# District Health Commodities Storage Guidelines









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#### Disclaimer:

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# **ACRONYMS**

AMC Average Monthly Consumption

DHO District Health Officer
EML Essential Medicines List
FEFO First Expiry First Out

GHSC-PSM Global Health Supply Chain Program-Procurement and Supply Management

ISO International Organization for Standardization

KP Khyber Pakhtunkhwa

MCC Medicines Coordination Cell

TB Tuberculosis

USAID U.S. Agency for International Development

WHO World Health Organization

## **ACKNOWLEDGEMENT**

The key challenge encountered by the districts is the uninterrupted and timely supply of health commodities at all levels of supply chain, most critically the last mile. Admittedly, the outcome of ensuring commodity security at the last mile could only be effectively accomplished through cascading of the fundamental supply chain functions at the district and sub-district levels.

We proudly put forward the completed version of the District Level Supply Chain Package, which was prepared after months of effort. The package containing supply chain guidelines will help the district staff to ensure best supply chain practices at the district and below levels, contributing towards improved access of health commodities to the people.

The Health Department, Government of Khyber Pakhtunkhwa is committed to improve the health and quality of life for all, particularly women, children and marginalized communities, through access to essential quality health services which are accessible, equitable, culturally acceptable, affordable, and sustainable.

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# **PREFACE**

The District Health Commodities Storage Guidelines will serve as a key document for officials working in the Health Department at the district level who are involved directly or indirectly in supply chain and storage activities, including the district health officer, district storekeeper, service providers at the health facilities and vertical program coordinators. The aim of these guidelines is to define storage practices as well as propose standard operating procedures based on international best practices. These guidelines are widely applicable to a broad range of health commodities, including but not limited, to essential drugs for Basic Health Services, vaccines, contraceptives, antimalarial and typhoid medicines, malaria rapid diagnostic tests, and tuberculosis (TB) medicines.

# **PREAMBLE**

Until a product is dispensed to a patient at the service delivery points (SDPs) it is imperative to maintain the safety, quality, and integrity of said product. Regardless of storage facility size—from a small health center to the district store — the main operational activities for storage are very similar. The complexity of these activities will vary depending on the volume of products managed, the storage facility size, and other specific requirements, such as cold storage.

# **OBJECTIVE**

The public health supply chain maturity curve has presented an upward trend at the provincial level, but the trickle-down impact is yet to be fully realized at the district and sub-district (or facility) levels. The Global Health Supply Chain Program – Procurement and Supply Management (GHSC-PSM) project has been working with provincial and district governments to assist the district health authorities on essential supply chain functions. The objective of these guidelines is to establish a practical reference for those managing a storeroom through written directions and clear illustrations on receiving and arranging commodities, storage space calculation, special storage conditions, tracking commodities, maintaining product quality, and waste management. The guidelines will also help senior officials, supervisors, and decision makers monitor stores and take necessary measures per international best practices. The guidelines would also inform policy decisions and serve as a base document for the district authorities to update their existing storage infrastructure and practices in line with international best practices. Furthermore, the districts can draw up costed plans and seek finances for establishing an integrated warehouse, ISO certification, and undertake human resource capacity development initiatives consistent with the following guidelines.

## STANDARD GUIDELINES

#### I. RECEIVING AND INCOMING

- a) When unloading vehicles, the cartons and packages are visually inspected to avoid the likelihood of damage during the transportation. The quantities of the products are also verified and recorded (bilty, invoice, voucher, packing lists).
- b) The responsible official must report any discrepancy in the physical count or any damaged items spotted during the visual inspection.
- c) Visual inspection is the process of examining products and their packaging to look for any obvious problems with the product quality.
- d) The products received at the store can potentially undergo two types of damages; mechanical (physical) damage and chemical damage.
- i. Mechanical damage is caused by physical stress, such as crushing or tearing when the product is loaded, off-loaded, or stacked. This kind of damage is usually limited to crushed or torn parts. Generally, mechanically damaged items are removed from stock and the remainder of the box, or carton, is redistributed.
- ii. Chemical damage is more difficult to detect and is usually not obvious during a visual inspection. Laboratory testing is typically required. Some indications of chemical damage include changes in the color, flavor, fragrance, or consistency of the product. Chemically damaged items are removed from inventory, quarantined, and destroyed per disposal procedure.

Table 1: Indicators of Product Quality Problem

All products	Liquids	Light-sensitive products (such as x-ray film)	Latex products
<ul> <li>Broken or ripped packaging (vials, bottles, boxes, etc.)</li> <li>Missing, incomplete, or unreadable label(s)</li> </ul>	<ul> <li>Discoloration (color change)</li> <li>Cloudiness</li> <li>Sediment</li> <li>Broken seal on bottle</li> <li>Cracks in ampoule, bottle, or vial</li> <li>Dampness or moisture in the packaging</li> </ul>	Torn or ripped packaging	<ul><li>Dry</li><li>Brittle or hard</li><li>Cracked</li></ul>
Lubricated latex products	Pills (tablets)	Injectables	Sterile products (including IUDs)
<ul> <li>Sticky packaging</li> <li>Discolored product or lubricant</li> <li>Stained packaging</li> <li>Leakage of the lubricant (moist or damp packaging)</li> </ul>	<ul> <li>Discoloration</li> <li>Crumbled pills</li> <li>Missing pills (from blister pack)</li> <li>Stickiness (especially coated tablets)</li> <li>Unusual smell</li> </ul>	Liquid does not return to suspension after shaking	<ul> <li>Torn or ripped packaging</li> <li>Missing parts</li> <li>Broken or bent parts</li> <li>Moisture inside the packaging</li> <li>Stained packaging</li> </ul>
Capsules	Tubes	Foil packs	
<ul><li>Discoloration</li><li>Stickiness</li><li>Crushed capsules</li></ul>	<ul> <li>Sticky tube(s)</li> <li>Leaking contents</li> <li>Perforations or holes in the tube</li> </ul>	Perforation(s) in packaging	

#### **II. PUT AWAY**

- a) After unloading and unpacking the containers, the goods should be stored in their designated area (rack, shelf or floor) and recorded in the stock ledger.
- b) The best approach is to store and record the commodities the day they are received.
- c) Commodities must be stored based on FEFO (First Expiry First Out) principle, ensuring that patients receive them in good condition and on time, well before their expiration dates.

#### **III.STOCK PLACEMENT**

#### a) Store Products Using FEFO Principle

- i. In addition to having visible expiration and manufacture dates, products must be stored such that those that expire first are easiest to reach. This will ensure that the first product to expire is the first out. Managing by expiration date ensures that the oldest products, having less shelf lives as compared to the fresh stocks, leave the store first. The storekeeper should confirm that FEFO is being followed every time they take a physical inventory.
- ii. At the service delivery point, old stock should be moved or rotated to the front of the shelf, with new stock placed at the back of the shelf. By rotating stock, staff can ensure that the first stock issued is the first stock to expire.
- iii. The goal is to get the product to the patient, not to have it expire on the shelves.
- b) Store supplies in a dry, well-lit, well-ventilated storeroom, out of direct sunlight
- i. One of the key considerations is to minimize the exposure to heat and direct sunlight as they can be detrimental to shelf life and the composition of products.
- ii. To avoid such damage, it is recommended to store products in their original cartons and shade the interior of the storeroom from direct sunlight at lower levels, store products in the inner boxes (i.e., those that came inside the cartons), and leave medicines in their dark-colored/opaque bottles.

#### c) Clean and disinfect storeroom regularly

Rodents and insects (e.g., termites and cockroaches) eat tablets and their packaging. Keep the storeroom clean and disinfected all the times as it protects from pests. Do not eat or drink there and if possible, regularly schedule exterminations to eliminate pests. If rodents are a serious problem, cats may be an inexpensive, nontoxic alternative to traps or poisons.

#### d) Secure storeroom from water penetration

Water has an equally destructive impact on medicines and its packaging. Even if there is no damage to the product, damaged packaging makes the product unappealing to the patient.

The best way to prevent water damage is to repair leaky roofs and windows. It is recommended to stack supplies off the floor on pallets at least 10 centimeters (4 inch) off the ground and 30 centimeters (1 foot) away from walls to avoid water damage from moisture.

#### e) Fire Safety Precaution

Stopping a fire before it spreads can save thousands of dollars' worth of supplies and the storage space itself. The right equipment must be available throughout the storage facility, especially fully functioning

fire extinguishers (clearly indicating expiry date) near the exits. If extinguishers are not available, use buckets of sand. Fire safety training is imperative for the staff managing the store.

#### f) Store latex products away from electric motors and fluorescent lights

Latex products, such as condoms and gloves, can be damaged if they are directly exposed to fluorescent lights and electric motors. Condoms and gloves stored in their proper packaging (i.e., boxes and cartons) will not be affected by limited exposure. Whenever possible, keep latex products in their paper boxes and cartons. If not, keep them away from lights and motors.

#### g) Maintain cold storage, including a cold chain, for commodities that necessitate it

Cold storage, including the cold chain, is essential for maintaining the shelf life of drugs and vaccines that necessitate it. These items are irreparably damaged if the cold chain is broken. If the electricity is unreliable, the alternative option is bottled gas or kerosene-powered refrigeration. During immunization campaigns, cold boxes or insulated coolers may be used for rapid transport.

It is important to follow the manufacturer's recommended storage conditions for all products. To remain compliant with the storage conditions, keep thermometers in various places within the storeroom and record temperatures twice a day (9:00 am and 4:00 pm). The following terms relate to temperature and medical supplies:

#### i. Store frozen:

Some products need to be transported within a cold chain and stored at  $-20^{\circ}$ C (4°F) (e.g. BCG and Measles vaccine stored in the freezer room). Frozen storage is normally for longer-term storage at higher-level facilities.

#### ii. Store at $2^{\circ}$ – $8^{\circ}$ C ( $36^{\circ}$ – $46^{\circ}$ F):

Some products are very heat sensitive but must not be frozen. These are usually kept in the first and second part of the refrigerator (never the freezer). This temperature is appropriate for storing vaccines for a short period of time as well as medicines like oxytocin.

#### iii. Keep cool:

Store between 8°- 15°C (45°-59°F). Contraceptives like DMPA are stored at this temperature

#### iv. Store at room temperature:

Store at 15°-25°C (59°-77°F). Medicines like paracetamol are held at this temperature.

#### v. Store at ambient temperature:

Store at the surrounding temperature. This term is not widely used due to significant variation in ambient temperatures. It means "room temperature" or normal storage conditions, which means storing in a dry, clean, well ventilated area at room temperature between 15° to 30°C (59°–86°) depending on climatic conditions.

#### h) Flammable products safety

Store these highly flammable products near a fire extinguisher and away from other products, such as phenobarbital sodium (elixir).

#### i) Stacking of Cartons

Pallets keep products off the floor, so that they are less susceptible to pest, water, and dirt damage. By keeping pallets 30 cm (I ft) away from the walls and from each other, air circulation is promoted and it is easier to move, clean, and inspect stock. If storekeepers can walk around the stacks, they are more likely to be able to follow other good storage practices (sweeping, reading labels, and FEFO).

Cartons should not be stacked higher than 2.5 m (8 ft), whether on pallets or not. This is the highest that products can be stacked without crushing the cartons at the bottom. Stacking products at a stable height of less than 2.5 m also reduces the possibility of injury to warehouse personnel. When a storeroom has s reliable metal racking system, the cartons should be stacked in the racks accordingly.

Where pallets are inappropriate, shelving is an excellent way to store products. Metal shelving is preferred because wood shelving may attract termites.

#### j) Arranging Cartons

It is essential that medicines that are the first to expire are also the first products issued, regardless of when they arrived at the storage facility. If shipping cartons do not show the manufacture or expiration dates, or if this information is difficult to read, use a marker to rewrite the dates on the cartons in large, easy-to-read letters and numbers.

Items should always be stored according to the manufacturer's instructions on the carton. This includes the direction of the arrows on the boxes, as storing cartons upside down can affect the usability of certain medicines.

#### k) Arranging Products

The district store should have a system for classifying and organizing medicines, which all relevant staff should be oriented on.

- Alphabetical order by generic name: Often seen in both large and small facilities. When using this
  system, the labeling must be changed when the Essential Medicines List/Medicines Coordination Cell
  (MCC) List is revised or updated.
- ii. **Therapeutic or pharmacologic category:** Most useful in stores where the store staff are very knowledgeable about pharmacology.
- iii. **Dosage form:** Medicines come in different forms, such as tablets, syrups, injectables, and external use products such as ointments and creams. In this system, medicines are categorized according to their dosage form. Using the other methods of categorization can be used to organize the items more precisely.
- iv. **System level:** Items for different levels of the health care system are kept together. This works well in stores at a higher level when storing kits is required.
- v. **Frequency of use:** Frequently used products that move quickly through the store should be placed at the front of the room or closest. This system should be used in combination with another system.
- vi. **Random bin:** Identifies a specific storage space with a code that corresponds to its aisle, shelf, and position on the shelf. This system requires computer automation.

#### IV. RECORD KEEPING

a) Every district store has a stock register. The stock will be entered by store staff on the stock register and all details will be recorded including brand name, generic name, strengths, dosage forms, quantity, batch, lot number, expiry and receiving date. Each entry should also list the initials of the staff member that completed the intake.

The minimal information that should be collected on stock records for medicines and other health products includes:

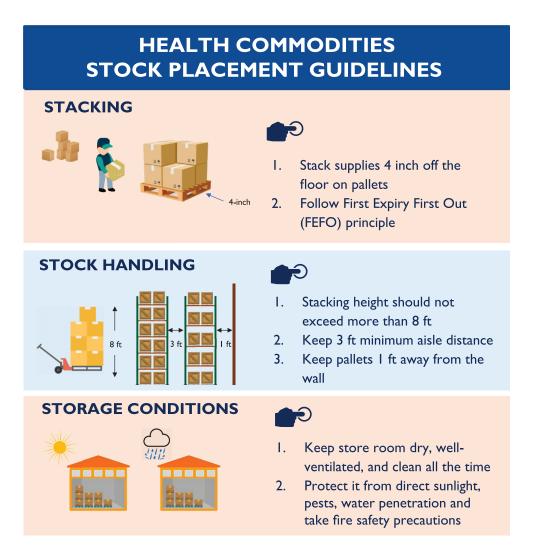
- Product name and description, including the dosage form (capsule, tablet, liquid suspension, etc.) and strength
- Stock on hand or opening balance
- Receipts
- Issuance
- Losses and adjustments
- Closing or ending balance
- Transaction reference (such as issue voucher number or name of recipient)

Depending on the system, stock records might also include additional product information such as:

- Special storage conditions (e.g., 2°–8°C)
- Unit prices
- Lot numbers or bin locations
- Item codes
- Expiry dates
- b) Stock records might also include certain calculated data items. These are determined by mathematical formulas that depend on system design parameters, such as how often orders are placed. Calculated data items include:
  - Consumption data, such as average monthly consumption (AMC)
  - Lead times | for ordering or requisition
  - Maximum and minimum stock levels
  - Emergency order points
- c) A storage and distribution system may not necessarily use all these forms but it will need forms to record stock data and product transactions. Standard forms used for inventory control include:
  - Stock register: Provides an up to date record of all transactions for medicines received, issued, and discarded
  - Bin cards: An updated balance of an item available in stock. The bin card will be placed and maintained on every item stack for immediate stock monitoring. A separate bin card will be maintained for every drug. Drugs with different dosage forms and strengths of same generic name will be treated as separate drugs and separate bin cards will be used for each of these items.
  - Requisition or issue vouchers: Used for supplies issued or received at one time by the store.

<sup>&</sup>lt;sup>1</sup> The time between placement of supply order and delivery of the medicines

- Receiving forms (packing slip, freight bill, bilty): Used for supplies issued or received at one time by the store.
- Delivery or issue vouchers: Used for recording the stock issued at one time
- Expired stock disposal forms: Used to keep record of the expired stock disposals
- Physical inventory forms: The physical stock counts will be conducted at the end of every quarter
  and records will be maintained after signatures of the relevant authorities to ensure transparency in
  procedures.
- List of approved medicines and prices.
- d) The store staff will ensure the presentation of monthly, quarterly, and annual stock reports to the authorities.



#### V.STOCK MANAGEMENT THROUGH INVENTORY MANAGEMENT

#### STORAGE SPACE CALCULATION

For district stores, shelves and racks are sparingly used and the following parameters are considered:

- Total product volume, by commodity, based on a peak month
- Required space for receiving, picking and packing, and shipping
- Organization and labeling of cartons to ensure accessibility and FEFO
- Required operation aisle distances (at least 3 feet)

Proper storage includes the effective use of storage space. If too much space is unused, a storeroom is underused and money is wasted. If products are crammed into too small a space, they may be damaged or inaccessible. Thus, store staff must learn how to calculate the space needed to store incoming shipments and how to calculate overall storage requirements for the store, as well as an ideal layout.

To develop a workable layout and calculate storage requirements at a large warehouse, which may serve multiple purposes, it is important to identify the various warehouse activities that would influence layout planning. The space requirements and ideal layout for each activity must be determined to mitigate on constraints.

To determine space requirements, the following must be considered:

- Total stored pallet equivalents, by commodity, based on a peak month
- Stored pallet orientation
- Required space for receiving, inspection, and quarantine (away from other medicines)
- Required space for picking, packing, and shipping
- Type of storage media per commodity (i.e., pallet rack, gravity flow rack, shelving)
- Required operation aisle distances
- Type of material handling equipment required

Some issues to consider before purchasing racking or shelving include:

- Product volume (size and weight of loads)
- Pallets and containers (type, condition, dimensions, and weight)
- Equipment clearance (standard height of equipment and equipment extensions, such as forklifts and load heights)
- Building dimensions
- Warehouse floors (stress and strength requirements)

For smaller storerooms, pallets might not be used as they take up too much space. Shelves may be used instead of racks. Other factors to consider are:

- Total product volume, by commodity, based on a peak month
- Required space for receiving, picking and packing, and shipping
- Organization and labeling of cartons to ensure accessibility and FEFO
- Required operation aisle distances

Space calculations begin with the total number of units of the product needed to be stored. If calculating space for a single shipment, use the number of units in that shipment. If calculating space requirements for the entire

quantity of a product that you need to be able to keep in store, use the maximum quantity, as per formula of max stock level × AMC. . In addition to knowing the total number of units stored, the store staff needs to know:

- Number of units in a carton (exterior packaging)
- Size of the cartons

If the carton size is not previously determined, ask the relevant supplier, donor (in case of donation), central or provincial warehouse staff.

To calculate the amount of floor space needed to store any product, follow the steps below (also see table). For example, to store 100,000 of injection—

- 1. Divide by 100 syringes of injection per carton, which equals 1,000 cartons of injections.
- 2. Multiply by 0.004307 m<sub>3</sub> per carton of injections, which equals 4.307 m<sub>3</sub> of the total volume.
- 3. Divide by 2.5 m the maximum carton stack height, which equals 1.723 sq. m of floor space.
- 4. Multiply by 2 to allow 100 percent for handling space, which equals 3.446 sq. m of total floor space. The square root of 3.446 sq. m is 1.86 m.

Table 2: How to calculate floor space

Step	What This Tells
Begin with the number of units expected in a single shipment.     OR	Most shipments are expressed in units. One needs the number of units expected to tell the total amount one should place in a stack.
Begin with the maximum quantity of a product you expect to store if calculating overall storage requirements for the warehouse.	
Divide the number of units to be stored by the number of units in a carton.	This tells the number of cartons. Sometimes, the shipping documents list the number of cartons in the shipment. In such cases, just skip this step.
3. Multiply the number of cartons by the volume of a carton.	Know the volume per carton. Obtain this information from the supplier, donor, or central or provincial warehouse. The answer is the total volume of space needed to store the product, but it does not tell the amount of floor space needed.
4. Divide the total volume by 2.5 m or 8 ft.	Whatever the volume of the cartons, you do not want to stack them higher than 2.5 m or 8 ft high. Divide the volume by the maximum height to determine the floor space needed to store the product.
5. Multiply the floor space needed to store the product by two.	Double the amount of floor space to allow for handling space, aisles, and other variables. This is the total amount of floor space needed. Multiply by a number larger than 2 to allow more space in which to create a handling area for new or outgoing shipments. In very small facilities where smaller quantities of product are kept, as much handling space may not be required, so one would multiply by a number smaller than 2.
6. Calculate the square root to get the dimensions of the total amount of floor space needed. You can also estimate the dimensions using your knowledge of mathematics.	The answer is the dimensions of the needed space, assuming the space is square. Of course, may storerooms are not square. For example, 36 sq. m is a square of 6 m $\times$ 6 m. It could also be an area of 9 m $\times$ 4 m.
7. Repeat these calculations for all products to determine the total amount of storage space you will need.	Calculate steps I-6 for each product separately to estimate the floor space needed for each product separately. If total space requirements for the store are to be known, follow steps I-3 above for each product, then total all the volume requirements and perform steps 4-6 on this total.

By calculating space requirements for future shipments, the storekeeper can determine whether they have adequate space to receive the shipment. If sufficient space is not available, the storekeeper should ask to receive the order in several small and staggered shipments, instead of one large one. However, large shipments are usually less expensive. Alternatives could also be considered, such as renting additional space when space is not available.

When procurement contracts are set, it would be advisable to set a fixed size of allowable shipments and include a shipping schedule in the contract. Knowing how to calculate storage space before shipments arrive can save a program time and money.

The formula to calculate space needed in an entire warehouse begins with the maximum quantity of product that can be stored rather than the number of expected units. The store staff will usually want to add extra room for loading and unloading docks, quality inspection and quarantine, packing and preparing shipments, and offices for administrative staff.

#### PHYSICAL INVENTORY COUNT

Stock-on-hand information is recorded but how is the accuracy of the information recorded on the stock card corroborated? The only way to be certain is to conduct a physical inventory count.

While conducting the physical inventory count, it is essential to compare the quantities on hand with the quantities that have been entered in records (for example, inventory control cards). A physical inventory count enables the storekeeper to confirm how much stock is at hand and whether forms are being completed correctly.

For quality assurance, a physical inventory count is also an opportunity to inspect products visually, as described earlier

The frequency of inventory counts depends on various factors, however the district storekeeper and/or District Health Officer (DHO) may advise a physical inventory count on quarterly, biannually, or yearly basis. If the storekeeper finds that the records do not match the actual stock, then there is need to conduct a physical inventory count more often and steps must be taken to improve recordkeeping.

When conducting a physical inventory count, it is important that the rules of proper storage are followed. Boxes are to remain sealed and only one box or carton is open at a time. A physical inventory count, therefore, can be a quick, routine exercise, especially if good storage practices are followed.

One factor that may deter storekeepers from conducting a physical inventory count is the large number of products in a storeroom that must be counted. Some options for conducting inventory counts in this situation include:

#### Complete physical inventory:

All products are counted at the same time. A complete inventory should be taken at least once a year. More frequent inventory (quarterly or monthly) is recommended.

#### **Cycle counting:**

The storekeeper conducts a physical inventory count for a fraction of items each month. By the end of the year, all items have been counted. When the next year starts, they begin the process again. Regular cycle counting can keep physical inventory up-to-date without disrupting store operations.

Selected products are counted and checked against the records on a rotating or regular basis throughout the year. This process is also called cycle counting.

#### Vital, essential, or nonessential (VEN) analysis:

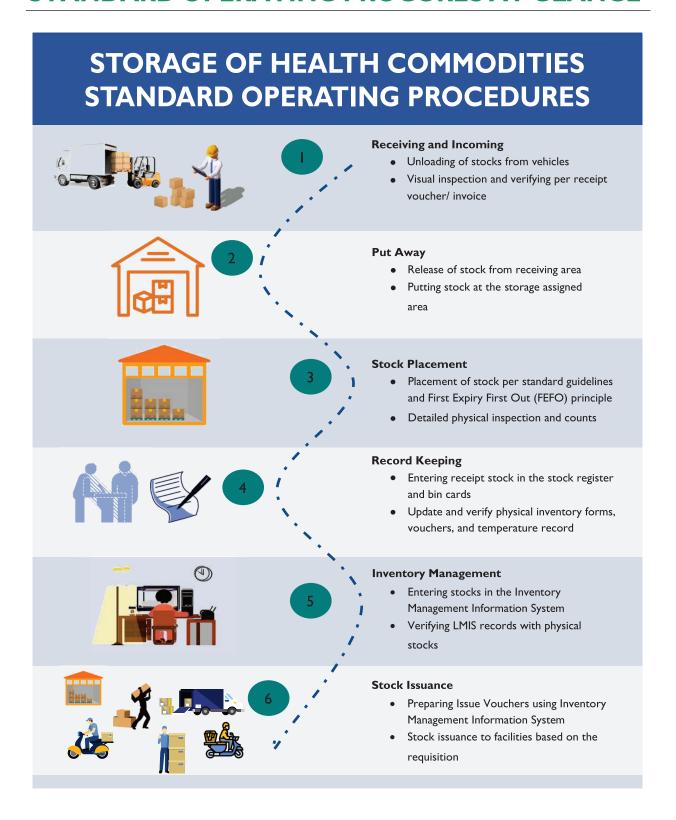
This involves counting the most essential, or most expensive items, more often. This analysis categorizes products as vital, essential, or nonessential, enabling the storekeeper to assess stocks of vital items more frequently than nonessential items.

#### **ABC** analysis:

In this process, the products are divided into three categories, based on monetary value. ABC analysis is not based on cost but rather how often a receipt or issue is made. Antibiotics can be issued more often from the store then any slow-moving stock like IUCD. In this situation, it is advised to count and assess antibiotic supplies more often.

As with assessing stock status, having many items to count does not need to be a barrier to conducting regular physical inventory counts or regular assessments of stock status.

# STANDARD OPERATING PROCURES AT GLANCE





# **USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM**

**Procurement and Supply Management**