Level at which to implement	Central-level procurement entity Intermediate-level warehouses conducting procurement (i.e., tendering, purchase orders directly)



## 2.4 SUPPLIER FILL RATE

Definition	This indicator compares the quantity ordered to the quantity received, and is a complement to Measure 2.1 Vendor on time and in full delivery rate. Comparisons can be made for specific commodities or aggregated for all commodities.
Formula	$((\text{Total quantity received}) / (\text{Total quantity of product ordered})) \times 100$
Required data	<ul style="list-style-type: none"> <li>Quantity ordered</li> <li>Quantity received</li> <li>Identifying information: product type, month of receipt or order</li> </ul>
Data sources	<p>Quantity ordered:</p> <ul style="list-style-type: none"> <li>Historical data: orders or requisitions</li> </ul> <p>Quantity received:</p> <ul style="list-style-type: none"> <li>Historical data: delivery notes /packing lists for orders received</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Data on both the order quantity and receipt quantity is required.</li> <li>Capturing quantity ordered and quantity received for each product in an order is preferable, but total quantity ordered versus received can be calculated, as this is often more feasible.</li> <li>Ensure data are collecting in the same units (either units or packs).</li> <li>Make sure that the ordering process is understood; capture intermediate steps such as pro formas or corrections to initial ordering quantities. Capturing all these steps allows for robust analysis.</li> <li>Overfilling an order will lead to an order fill rate percentage above 100%.</li> <li>To report an average, total together the results from application of the formula for each commodity, and divide that total by the number of calculations made.</li> <li>For deeper analysis, the formula may be applied separately by commodity or to specific consignments to identify where challenges are apparent.</li> </ul>
Reference performance level	95% in line with target for KPI 3.4
Related indicators	2.1 Vendor on-time and in full delivery rate
Level at which to implement	Central level, will require information from procurement and warehousing

## 2.5 PROCUREMENT METHODS EMPLOYED

Definition	This indicator shows the percentage of the types of procurement undertaken during the reporting period to assess the performance of the procurement operation in using a variety of procurement methods as appropriate to the purchases made.
Formula	$\left( \frac{\text{Number of purchase orders placed of each type}}{\text{Total number of purchase orders placed in the same period}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of procurements undertaken</li> <li>Classification of procurement methods used e.g. RFP, quotation, direct order, framework /call-off order (or other types that may be agreed).<sup>1</sup></li> </ul>
Data sources	<p>List of procurements</p> <ul style="list-style-type: none"> <li>Procurement unit tracking records (paper, Excel or automated)</li> <li>Purchase orders</li> </ul> <p>Identifying information: order classification, product type, order month, supplier information</p>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Data must be collected for all types of procurements – routine, framework, planned, unplanned and emergency across all product types.</li> <li>Data collectors should include product type and order time period for each order to facilitate analysis, comparing performance by product type or at each time period (usually months).</li> <li>Supplier information helps determine sources for emergency order needs versus planned order needs and can be useful for in-depth analysis.</li> <li>Report by type of procurement for each level that is conducting procurement.</li> </ul>
Reference performance level	There is no global guidance on the mix of procurement types, but to improve efficiency framework or call-off orders for routinely purchased products should grow to >60% in most cases.
Related indicators	N/A
Level at which to implement	<p>Central-level procurement entity</p> <p>Intermediate-level warehouses conducting procurement (i.e., tendering, purchase orders directly)</p>

<sup>1</sup> Definitions of these and other procurement terms may be found here: <https://www.cips.org/Knowledge/procurement-glossary/>

## 2.6 PERCENTAGE OF HEALTH PRODUCTS PROCURED LISTED ON THE NATIONAL ESSENTIAL MEDICINES LIST OR SIMILAR DOCUMENT FOR OTHER HEALTH PRODUCTS

Definition	This indicator measures the percentage of procurements that are made based on the National Essential Medicines List (NEML).
Formula	$((\text{Number of products procured on the NEML}) / (\text{Total number of products procured})) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of products procured</li> <li>NEML or similar document(s) for other health equipment, supplies, devices or laboratory reagents</li> <li>Identifying information: product type</li> </ul>
Data sources	<p>List of products procured</p> <ul style="list-style-type: none"> <li>Procurement unit records</li> <li>Inventory management system</li> </ul> <p>NEML and similar document(s)</p> <ul style="list-style-type: none"> <li>MoH or other responsible entity</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Assessment teams may find that the way products are described in records of orders and the NEML differs.</li> <li>When comparing the two lists, assessment teams should take notice of the form (e.g., tablet, capsule, vial, powder) and dosage of each commodity ordered to ensure that it matches the NEML.</li> <li>Someone with a pharmacist background, or a laboratory specialist, may be of assistance in this exercise, as he or she can identify whether the two lists are identifying the same or different products.</li> <li>Although this indicator does not use tracer commodities, assessment teams should capture the product type for each procured commodity in order to conduct analysis by product type.</li> </ul>
Reference performance level	100% is recommended by WHO, suggested performance level is 95% to allow flexibility.
Related indicators	N/A
Level at which to implement	Central level. Data should be retrieved from procurement and policy or regulatory agency that maintains the NEML and/or National Laboratory Equipment and Commodities List (NLECL)

## 2.7 CUSTOMS CLEARANCE TIME

Definition	This indicator measures the time taken for international consignments to be processed by the Customs authorities, and released for delivery to the in-country delivery address.
Formula	$((\text{Date order consignment received by Customs}) - (\text{Date released to agent for delivery})) = \# \text{ of days}$
Required data	<ul style="list-style-type: none"> <li>• Date order received into Customs</li> <li>• Delivery date(s) released to agent for delivery</li> <li>• Identifying information: ordering facility, product type.</li> </ul>
Data sources	<p>Customs date:</p> <ul style="list-style-type: none"> <li>• Historical data: orders or requisitions</li> </ul> <p>Delivery date:</p> <ul style="list-style-type: none"> <li>• Historical data: delivery notes issued by receiving entity</li> <li>• Customs clearance agents' records</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• Provide a standard sampling methodology to select orders for analysis to ensure that this indicator is feasible to collect. It is recommended to select at least 20 consignments. Please use systematic sampling. For example, take every 5<sup>th</sup> consignment if you need to sample 20 orders and have 105 consignments in total.</li> <li>• This indicator is a measure of the operational efficiency within the international supply chain, although it is recognized that the ability of supply chain managers to affect the time taken is limited.</li> <li>• To report an average time taken for Customs Clearance, strike a total for the number of days taken for the consignments assessed, and divide that total by the number of consignments assessed.</li> </ul>
Reference performance level	This measure is highly dependent on the customs regimen of the country, acceptable performance can vary from hours to weeks. Therefore, expected performance levels must be set locally.
Related indicators	N/A
Level at which to implement	Central procurement entity

## OPTIONAL WAREHOUSING INDICATORS

### 3.6 STOCK TURN PER ANNUM

Definition	This indicator measures the number of times the warehouse issues and replaces its inventory during the period under review and is a measure of efficiency of the operation.
Formula	$((\text{Total value issued}) / (\text{Average value of inventory held in the period})) = X$ (number of turns)
Required data	<ul style="list-style-type: none"> <li>Total value of orders completed and issued in the period</li> <li>Average value of stock held in the warehouse (if an average is not available the value at the end of the period may be used, but may give a distorted value for the stock turn if the end of period inventory level is not typical)</li> </ul>
Data sources	<p>Value of issues or deliveries:</p> <ul style="list-style-type: none"> <li>Historical data: fulfilled orders or delivery notes</li> </ul> <p>Average inventory:</p> <ul style="list-style-type: none"> <li>Warehouse management systems, or annual stock take record</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>Ensure that all deliveries/issues are included in the totals provided.</li> <li>If an average value of inventory is not available, ensure that the point in time value used is representative of the normal levels held in the warehouse. This will be a judgment call by the assessment team and the counterparts.</li> <li>The value of this measure is as an indicator of how well product is moving through the warehouse to the service delivery points, rather than sitting unused in the warehouse. A high level of stock turn is considered desirable.</li> <li>A low level of stock turn or a reducing ratio will indicate that product is getting stuck at the central level, which may indicate over forecasting, declining demand, problems in distributions or other barriers.</li> <li>A low level of stock turn or a reducing ratio may also indicate the levels of expired or otherwise unusable stock is growing in the warehouse.</li> <li>In commercial operations, a low ratio indicates that excessive working capital is tied up in slow moving stocks. The public sector may not measure working capital use, but a low stock turn nonetheless indicates poor use of financial resources or donations.</li> </ul>
Reference performance level	Industry norms vary widely, but a pharmaceutical warehouse should expect a stock turnover of at least 4 time per year.
Related indicators	N/A
Level at which to implement	Central level warehouses. Stock turn is less relevant at intermediary warehouses, hospitals and SDPs where stock volumes will be lower and responsive to patient demand.

### 3.7 NUMBER AND DURATION OF TEMPERATURE EXCURSIONS IN COLD STORAGE FACILITY

Definition	This indicator measures the number of days in which there was a temperature excursion or percentage of time (in days) that the cold storage facility may not have kept commodities at the required temperature.
Formula	$\frac{\text{((Total number of days in the period where there was a temperature excursion) / (Total number of days in the period))} \times 100}{}$
Required data	<ul style="list-style-type: none"> <li>• Days in which the cold storage facility did not maintain temperature defined as: -             <ol style="list-style-type: none"> <li>i. Heat excursion, when temperature was above 8C for more than 10 hours</li> <li>ii. Freeze/cold excursion, when the temperature was below -0.5C (minus 0.5C) for more than one hour<sup>2</sup></li> </ol> </li> <li>• Number of individual incidents</li> <li>• Identifying information: beginning and end dates of temperature excursions</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• Historical data from warehouse management records. Modern facilities will produce printouts of temperature excursions. For older equipment temperature compliance may rely on visual observation and manual record keeping.</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• If available it is desirable to collect the duration of individual incidents, as this will indicate the level of risk to commodity quality.</li> <li>• Well-managed facilities will record each incident and investigate the cause and risk to commodities or corrective and preventive actions (CAPA).</li> <li>• The temperatures indicated have been selected because sustained temperatures outside the levels shown are likely to damage cold chain commodities such as vaccines.</li> <li>• Sampling or use of tracer commodities is not appropriate for this measure. The review is of operation of the cold storage facility, irrespective of contents, and must cover the full period. A lack of records is a finding, as the warehouse cannot be assured of product quality.</li> <li>• If a facility has more than one cold unit/refrigerator, data must be collected on excursions for each refrigerator and totaled, and then divided by the total time across all fridges. Calculate first for each entity, and then average across entities for each level of the health system included in the analysis.</li> </ul>
Reference performance level	No more than 1 day per month, or percentage equivalent
Related indicators	N/A
Level at which to implement	Central level warehouses, intermediary warehouses and SDPs that maintain cold storage facilities

<sup>2</sup> Heat and freeze/cold excursion definitions are consistent with those used by the Effective Vaccine Management (EVM) tool when monitoring low and high temperature alarms in vaccine cold chains.

### 3.8 STOCKOUT RATES OF ONE OR MORE TRACER PRODUCTS BY FACILITY

Definition	<p>This indicator measures whether facilities experienced a stockout of one or more tracer commodities at any point during the reporting period being assessed. The result is expressed as a percentage of the total number of facilities.</p> <p>The measure may also be used for a single facility, in which case the result will be expressed as the number of tracer commodities experiencing a stockout and the number of days. It may also be appropriate to report on the number of times a tracer commodity was stocked out, if there are multiple occurrences.</p>
Formula	$\left( \frac{\text{Number of facilities experiencing a stockout of one or more tracer commodities}}{\text{Total number of facilities dispensing tracer commodities}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Stockout occurrence (yes/no) for each month in the identified reporting period</li> <li>• Identifying information: product type, facility type</li> </ul>
Potential data sources	<ul style="list-style-type: none"> <li>• <i>Day of visit:</i> Physical inspection/stock count</li> <li>• <i>Historical:</i> Stock cards/inventory management system</li> <li>• <i>Secondary data:</i> logistics management information system (LMIS) reports</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• Historical data should be taken from stock cards or other available management records. Assessment teams should look at all stock cards for each tracer commodity for the time period in question. Each tracer commodity will usually have its own stock card; depending on the reporting period, multiple stock cards may encompass the whole timeframe. Stockouts will be indicated by zero quantity on the stock cards.</li> <li>• Number of days is determined by counting the number of days when stock quantity was zero at the end of the business day as recorded on the stock card.</li> <li>• If the scope of the assessment is such that facility visits are not undertaken, exceptionally stockout data can come from a secondary data source. Assessment teams can use LMIS reports if they capture stockouts. Data quality of this secondary source should be considered if assessment teams use this option.</li> </ul>
Reference performance level	<p>In line with the expectation in KPIs 3.1, 90% of stocks should be within the max/min tolerances, ideally no more than 10% of facilities should record a stock out of a tracer commodity in any reporting period. However, dependent on the length of the reporting period, and the number of tracer commodities this could be a very difficult level to maintain. It is suggested that this measure be assessed over several reporting periods, with the objective being a declining incidence, and from this record countries can establish a realistic performance level that meets their circumstances.</p> <p>Less than 5% of facilities should record a stock out on the day of the assessor visit.</p> <p>Stock outs should be corrected within 5 days.</p>
Related indicators	3.2 Stockout rates by tracer commodity by level in the system.
Level at which to implement	All warehouses, hospitals and health facilities that are part of the site-visit sample

### 3.9 COST OF WAREHOUSING OPERATION

Definition	This indicator compares the cost of the operation of the warehouse to the total value of the commodities managed by the warehouse during the period under review, and expresses the costs as percentage of turnover.
Formula	$\left( \frac{\text{Costs incurred in operating the warehouse}}{\text{Total value of commodities managed by the warehouse}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>Operating costs</li> <li>Value opening inventory balance, plus all in-coming deliveries</li> </ul>
Data sources	<p>Operating costs:</p> <ul style="list-style-type: none"> <li>Audited accounts, or management accounts if audited are not available</li> </ul> <p>Value of commodities managed:</p> <ul style="list-style-type: none"> <li>Historical data: opening and closing inventory balances from audited or management accounts, delivery notes or similar for all commodities received.</li> <li>Transport costs are not included, as these would normally be considered part of the distribution costs.</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>These data should be readily available from the warehouse finance department in a single interview. It is recommended that the finance department be advised in advance so that they can have the data readily to hand.</li> <li>The measure can be used to track costs over time, and for budgeting purposes.</li> <li>The measure can also be compared to other similar warehouse operations, including private sector and not-for-profit operations. For all such comparisons, it is essential to ensure that the respective measures are arrived at by a common approach and include all similar costs and values.</li> <li>This is an aggregate measure for the total costs, under the control of the central entity responsible for holding stock above the health facility level, and does not measure the cost of individual warehouse operations. If a deeper analysis is required, different levels can be broken out, if the accounting data allows.</li> </ul>
Reference performance level	Budget costs vary extensively, and there is no international published norm, but costs related to turnover should reduce over time.
Related indicators	4.3 Cost of distribution operation
Level at which to implement	Central and/or regional level warehouse. If desired, and the costs are available broken out accurately from other operating costs, this measure could also be applied at any stock holding facility such as a hospital or SDP.



### 3.10 ORDER TURNAROUND TIME

Definition	This indicator measures the time taken by the warehouse to fulfill orders from hospitals and SDPs. Comparisons can be made for specific commodities, for specific regions or aggregated for all commodities and regions.
Formula	$((\text{Date order received}) - (\text{Date delivered})) = \# \text{ of days}$
Required data	<ul style="list-style-type: none"> <li>• Date order received or accepted</li> <li>• Delivery date(s) to facility placing the order</li> <li>• Identifying information: ordering facility, product type.</li> </ul>
Data sources	<p>Order date:</p> <ul style="list-style-type: none"> <li>• Historical data: orders or requisitions</li> </ul> <p>Delivery date:</p> <ul style="list-style-type: none"> <li>• Historical data: delivery notes (receiving or issuing facility). Other data sources such as picking/packing lists could be substituted, but delivery notes at receiving facility are preferable.</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• If possible, data should be collected from both the ordering facility and the warehouse, to ensure there is common understanding of performance.</li> <li>• Provide a standard sampling methodology to select orders for analysis to ensure that this indicator is feasible to collect. For example to collect data on 20 orders when the total number of orders available with the needed data is 103, sample every fifth order.</li> <li>• Make sure that the ordering process is understood; capture intermediate steps such as pro formas or corrections to initial ordering quantities. Capturing all these steps allows for robust analysis.</li> <li>• This indicator is a measure of the operational efficiency of the warehouse and distribution process, and is complementary to the order fill rate, as delays in order processing may be caused by awaiting incoming deliveries to fulfill the order.</li> <li>• To strike an average aggregate (add) the total number of days from the formula answers and divide by the number of orders sampled. Calculate this first for each entity, and then average across all entities within a level of the health system.</li> </ul>
Reference performance level	5 business days, unless there is a set process for monthly orders and deliveries, in which the objective should be adherence to the agreed monthly timings.
Related indicators	3.4 Order fill rate
Level at which to implement	Central and intermediary warehouses that supply hospitals and SDPs.

### 3.11 PERCENTAGE OF INCOMING PRODUCT BATCHES TESTED FOR QUALITY

Definition	This indicator measures the percentage of product batches received from suppliers and tested by a quality assurance laboratory.
Formula	$((\text{Number of product batches tested}) / (\text{Total number of product batches received})) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of product batches received</li> <li>List of product batches tested</li> <li>Identifying information: product type, place of test, product supplier/manufacturer, location of supplier/manufacturer</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>List of product batches tested and quality testing results</li> <li>Quality assurance unit</li> <li>Quality testing laboratory</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>If quality testing is outsourced, results may be self-reported on a tracking sheet to assessment teams. If possible, data collectors should view the records from the laboratory as well to ensure data quality.</li> <li>This indicator is calculated for each individual batch.</li> <li>Although this indicator does not use tracer commodities, assessment teams should capture the product type for each batch tested in order to conduct analysis by product type.</li> <li>Neither the denominator, nor the numerator should include donated products tested by the donor outside the country</li> <li>This KPI is a calculation (e.g. 100 batches received, 20 tested = 20%) based on all batches received, not by supplier, although if desired for a deeper analysis could be sub-divided in that way. It should be reported separately for each product. Aggregating across products should be done by totaling the numerator and denominator across products, and then calculating the formula.</li> </ul>
Reference performance level	The level of testing needs to create a credible threat that non-compliance will be identified. This will normally be set by national policy to define number of batches to be tested, or in an appropriate SOP. The expected performance level should be 100% compliance with that policy or procedure.
Related indicators	3.12 Percentage of product batches tested that meet quality standards.
Level at which to implement	Warehouse and central-level quality testing facility or unit that manages outsourced quality testing.

### 3.12 PERCENTAGE OF PRODUCT BATCHES TESTED THAT MEET QUALITY STANDARDS

Definition	This indicator measures the percentage of product batches tested by a quality assurance laboratory that meet established standards.
Formula	$((\text{Number of product batches passing quality testing}) / (\text{Total number of product batches tested})) \times 100$
Required data	<ul style="list-style-type: none"> <li>List of product batches tested</li> <li>Quality testing results – i.e. Pass/Fail</li> <li>Identifying information: product type, place of test, product supplier/manufacturer, location of supplier/manufacturer</li> </ul>
Data sources	<p>List of product batches tested and quality testing results</p> <ul style="list-style-type: none"> <li>Quality assurance unit</li> <li>Quality testing laboratory</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>If quality testing is outsourced, results may be self-reported on a tracking sheet to assessment teams. If possible, data collectors should view the records from the laboratory as well to ensure data quality.</li> <li>This indicator is calculated for each individual batch that is tested. If a product has several batches tested during the reporting period, the assessment teams should consider each batch tested as one within the denominator.</li> <li>Although this indicator does not use tracer commodities, assessment teams should capture the product type for each batch tested in order to conduct analysis by product type.</li> <li>This KPI is a calculation based on the total number of batches tested and passing (e.g. 100 batches tested, 90 pass = 90% meet the level required), not supplier, although if desired for a deeper analysis could be sub-divided in that way. It should be reported separately for each product. Aggregating across products should be done by totaling the numerator and denominator across products, and then calculating the formula.</li> </ul>
Reference performance level	The objective is that all incoming products meet the required standard, but it is recognized that there may be some level of divergence even in well managed systems. It is suggested that if more than 5% of batches are failing there is problem to be investigated, or if a high level of failures is seen in particular product categories, or from particular suppliers, there is a root cause issue with selected suppliers.
Related indicators	3.11 Percentage of incoming product batches tested for quality
Level at which to implement	Warehouse and central-level quality testing facility or unit that manages outsourced quality testing.

### 4.3 COST OF DISTRIBUTION OPERATION

Definition	This indicator compares the cost of the operation of distribution from the warehouse to hospitals and SDPs with the total value of the commodities distributed, and expresses the costs as percentage of turnover.
Formula	$\left( \frac{\text{Costs incurred in operating the distribution system}}{\text{Total value of commodities distributed from the warehouse}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Operating costs, e.g. vehicle depreciation, fuel, driver wages, vehicle maintenance.</li> <li>• Value commodities delivered.</li> </ul>
Data sources	<p>Operating costs:</p> <ul style="list-style-type: none"> <li>• Management accounts</li> </ul> <p>Value of commodities managed:</p> <ul style="list-style-type: none"> <li>• Historical data: total value of commodities delivered from delivery notes.</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• These data should be readily available from the warehouse finance department in a single interview. It is recommended that the finance department be advised in advance so that they can have the data readily to hand.</li> <li>• The measure can be used to track costs over time, and for budgeting purposes.</li> <li>• The measure can also be compared to other similar distribution operations, including private sector and not-for-profit operations. For all such comparisons, it is essential to ensure that the respective measures are arrived at by a common approach and include all similar costs and values.</li> <li>• The measure does not show costs by volume, weight distance or time (i.e. urgent vs. routine orders). This level of information is rarely available from public sector operators, but if distribution is outsourced more data may be available from those operators.</li> <li>• This is an aggregate measure for the total costs, but can also be disaggregated by region, or commodity type if distribution is also split by commodity category.</li> </ul>
Reference performance level	Budget costs vary extensively, and there is no international published norm, to recommend a performance level, but costs as a proportion of turnover should reduce over time.
Related indicators	3.9 Cost of warehousing operation
Level at which to implement	Central level warehouse. If desired, and the costs are available broken out accurately from other operating costs, this measure could also be applied at any stock holding facility.

## OPTIONAL HUMAN RESOURCES INDICATORS

5.2 PERCENTAGE OF SUPPLY CHAIN POSITIONS VACANT	
Definition	This indicator measures the percentage of supply chain post vacancies that can be expected to impact performance.
Formula	$((\text{Number of supply chain staff posts vacant on the day of assessment}) / (\text{Total number of supply chain staff positions in the entity})) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Number of technical supply chain posts in the organization</li> <li>• Total number of supply chain posts vacant</li> <li>• Identifying information: post name, facility, geographic location</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• Interview</li> <li>• Human resources (HR) records</li> </ul>
Collection & analysis tips	<ul style="list-style-type: none"> <li>• A simple interview with a health facility manager or HR department can be sufficient for data collection of this indicator.</li> <li>• Validation of samples of the HR data with the facilities or operational units in question is recommended.</li> <li>• It will first be necessary to agree with the management which posts are considered supply chain positions that impact performance if vacant. This is subjective, but any manager and technical staff for whom 100% of their job description is supply chain tasks would be a candidate to be considered. In small facilities where supply chain is not a dominant activity, e.g. a rural health facility, a staff member or manager for whom over 50% of their activity is supply chain may be considered.</li> <li>• Calculate separately for each entity first, then average the results for each level of the health system include din the assessment.</li> </ul>
Reference performance level	To maintain operation efficiency >90% of supply chain posts should be filled at any one time.
Related indicators	5.1 Staff turnover rate
Level at which to implement	Central level, if they maintain records of supply chain posts and vacancies throughout the organization, otherwise data will need to be collected at each location with employees with supply chain roles/posts.

## OPTIONAL DATA AND INFORMATION INDICATORS

### 6.2 FACILITY REPORTING RATES - COMPLETE REPORTS

Definition	This indicator measures the percentage of facilities submitting complete LMIS reports to the receiving facility.
Formula	$\left( \frac{\text{Number of facilities submitting complete reports}}{\text{Total number of facilities required to report}} \right) \times 100$
Required data	<ul style="list-style-type: none"> <li>• Reports to review for completeness</li> <li>• Identifying information: facility name, facility type, geographic location (product type in nonintegrated LMIS)</li> </ul>
Data sources	<ul style="list-style-type: none"> <li>• LMIS reports</li> <li>• Secondary data: LMIS submission tracking sheet</li> </ul>
Collection and analysis tips	<ul style="list-style-type: none"> <li>• Data can be collected from a tracking sheet or original submitted LMIS forms. If using a tracking sheet, be sure to spot-check with actual records to validate data quality.</li> <li>• If LMIS is not integrated, data collection forms should note the product type of the LMIS report being evaluated.</li> <li>• Data on this indicator could be collected at the issuing and receiving facility.</li> <li>• Data on whether each element of “completeness” is in each LMIS report should be included in data collection forms. Data collection teams should determine these elements with in-country stakeholders. The two required elements to consider a report complete are 1) stock on hand and 2) consumption. Countries may choose elements for their specific context.</li> <li>• Recommended to measure for tracer products only.</li> </ul>
Reference performance level	100% as recommended by WHO, SCMS, JSI and others
Related indicators	6.1 Facility reporting rates on-time
Level at which to implement	Central.