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Family Planning Logistics Guidelines

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CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

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Preface

This manual was developed by technical advisors at the Centers for Disease Control and Prevention and the John Snow Inc. (JSI) Family Planning Logistics Management Project under an agreement with the Agency for International Development, Washington, D.C. It is designed for use by supervisors, managers, and administrative personnel who work in family planning programs in developing countries. The purpose of *Family Planning Logistics Guidelines* is to help programs manage contraceptive supplies and analyze logistics problems when they occur. When quality contraceptives are continuously available, a program is better able to reach new clients and retain existing ones. Over time, this can lead to an increase in contraceptive prevalence, which helps reduce the morbidity and mortality associated with frequent childbearing.

The first chapter provides an overview of the various components and objectives of the logistics system. Subsequent chapters address logistics information systems, inventory control, techniques for assessing supply status, and methods of calculating resupply quantities. Warehousing, quality assurance, and logistics evaluation guidelines are also discussed. Where appropriate, suggestions are offered for applying these guidelines at clinic, regional, or central levels.

Several chapters in this manual contain forms, examples, and formulas that can be photocopied for local use or quick reference. Although this manual is primarily designed as a general reference guide, it may also be used as a resource document for training. Because detailed family planning logistics procedures are not addressed in this manual, program managers are encouraged to seek the help of recognized experts when setting up a new program.

Comments and queries should be addressed to the Centers for Disease Control and Prevention, Division of Reproductive Health, Program Services and Development Branch, 1600 Clifton Road NE, Atlanta, Georgia 30333.

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Introduction to Logistics

Overview

The contraceptive logistics system

A contraceptive logistics system, in the broadest sense, encompasses all the activities that occur between the manufacture of contraceptive products and the point at which contraceptive products are dispensed to consumers. A contraceptive logistics system includes:

- Estimating future contraceptive needs (***forecasting***)
- Selecting methods
- Selecting ***sources*** of contraceptive supplies
- Setting up ***logistics management procedures***
- Ensuring reliable ***transportation***
- Developing an efficient ***warehousing system***
- Assuring contraceptive quality

In a country that is just beginning to develop a family planning program, supply needs are usually based on estimates of the population to be served. The program estimates its supply needs for the target population, identifies a source of supply, and then plans appropriate management, transportation, and warehousing systems. Family planning supplies may be donated to the program by international agencies, purchased from local or international suppliers, manufactured locally, or come from a combination of sources.

Uncontrollable factors in family planning programs

Most well established family planning programs will have little control over some parts of their logistics system. Sources of supply, warehouses, distribution points, and logistics

procedures are often already in place, particularly if family planning is linked to other health-related activities. Therefore, program managers are not free in the short term to make major changes in these facilities or procedures. In such cases, managers must try to improve the efficiency of existing systems rather than develop new systems.

Component Activities

Logistics system activities

At least ten different activities make up the logistics system in a family planning program:

1. Selecting items (contraceptives) to be used
2. Forecasting quantities to be procured or manufactured
3. Procuring items
4. Receiving items from suppliers
5. Managing the inventory
6. Warehousing items at the central level
7. Processing orders for lower levels
8. Transporting items to lower program levels
9. Warehousing at lower program levels
10. Serving consumers

Supply selection and *quantity forecasting* are not generally the responsibility of those who manage the logistics system, but rather are tasks completed by the various program divisions. For example, the contraceptives used may be chosen by a selection committee, perhaps including persons not directly employed by the program, such as a representative from the national drug control board or a consultant. Specific brands and quantities to be ordered may be determined by donor agencies and the local organization receiving the supplies.

Procurement results in a flow of supplies into the program. This supply flow involves inbound *shipping and receiving* operations. The materials are usually stored in a central warehouse and then shipped to family planning outlets for ultimate distribution to consumers. Intermediate activities include gathering and using supply information, transportation, and warehousing in the field.

Inventory management: the critical link

Managing the inventory is the central activity on which the others depend. Inventory management is the link between consumer demand and the program's manufacturing or procurement activity. If this activity is working properly, consumption lowers the inventory level and manufacturing or procurement raises it back up again in a continuing process.

The well-managed logistics system

All activities depend on and affect the others. If these activities are well-managed, the logistics system will function efficiently. A poorly managed system may suffer from stockouts, which can lead to decreased use of family planning services if clients frequently find their method or brand is not available. Additional program inputs, such as health promotion and education activities that are beyond the scope of the logistics system, are necessary to ensure a high level of consumer acceptance. However, a high level of acceptance can only be sustained if the contraceptives are always available and in good condition.

Objectives

The six "rights"

Many organizations, including family planning programs, state their logistics objective as "the six rights," which are: getting the *right quantities* of the *right goods* to the *right places* in the *right condition* at the *right time* for the *right cost*. "Right" does not mean that the logistics system can maximize service to consumers and at the same time minimize distribution costs. Maximum service requires large inventories, more

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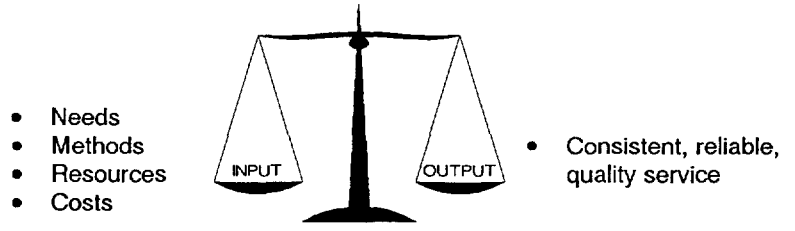
An efficient system balances input and output

frequent transportation, and many warehouses—all of which raise distribution costs. Minimum distribution costs often mean cheap transportation, low stock levels, and few warehouses. Rather, "right" refers to an efficient system in which "input" (i.e., program needs, methods, available resources, and costs) is balanced against "output" (i.e., level of service to outlets and consumers).



Included in system "inputs" are the transportation, inventory, and warehousing costs required to provide a given level of service. A system is efficient if an adequate level of service is continuously maintained using the minimum necessary level of inputs.

However, if reorganization is needed, input and output trade-offs are inevitable because changing one component of the logistics system affects all others. For example, if a program decides to reduce the number of shipments to its outlets from six a year to three to save on transportation costs, the quantity ordered and the quantity of inventory maintained must increase to provide the same level of service.

Ideally, all logistics system decisions should result in a level of service that meets outlet needs. The key logistics factors which determine this level or quality of service include:

Service factors

- Availability of accurate and timely information on consumption and stock levels
- Accurate forecasting of needs
- Timely ordering and processing of supplies

- Reliable delivery
- Organized and efficient warehousing

In a family planning program, the service provided to clients must be consistent and of high quality. Because a stockout can result in unwanted pregnancy, a program cannot afford to run out of contraceptives at any outlet and therefore must ensure that contraceptives are always available at all program levels. Similarly, overstock situations may allow the quality of the product to be compromised (through improper storage or expiration) and result in wasted resources. To be successful, family planning programs need a smooth flow of supplies and equipment with no overloads and no interruptions.

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Logistics Information Systems

Introduction

Every inventory control system must be supported by an information and records system that monitors the flow of goods and assures accountability for goods within the system. At a minimum, this information and records system must track:

Basic information needs

- Stock on hand -- the quantities of usable stock available at all levels of the logistics system at a particular point in time.
- Rate of consumption -- the average quantity of commodities dispensed to consumers during a particular period of time.
- Lead time -- the time required for new supplies to arrive once ordered.
- Losses/adjustments -- the quantity of contraceptives removed from the distribution system for any reason other than consumption by clients.

The more contraceptive products handled by the system, the more difficult the system is to manage, because each item has its own rate of consumption and lead time. As a result, the success of the system depends largely on the accuracy of logistics management data.

Accuracy of data

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As goods move down through the logistics system, information flows up through the system. This chapter addresses basic logistics management information systems and reporting requirements that can be used in program monitoring and evaluation. Examples of information management forms and reports are included for illustration and reference purposes. If your program already has standardized forms, compare them with these sample forms to ensure that all essential data are included.

Information and Record Systems

How supplies leave the system

Supplies can leave a family planning facility in four ways:

- Through the service delivery system
- Through transfers or loans
- Through loss or theft
- Through damage or deterioration

Categories of information system records

Tracking the movement of supplies by these four means requires a variety of records:

- *Stock Transaction Records* -- These include records of the amounts ordered, shipped, received, issued, and transferred.
- *Stockkeeping Records* -- These usually refer to stock cards, but may include other records.
- *Consumption Records* -- These monitor the quantities dispensed to family planning clients.
- *Inventory Reports* -- These summarize information on stock transactions and balances.

- *Quality Assurance Records* -- These include test requests and results, inspection control reports, and forms for recording the quality of shipments received.

Stock Transaction Records

The details of inventory control of family planning commodities vary from country to country depending on whether a "push" or "pull" inventory system is used. (See Chapter 3, ***Inventory Control Systems*** or the ***Glossary*** for a brief explanation of push/pull systems.)

In a *pull* system, where supplies are directly requested by a lower-level facility, a single requisition and issue voucher can generally be used to record stock transactions at all distribution levels. This form combines a requisition (request for supplies), an issue voucher (verification of supplies sent), and a receipt (proof of supplies delivered). Nonetheless, many programs use separate forms for requisitions, issues, and receipts. The principles for using them are the same, but information must be copied from one form to the next, increasing the workload and the possibility of errors.

Use of the requisition and issue voucher

Figure 1 is an example of a requisition and issue voucher used in a pull system. It is a simple form that lists each product (Column 1), quantities on hand (Column 2), quantities requested (Column 3), amounts shipped (Column 4), and amounts received (Column 5). If the program sells its contraceptives, the unit and total costs due from the recipient (Columns 6 and 7) are also stated. Although not shown on the sample form, stock numbers are helpful, especially if computers are used for inventory control.

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Figure 1

Requisition and Issue Voucher

Requisition and Issue Voucher No._____

Date: _____ Ship to: _____

_____

_____

	Requisition			Issue		Price		Remarks
	Product	Quantity on Hand	Quantity Requested	Shipped	Received	Unit	Total	
1.								
2.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
3.								
4.								

Requested by: _____ Date: _____

Approved by: _____ Date: _____

Shipped by: _____ Date: _____

Received by: _____ Date: _____

(Make 5 copies)

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"Pull" system stock transaction record

In this example, five copies are made of the requisition and issue voucher. The requester, approving officials, shipper, and recipient can each eventually have copies to initiate action and to confirm (or deny) that the requested action was taken. The final, fifth, copy is confirmation of receipt, sent back to the shipper. As an alternative, consider printing "multi-copy" or carbonless sets of stock transaction forms for distribution purposes. The "Quantity on Hand" column (Column 2) enables the logistics manager to confirm that the program policy for maximum and minimum stock levels and reorder points is being followed. (See chapters 3 and 4 for a discussion of maximum/minimum inventory control systems.)

Although this type of requisition and issue voucher can be used at all levels in a pull system, in some programs simple prescription forms or consumption records may work best at the clinic level.

"Push" system stock transaction record

In a *push* system, each stock transaction is initiated by the higher-level facility rather than the lower. In such a system, an issue voucher similar to the one in **Figure 2** can be used. This form is completed in quadruplicate by the issuing warehouse, which keeps one copy as a record of shipments in process. Three copies accompany the supplies; one copy is retained by the receiving facility, one is retained by the shipper, and the other copy is returned to the warehouse as proof of receipt.

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Figure 2

Issue Voucher

Issue Voucher No. _____

Date: _____ Ship To: _____

_____

_____

_____

Serial #	Article	Quantity Issued		Remarks
		Shipped	Received	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10				
11.				
12.				

Approved by: _____ Date: _____

Shipped by: _____ Date: _____

Received by: _____ Date: _____

(Make 4 copies)

Source: World Health Organization, Global Programme on AIDS

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Stockkeeping Records

Purpose and use of the stock card

The basic stockkeeping record is the stock card (**Figure 3**), which should be kept at every storage facility for each product in stock. The purpose of the stock card is to provide an up-to-date record of all transactions and of the amount in stock so that managers can easily determine trends in stock levels and distribution. Some programs use stock books for this purpose, but cards are preferable, as they are easier to manipulate. A stock card may also be called an inventory control card.

There should be a separate stock card for each brand and formulation of every product. For example, for each formulation of pill and each brand or size of condom. A stock card shows the quantities received and issued, as well as the amount in stock, and should also be used to record the results of physical inventories. The stock card also records the date of each transaction, so that lead time can be calculated.

The "Stock Number" entry records the number assigned to this particular product by either the manufacturer or the central warehouse. "Maximum Stock Balance" and "Minimum Stock Balance" refer to the highest and lowest quantities to be maintained for this product, and should generally be stated in terms of months of supply, as discussed in Chapter 3.

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Figure 3

Stock Card

Product _____ Maximum Stock Balance _____

Warehouse Location _____ Minimum Stock Balance _____

Stock Number _____ Unit of Packing _____

Date	Requisition and Issue Voucher No.	Quantity				Balance on Hand	Remarks
		Requested	Received	Issued	Loss/ Adjustment		

"Unit of Packing" is the number of individual pieces contained in the standard packaging for this product (e.g., 6,000 is the packing unit for A.I.D.-supplied condoms). It is very important to note that supplies should always be requested, issued, and reported by number of individual pieces, and not some larger unit such as packing cartons. This guideline is especially important in programs that receive commodities from more than one manufacturer, since the number of items in packing cartons differs from one manufacturer to the next.

Avoiding confusion over quantities

The "Requisition and Issue Voucher Number" column should refer to an actual voucher number. If the stock card is used at the central level, this column could refer to a vendor's invoice or other document indicating receipt of product. The key point is that this column links the stock card with the stock transaction record (requisition and issue voucher or other document) on file.

The "Remarks" column should be used to record contraceptive quality assurance test dates and results or to explain entries in the "Loss/Adjustment" column. Depending on program needs, the stock card may also contain the manufacture or expiration date.

In larger warehouses that manage many items or where the store management is physically separated from the supplies, "bin cards" are often maintained in addition to stock cards. Whereas stock cards are generally kept in a single file for easy consolidation, bin cards stay with the individual lot, batch, or shipment of a product. Bin cards are simplified versions of stock cards, in that the "Maximum Stock Balance," "Minimum Stock Balance," and "Quantity Requested" columns may be omitted. Bin cards should never replace stock cards, only supplement them.

Stock cards versus bin cards

Consumption Records

Accurate information on quantities dispensed at the clinic level is essential for proper management of any logistics system. Methods of collecting such data may vary depending on whether the program needs to track usage by individual client or general consumption within a given time period.

At many clinics, a daily activity register, such as the one shown in **Figure 4**, is sufficient to record consumption data.

Use of the daily activity register

The daily activity register has one line for each client served, including the actual quantities of contraceptives dispensed. Consumption data for all products are obtained by totaling each column of the daily activity register. Stock cards (and/ or bin cards) should be periodically cross-checked against the daily activity register to ensure that quantities issued from inventory have actually been dispensed.

Figure 4

Daily Activity Register

Date	Name of Client	Client Type		Contraceptives												COMMENTS/ REMARKS
				Oral Contraceptives (Cycles) Type				Injectables (Doses)		Norplant (Doses)	IUDs (Units)		Condoms (Units)	Foaming Tablets (No.)		
		New	Revisit					Depoprov.	Noristerat		Copper T	Other				
	Totals for this Page:															

Inventory Reports

Using inventory reports to summarize stock cards

Figures from stock cards can be summarized and entered on periodic inventory reports. In an inventory report, family planning outlets summarize the quantities in stock as well as the total receipts and total issues of each item in their storage facilities for the reporting period. Some programs report monthly. Where the rates of contraceptive use change slowly, however, quarterly reports are often preferred because they produce the needed information with less time spent on data management.

An inventory status report for a program should contain information similar to that shown in **Figure 5**, a form used in Kenya. This type of form can be used at all levels: central, regional, and outlet. It serves as a status report and as a request for resupply -- and is thus also a transaction record. [Note: the service statistics at the lower left corner of **Figure 5** are used in Kenya and are not necessary for inventory tracking purposes.]

Figure 5

Kenya Ministry of Health

Quarterly Report & Request for Contraceptives

Province: _____ District: _____ Location: _____

Facility Type: Depot ◯ District Store ◯ SDP/Clinic ◯ Other _____

Report for Quarter Beginning _____ , 19____ Ending _____ , 19____

Contraceptive	Beginning Balance	Received This Qtr	Dispensed/ Issued	Losses	Ending Balance	Quantity Needed
Microgynon						
Neogynon						
Eugynon						
Microlut						
Nordette						
Logynon						
Trinordial						
Depoprovera						
Noristerat						
Norplant						
Copper T						
Nova T						
Multiload						
Condoms						
Foaming Tablets						
Gloves						

New Clients	
Revisits	
Sterilization Referrals	
Natural FP Referrals	

Explanation of Losses: _____

Submitted By: _____

Date: _____

Source: Kenya Ministry of Health, Division of Family Welfare

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Use of report data

In some large programs, data from all periodic inventory reports are summarized to identify how many commodities are moving through all lower-level facilities in the program during the reporting period. It is essential that data on quantities *dispensed* from the lowest level reach the top level of the distribution system. These data are used to determine the inventory levels needed to maintain a sufficient supply, prevent supply imbalances, and estimate future needs. These decisions can be made correctly only if they are based on consumption data.

Data on quantities dispensed at all administrative levels can also be used to calculate Couple Years of Protection (CYP) as an estimate of the amount of contraceptive coverage provided by a program in a year.*

Central level reports

At the central level, periodic reports should be prepared on the status of supplies received from all sources and issued to all program levels. Examples of such reports include:

- Comparison of stock levels of each item at central and regional warehouses and at clinics in terms of (a) the total quantities in stock, and (b) the number of months of supply these quantities represent for the program as a whole.
- A trend analysis of the quantities of each item dispensed, by type of contraceptive and by region.
- Summary reports for senior program managers.

An inventory management system for a national family planning program must manage commodities supplied by many donor agencies or purchased locally. At the central level it is desirable to keep separate inventory records for identical commodities coming from different sources; at the field level this may not be necessary.

* CYP is explained in detail in Appendix D, *Supply Data Analysis*.

Uses of Inventory Report Data

At the operational level, inventory reports can be used to determine whether an order should be placed, and how much to order. At the supervisory and program management levels, the reports can help determine whether stock levels are in compliance with program policies and whether ordering procedures are being followed. At the program management level, problems of undersupply and oversupply can be detected across the entire program, and program method mix can be compared to data from contraceptive prevalence surveys.

Quality Assurance Records

Quality assurance begins with the purchase of a product and continues at intervals as the product passes through storage facilities and distribution channels to the consumer. This quality assurance process (which is described in detail in Chapter 8, ***Contraceptive Quality Assurance***) requires a documentation system that permits the tracking of:

Quality assurance tracking

- Receipt/issue dates
- Specific identifying product information such as
  - Type
  - Brand
  - Age
  - Lot number
- Product condition upon receipt
- Visual inspection sample information
- Inspection results
- Laboratory analysis reports

In establishing an effective quality assurance documentation system, use of the following (or similar) records is suggested.

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Requisition and Issue Voucher

The requisition and issue voucher should indicate the quantities ordered and include relevant product specifications in the remarks section (see **Figure 1**). As necessary, the voucher should request a certificate of analysis for each lot sent. Certificates may not be available for commodity donations.

Shipment Receipt Form

Use of shipment receipt form

Shipment receipt forms (see **Figure 6**) should be sequentially numbered and completed for each product as soon as the product arrives at the storage area. Information such as product name, lot number, expiration date, amount received, and general condition of the packaging should be noted on the shipment receipt form and on stock cards, as appropriate. The shipment receipt form is forwarded to the appropriate authorities and filed by shipment for future reference. One copy should also remain with the commodities in the warehouse.

The shipping cartons should be marked with the shipment receipt form number and the date the product was received. This number (and the lot number whenever possible) help identify the product from this point forward.

Inspecting damaged or broken shipments

If any of the shipping cartons arrive broken or damaged, their contents should be sampled and inspected. Any product damaged during transport should be isolated from the rest for a possible claim with the insurance company or supplier, after which time it should be destroyed or returned. The number of damaged cartons should be noted. If no damage is apparent, only one or two cartons should be opened at random to ascertain that shipping contents coincide with shipping documentation and with the procurement order.

Figure 6

Shipment Receipt Form

Shipment Receipt Form No. _____ Date: _____

Manufacturer's Name/Address: _____ Product/Brand Name: _____

_____

_____

Date of Manufacture: _____

Quantity per Carton: _____ No. of Cartons _____ Total Units: _____

Lot No.: _____ Expiration Date: _____

Purchase Order / Request No.: _____

Supplier: _____

_____

Cartons in bad condition: _____

Cartons in good condition: _____

Comments: _____

_____

_____

_____

_____

_____

_____

Name of person acknowledging receipt: _____

Signature: _____

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Recording inspection results

Inspection Control Report

Any time a visual inspection is carried out, the results should be recorded on an inspection control report (see **Figure 7**). In addition, a representative sample of the entire batch should be retained for future checks when dealing with new or unknown manufacturers. (See Chapter 8, ***Contraceptive Quality Assurance,*** for inspection guidelines.)

Figure 7
Inspection Control Report

Date: _____ Receipt Report No. _____
Product: _____ Lot No: _____
Brand Name: _____ Manufacturer: _____
Expiration Date: _____ Date of Manufacture: _____
Inspection Lot Size: _____ Sample Size: _____
Warehouse Location: _____ Second Sample Size: _____

Reason for inspection:

INSPECTION RESULTS — Number of Defects in Sample

CRITICAL DEFECTS: _____
MAJOR DEFECTS: _____
MINOR DEFECTS: _____

INSPECTED : ☐ Signature _____
APPROVED : ☐ Signature _____
REJECTED : ☐ Signature _____

When critical defects are found in a lot, a 100% inspection shall be carried out. Any units displaying critical defects shall be removed. After determining that the lot contains no more units with critical defects, and is otherwise acceptable, it can be approved.

COMMENTS:

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Consolidated Files and Records

The ability to easily locate and retrieve records is very important to the proper control of contraceptives. For each order or shipment received, a file should be established containing copies of shipment receipt forms, inspection control reports, and issue vouchers for all distributions of the product. These files should be maintained with the commodities at the central and regional level and with the appropriate program or medical/technical authority. One copy of all inspection results should also be forwarded to the donor or central local authority responsible for procurement. If the product has been analyzed in a laboratory, include the analysis reports in this file.

3

Inventory Control Systems

Introduction

A well-managed family planning program uses an inventory control system that maintains sufficient stock levels of all contraceptives. At the same time, programs must not hold too much stock in inventory, since this can lead to a waste of both money and contraceptives.

Purpose of inventory control

Controlling and maintaining the proper types and quantities of contraceptives at all program levels requires a basic knowledge of the following logistics activities:

- Selecting the items to be used
- Managing inventory
- Procuring and ordering supplies
- Determining maximum and minimum inventory control systems
- Scheduling delivery
- Shipping
- Receiving
- Transporting supplies

This chapter presents general guidelines for managing these activities and provides helpful information for identifying and resolving logistics problems accurately and quickly.

Although warehousing and forecasting are major components of the logistics system, they involve specialized activities and require prior knowledge of the other logistics system components. They are therefore covered separately in Chapters 6 and 7, respectively.

Selecting the Contraceptives and Items to Be Used

The *quantities* and *types* of contraceptives that are ordered and distributed are usually determined by consumer demand and program policy. Product selection decisions frequently require policy maker input, leaving the program manager with little influence on actual product selections. As appropriate, program managers should share information on local and regional contraceptive preference with policy makers so consumer demand may be considered when the final product selection is made.

Minimum flexibility in determining brands

In determining the specific *brands* to be used in government programs for free distribution, consumer demand plays a lesser role. Specific brands are frequently determined by donor agency preference. For example, public sector program managers may have some flexibility in specifying that a certain percentage (usually 10%-15%) of oral contraceptives be of the mini-pill (progestin-only) type, but they usually have little say in the brand procured.

Several other variables also affect the selection of contraceptives and related items:

Variables affecting selection decisions

- Price
- Procurement procedures and regulations (for example, competitive bidding requirements)
- Availability of locally produced products

- The scope of the family planning services offered and whether these services are integrated with other healthcare activities
- Local laws governing contraceptives
- The economic development of the area (including the affordability of particular contraceptive products)
- The availability of trained service providers (skilled in the clinical and counselling aspects of methods to be dispensed)
- Preferences of donor agencies and selecting groups (i.e., committees, service providers, planners, or consumers)

The net result is that items of supply vary from one family planning program to another and that no single set of guidelines applies to all situations. The most effective product selection decisions are those which consider the goals of the entire logistics system.

Inventory Management

Importance of proper inventory management

The purpose of inventory management, the heart of any logistics system, is to maintain and store the right quantity of supplies to meet consumer demand for contraceptives at all program levels. Without proper inventory management and control, an undersupply or oversupply of contraceptives can occur, either of which will adversely affect the program. An undersupply means stock-outs or hoarding may occur and fewer clients will be served; an oversupply may result in waste.

Inventory management systems tend to fall into one of two categories:

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Types of inventory management systems

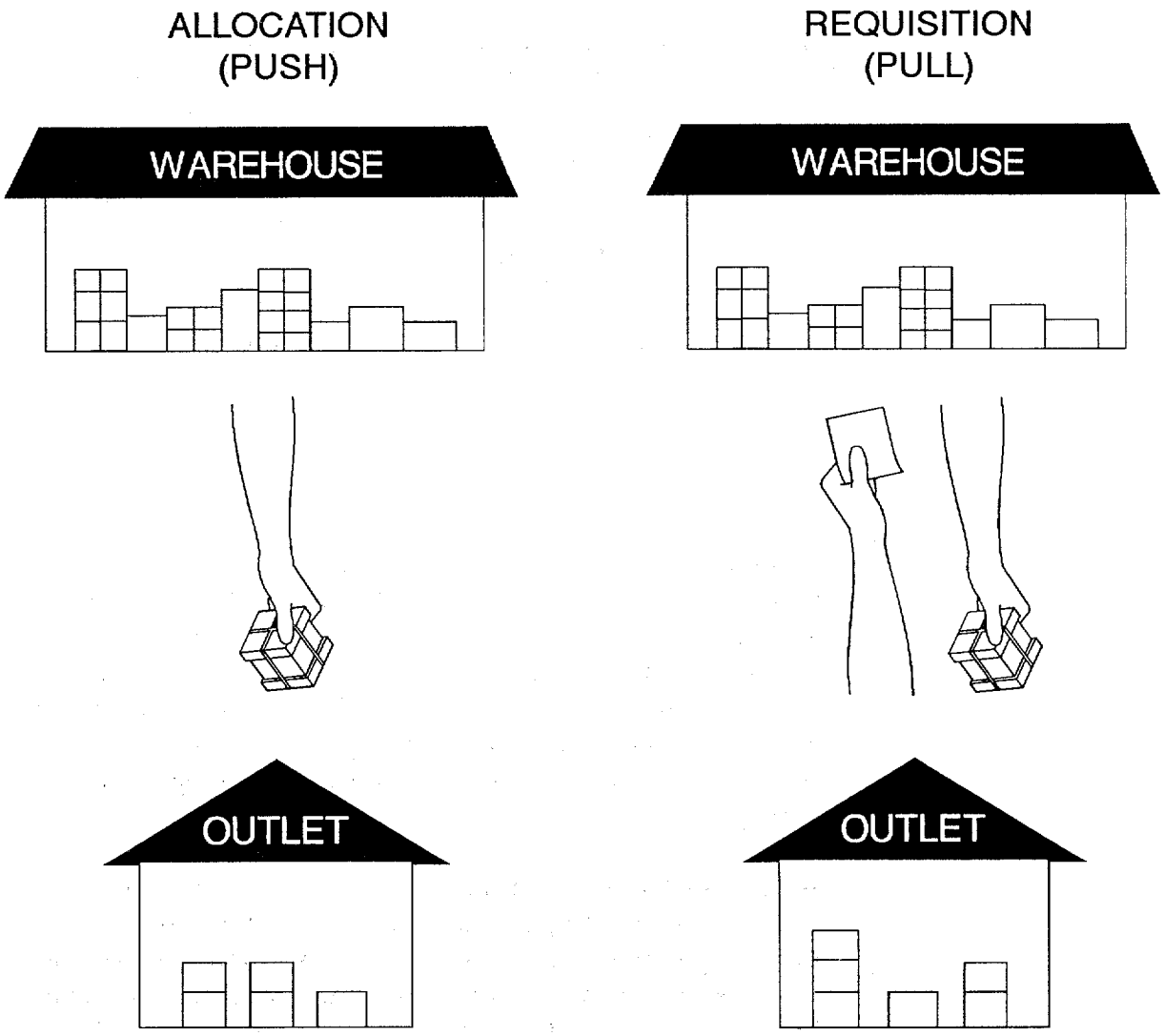
- The *push*, or allocation system, in which the central and intermediate warehouses decide how often and how many supplies should be sent to the lower storage facilities and outlets

- The *pull*, or requisition system, in which the outlets request supplies and the higher-level storage facilities respond

The essential difference between the systems lies in the location of decision making for the flow of supplies. In the push system, this decision is made at the higher level; in the pull system, at the lower. Thus, in a push system the outlets are not responsible for ordering their own supplies; in a pull system they have this responsibility (see **Figure 8**).

Figure 8

Types of Inventory Control Systems



DECISIONS:

- Timing
- Amounts

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The push system

Each system has advantages and disadvantages. Some of the advantages and disadvantages of a push system include:

ADVANTAGES	DISADVANTAGES
1. Personnel require little training at the receiving level(s)	1. More report data must be handled for multiple supplies, outlets, or at higher program levels
2. Outlets cannot order more supplies than they need	2. Field staff are not involved in logistics decision-making
3. Enough stock can be kept in the outlets to meet program policy or stock can be appropriately rationed when there are shortages	3. Central office staff cannot respond to unusual conditions at lower levels.

The pull system

In most cases, the advantages and disadvantages of a pull system are the opposite of those for the push system. One advantage of a pull system is that once it is operating well, the need for reporting stock balances, items dispensed, etc., can be minimized. However, a pull system initially requires close supervision at field levels, especially when field personnel lack knowledge and experience in logistics management.

A push system is recommended where conditions are uncertain and field personnel have had little or no experience in supply management. As key supply personnel become more experienced and better trained, it may be possible to implement a "mixed" system. An example of a mixed system is a pull system from the central warehouse to the intermediate warehouses, and a push system from the intermediate warehouses to outlets. Another type of mixed system is where certain items are allocated automatically and others have to be ordered.

To summarize, there are three major factors to consider when deciding whether to use a push or pull system or a combination of these:

Choosing an inventory control system

- The management skills of the individuals working at each level in the system
- The information available at each level about actual usage
- The number and quantity of different items managed

Push Systems Work Best When:	Pull Systems Work Best When:
1. Staff at lower levels in the system do not have the management skills necessary to make logistics decisions	1. Staff at lower levels in the system have sufficient management skills to make logistics decisions
2. Information about actual consumer usage at outlet levels is available and reliable	2. Data-processing capacity at the central level is limited
3. Responsibility for program operations is centralized	3. Responsibility for program operations is decentralized
4. The system manages relatively few items	4. Many items are included in the system
5. Demand for supplies is greater than the amount of supplies available; supplies thus must be rationed among facilities at lower levels	5. Supervision at field levels is an integral part of the program

Some programs operate as a push system, some as a pull system, and still others are a combination of both. In general, programs tend to start as push systems and convert to pull systems when skills are improved, when the program has established accepted routines, and when shortages of various items of supply are minimized. Where appropriate, a pull system is recommended.

Guatemala: a successful push system

For example, the Guatemala Ministry of Health uses a successful push system. The program is staffed by a director, several medical advisors, and support personnel. Each medical advisor is responsible for supervising approximately 140 health facilities every 6 to 8 weeks. To determine how many contraceptive supplies should be issued to the facilities, the medical advisors review the logistics data maintained by the facilities and take physical inventories. Since this logistics system has been in operation, very few health facilities have reported shortages of contraceptive supplies. One result of the program is that the quantity of contraceptives dispensed doubled in 2 years.

Panama: a successful pull system

On the other hand, the Social Security Institute in Panama uses a pull system. Unlike the Guatemalan system, health facilities in Panama determine the timing and quantity of the flow of supplies. At least one person in each health facility is trained in supply management, and is responsible for requesting supplies when quantities reach a minimum level. Whereas the Guatemala system only manages family planning commodities, the Panama system manages the needs of the total health system, including hundreds of different items.

Procuring and Ordering Supplies

Procurement activities in the logistics system depend heavily on demand and timing. These factors, in turn, influence order quantities, stock levels, delivery schedules, and emergency reserves. Most supply systems use two basic types of orders for procuring supplies:

Basic order types

- *Regular orders* are routine orders generally placed periodically (monthly, quarterly) or when stock levels fall to a predetermined reorder point. Regular orders are designed for relatively large quantities to be shipped by low-cost transportation.

- *Emergency orders* are placed when stocks are depleted to avoid running out of supplies. An emergency order may require an expensive means of communication, such as a telegram or a telephone call, an expensive means of transportation, such as air freight, and may be impossible to fill. Some programs avoid such expense by borrowing supplies from a nearby unit. In these cases, the "lender" and the "borrower" should be resupplied as soon as possible.

Minimizing emergency orders

The demand for contraception in most family planning programs usually can be predicted accurately enough to minimize the need for emergency orders. Often, emergency situations arise because a special campaign is scheduled without considering the availability of supplies to support it or the increased demand that follows. Emergency situations can also be caused by breakdowns in transportation or administrative delays. Family planning programs should establish procedures to minimize such occurrences.

Maximum and Minimum Inventory Control Systems

How stock levels are expressed

The amount of stock on hand, or *stock level*, at a given facility should be based on the quantities needed to ensure the continuous availability of contraceptives. Levels are therefore expressed in terms of a certain number of months of supply to meet anticipated demand. When program policy requires three months' supply in all outlets, however, confusion can result over how much more or less than this quantity may be kept on hand.

Clarifying understock and overstock conditions

An understock or overstock condition can be better understood by using a range to express the quantities to be kept on hand. For example, a program may establish a clinic stock level of not less than three months' and not more than six months' supply. Less than the three-month minimum is understock; more than a six-month maximum is overstock. This is called a maximum/minimum system. Its basic elements are:

Basic elements of the maximum/ minimum system

1. ***Lead time***—The time interval between the time supplies are ordered (or, in a push system, allocated) and when they are received and available for issue.

2. ***Safety stock****--The buffer, cushion, or reserve stock kept on hand to protect against stockouts caused by delayed deliveries or markedly increased demand.

3. ***Maximum quantity****—The quantity of stock above which inventory levels should not rise under normal conditions. Routine stock orders should be the amount required to bring inventory levels up to this point.

4. ***Minimum quantity****—Standard variation - The stock level which, if reached or fallen below at the usual time of reorder, triggers the reorder of stock; the average quantity of stock used during the lead time plus the safety stock.

* In a maximum/minimum inventory control system, these are expressed in terms of "months of supply."

Continuous review variation - The stock level at which more stock should be reordered immediately; the average quantity of stock used during the lead time plus the safety stock.

Forced ordering variation - The stock level below which stocks should not routinely fall. Often, it is the trigger for placing an emergency order.

5. ***Order interval***—Also known as *review period* or *resupply interval*. The routine interval of time between reviews of stock levels to determine whether or not an order should be placed. (Not applicable to the continuous review variation.)

6. ***Average Monthly Consumption*** -- the average of actual quantities distributed each month in a given time period (usually the most recent six months). It is sometimes called average monthly use.

In general, maximum and minimum stocks must be high enough to cover periods of heavy use and to provide an adequate supply until the arrival of a new shipment. At the same time, stock levels should not be so high that stocks cannot be stored safely or used before their expiration dates.

Maximum/minimum variations

Most programs with a maximum/minimum system use one of the following variations:

1. In the standard variation, stock levels are reviewed on a fixed timetable, either monthly or quarterly, but an order is placed only if the stock balance is at or below the minimum level. The quantity ordered is the amount needed to bring the supply on hand up to the maximum level. The major advantage of this system is that very small shipments are eliminated and storekeeper decision-making is simplified. A potentially serious disadvantage is that minimum and maximum stock levels must be set relatively high, thereby increasing the

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chances of product expiration or deterioration before delivery or use.

2. The continuous review version is used by some programs in which stock levels are reviewed each time product is issued, rather than at fixed intervals, and an order is placed if the minimum has been reached. This version is generally suitable only for programs which manage a very small number of products.

3. In the forced ordering version of the maximum/minimum system, periodic orders bring stock balances up to the maximum level regardless of the stock balance on hand. This version is used by many programs and the examples and text which follow assume forced ordering is used.

The "topping up" system

A variation of forced ordering used by some programs for resupplying outlets is the *topping up* system. This is a combination of push/pull in that supervisors draw supplies from the warehouse before making supervisory visits. The supervisor inspects the stocks and records of the outlets visited and, in consultation with the manager of the outlet, determines the quantities needed to "top up" the supplies to their maximum level. A receipt is prepared, and the supervisor provides the contraceptives directly to the outlet.

The topping up system has the obvious advantages of involving local managers and supervisors in inventory decisions, eliminating the need for shipment, and reducing paper work. The main consideration is that supervisory visits must be regularly scheduled, and any lack of transportation or unavailability of the supervisor will disrupt the flow of contraceptives.

When deciding which maximum/minimum alternative to use, program managers must take the following factors into consideration:

Considerations in using maximum/ minimum systems

- Cost, difficulty, and reliability of transportation
- Reliability of source of supply
- Availability of adequate storage space
- Cost of storage
- Shelf-life of contraceptives
- Lead time
- Accuracy of forecasting
- Management skills of staff at lower levels
- Cost of contraceptives

In some cases it may be appropriate to use different maximum/minimum variations at different program levels.

Although maximum/minimum systems are simple to operate, considerable care must be taken in establishing the maximum and minimum levels. Once established, these levels should be periodically reviewed for appropriateness and adjusted for program growth, as needed.

Setting maximum and minimum levels

A program's maximum and minimum supply levels are critical because they determine how frequently an order must be placed and the average amount of stock to be maintained.

EXAMPLE

If a distribution point's maximum number of months' supply is 6 months, its minimum number of months' supply is 3 months and the projected distribution for an item is 50 per month, then maximum quantity is 6 x 50 = 300, and minimum quantity is 3 x 50 = 150. The minimum frequency of resupply is 6 - 3 = 3 months. There must be at least 1 shipment every 3 months, or 4 shipments per year.

The maximum and minimum months' supply of each contraceptive product are usually calculated based on the most recent 6 months consumption of that product. When maximums and minimums are estimated at the central level, a growth factor is typically added, and/or more sophisticated projection formulas are used. At lower levels, safety stock inventory is generally used to cover any short- term increases. (See Chapter 5 for formulas on maximum/minimum calculation.)

In an ongoing program, the choice of maximum months' supply and minimum months' supply should be based on the lead time, the resupply interval, and the reliability of the source to deliver on schedule. In most programs, the frequency of resupply is heavily influenced by such factors as the availability of transportation and the relative accessibility of different geographical areas.

Maximum and minimum quantities for new programs

In a new program where no previous data are available, maximum and minimum quantities should be estimated for each location by using the best estimates of lead time and considering the target population to be served. Program planners sometimes express targets to be served as a percentage of married women of reproductive age or as a percentage of all women of reproductive age. Also applied to the target is a percentage estimate of the contraceptive method mix. The manager of the logistics system must then estimate the maximum and minimum quantities of the various contraceptives to be stocked. (See Chapter 7, ***Forecasting,*** for a more detailed discussion of how these estimates are made.)

NOTE

As discussed in Chapter 2, care must be taken to ensure that planners at all program levels understand the difference between quantities ***issued*** from a central warehouse to field warehouses and service delivery points and quantities ***dispensed*** to users. One way to clarify this is to use different terms for these transactions. For example, some programs use the word *dispensed* for those items given to consumers and *issued* for items sent from one facility to another. Inventory management decisions at all levels should be based on quantities dispensed to users.

Safety Stock

Protection against unanticipated increases or delivery delays

Safety stock is the portion of the minimum stock which provides a reserve of contraceptive supplies to be used in the event of unanticipated increases in demand or breakdowns in the supply system. Safety stock may be used when:

- Demand increases suddenly and unexpectedly
- Unforeseen losses occur, such as flood or fire damage
- Reports are submitted late in a push system
- Requisitions are submitted late in a pull system
- Delivery is delayed
- Supply personnel do not order enough contraceptives

Emergency orders might be needed in situations where demand is so high that safety stock will be depleted before a routine order can be received. The greater the uncertainty in either demand or lead time, the larger the safety stock needs to be. Since stockouts have a negative impact on program goals, managers should err on the high side in setting safety stock levels. However, the need to maintain adequate reserves must also be balanced against greater inventory and handling costs.

Managers should periodically analyze data on fluctuations in demand and lead time to detect safety stock levels that are too high. Stock levels may be calculated monthly or quarterly, based on a six-month "moving average" of monthly consumption.

Delivery Schedules

Delivery schedule considerations

In addition to choosing what type of ordering system to use and how many supplies to keep on hand, planners must determine a delivery schedule for stock orders. The delivery schedule is largely based on three factors as they apply to each program location:

- The amount to be dispensed to consumers (demand)
- The amount to be maintained on hand (inventory)
- Lead time

The delivery schedule is then determined by:

- Order size -- how many contraceptives should be ordered
- Order interval -- how often they should be ordered

Obviously, the order size and the interval are interrelated. The order size determines how often it will be necessary to deliver supplies, and the order interval determines the size of the order. If an order is large, fewer deliveries are needed, and handling and transportation costs are reduced.

However, fewer deliveries require higher stock levels and more storage space. For example, certain family planning outlets in difficult-to-reach areas might be resupplied only twice a year. This schedule would require keeping up to 9 to 12 month's supply of contraceptives on hand, since the clinic should have safety stocks on hand when the semiannual supply of contraceptives arrives. If the storage space at the clinic is inadequate (too small, damp, subject to theft, unprotected from pests, etc.), this procedure is not acceptable. On the other hand, if the storage space at the clinic is satisfactory, costs of storage at the central level and transport costs to the field could be reduced.

Supply personnel should place an emergency order whenever any item might be out of stock before the scheduled shipment arrives. If this happens very often, the minimum amount to be kept on hand for those particular items should be increased.

Shipping from Suppliers

Monitoring and communicating delays

The shipping of contraceptive supplies from suppliers to central warehouses is largely the responsibility of donor agencies, distributors, and manufacturers. However, central-level program staff should find out in advance which products require registration and what documentation is needed to avoid unnecessary delays in port. Because some supplies (especially condoms) are extremely sensitive to sub-optimal environmental conditions, transit times should be monitored to ensure that the particular shipping companies or routes do not cause excessive delays in the arrival of supplies. When problems are detected, suppliers should be informed so they can take corrective action. It is usually best for deliveries to be spread out over the year.

Receiving from Suppliers

Receiving shipments from suppliers outside the country consists of receiving shipping documents and goods at the port of entry, clearing customs, and checking the supplies received. Prompt clearance and delivery of program commodities are essential to an efficient logistics system because storage charges at the port are usually high and storage conditions are usually poor. However, the problems encountered in this activity are so specific to individual countries that the topic is beyond the scope of these general guidelines.

Ensuring prompt customs clearance

Program staff should monitor customs clearance time and, if excessive, consult with customs brokers to minimize delays. For prompter clearance, suppliers should use international air couriers to send original shipping vouchers (for example, bills of lading) and other necessary documents so they arrive at the destination well before the shipment itself. The responsibility for processing documents and clearing goods through customs should be clearly allocated to appropriate staff within the receiving institution. (See Chapters 2 and 8, respectively, for guidelines on documenting and inspecting supplies received.)

Transportation

Getting supplies to a desired location on time and within budget is another logistics system challenge facing the program manager. The manager needs to handle such transportation issues as alternative types of transportation, the transportation budget, and the use of commercial transportation methods.

Transportation Alternatives

A family planning program has three major alternatives when planning the transportation of supplies within the country:

- Program-owned and -operated transportation
- Shared transport with other related programs within the Ministry of Health (e.g., vaccine distribution program)
- Commercial transportation

Clinic staff can transport supplies when they visit district- or central-level headquarters in the course of other business.

This arrangement is not recommended as a program policy because such visits are often sporadic and cannot ensure regular resupply. Of course, this may sometimes be the most expedient way to obtain supplies.

Program-owned and -operated transportation advantages

The major advantages of program-owned and -operated transportation include:

- Greater control over scheduling and delivery
- Lower operating costs if vehicles are also used for general program purposes at the same time
- Reduced need for commercial transportation in rural locations

Shared transport advantages

The major advantages of shared transport are:

- Possible efficiencies through reduced duplication of personnel, vehicles, or equipment
- Cost savings through combining shipments

Commercial transportation advantages

The major advantages of commercial transportation are:

- Simplified administration, since the program is not responsible for vehicle maintenance or drivers
- Cost savings through combining shipments
- Savings in capital investment for vehicles and repair facilities
- Greater flexibility for handling different-sized shipments

If program managers rely on program-owned and -operated transportation, they must choose between using commercial repair and maintenance facilities or program-operated

Maintenance and repair facility decisions

facilities. The advantage of commercial repair facilities is that the program has greater control over the quality of work performed because it can switch to a different repair facility if necessary. However, program-operated repair facilities sometimes cost less. Many programs use a combination of both types—routine maintenance by program mechanics and major repairs by commercial facilities.

Types of Commercial Transportation

Air freight considerations

When commercial transportation is used, managers must consider the volume, weight, and urgency of the shipment. In most countries, air freight is the fastest and most expensive form of transportation by weight, followed by motor freight, then rail and water. However, *small* shipments can sometimes be sent more economically by air freight because of lower handling costs, faster delivery times, and other factors. This principle especially applies to contraceptives, which are light in weight compared to their bulk and are usually packed in lightweight cardboard cartons.

Transportation Budget

Transporting supplies within a country requires an adequate budget to ensure that the supplies are distributed efficiently. However, problems with financing transportation will frequently arise. The facility that ships the supplies should pay for transporting supplies to lower levels. Experience shows that when the lower levels receiving the goods are responsible for payments, budgets are often inadequate.

4

Assessing Supply Status

Introduction

It is important to assess the status of contraceptive supplies in order to determine whether the balances on hand are too little, satisfactory, or too much. Supply status can be assessed at all levels of the program or for individual clinics and warehouses. Such an assessment is useful for:

Value of assessing supply status

- Identifying oversupply or undersupply in the logistics system
- Identifying and preventing "bottlenecks" in the flow of supplies
- Projecting future supply requirements for the program

The most common way to evaluate the supply status of a program is to first conduct a physical inventory and then compare stocks and scheduled shipments to consumption and the quantities entered on daily activity registers and stockkeeping records. (See Chapter 6, ***Warehousing***, for suggested guidelines on conducting a physical inventory.)

After a physical inventory, the next step in assessing supply status is to enter the following information on the stock card:

- Date

- Quantity counted in the inventory under the "Balance on Hand" column
- Reasons for discrepancies (for example, "Error in calculation" or "Neglected to enter 5000 sent to regional warehouse")

Once the stock cards are updated, the number of *months of supply on hand* for each contraceptive is calculated and compared to recommended program supply levels. This chapter provides helpful formulas for determining months of supply on hand and recommends guidelines for maximum and minimum supply levels.

Relating Stock Levels to Usage

The quantities of contraceptives in stock, by themselves, are not enough to evaluate supply status. That amount must be compared with the rate at which contraceptives are used to provide a meaningful indicator of supply status. This comparison is done by converting the quantities in stock to the number of months of supply on hand.

Calculating the number of months' supply on hand

For example, if an outlet distributes to users an average of 500 cycles of pills per month and has 2500 cycles in stock, there are enough pills for 5 months' use. This is often expressed as a 5 months' supply. This is illustrated by the following formula, which applies to all program levels:

FORMULA

$$\frac{\text{Balance on Hand}}{\text{Avg Monthly Quantity Dispensed to Users}} = \text{Months of Supply on Hand}$$

Note: Where consumption is reasonably stable, it is recommended that programs use 6 months of data to calculate their average monthly consumption. A 6-month average smooths out wide fluctuations in the data better than an average using fewer months.

Sources of balance-on-hand information

The balance-on-hand information used in this formula may come from a variety of sources, including:

- Physical inventories
- Stock records
- Lower level stock reports

Note that in this formula, the balance of stock on hand is divided by the average monthly quantity dispensed to users, or the *average monthly use.* An average is used instead of the quantity dispensed in one month, to smooth out sharp increases or decreases in demand that might occur in any given month, as illustrated below.

FORMULA

$$\frac{\text{Quantity Dispensed During Past 6 Months}}{6} = \text{Average Monthly Use}$$

EXAMPLE

April	1,200
May	600
June	1,000
July	836
August	800
September	1,000
TOTAL	5,436

$$\frac{5{,}436}{6} = 906 \text{ average monthly use}$$

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Six months is usually enough time to get a reasonable average. However, to ensure that the data reflect current consumption, it is important to use the most recent six-months' data on quantities dispensed to users, rather than quantities issued from higher-level warehouses to lower-level warehouses.

Data on quantities of contraceptives dispensed to users are typically gathered from clinic records. Since some programs do not gather this information, it may be necessary to substitute the amounts sent from warehouses to clinics. However, warehouse shipments give a less accurate evaluation of supply status because in certain periods, quantities dispensed to users may be high while warehouse shipments are low, and vice versa. Where consumption data are unavailable, data on the amount issued from the lowest-level storage facilities should be used, since these more closely reflect quantities dispensed to users.

The calculations provided on the following page can be used to determine supply status for each type and brand of contraceptive used at various program levels.

Formulas for determining supply status

FORMULAS TO CALCULATE MONTHS OF SUPPLY ON HAND

1. **GENERAL FORMULA**

$$\frac{\text{Balance on Hand at all Levels}}{\text{Average Monthly Dispensed to Users By all Outlets in the Country}} = \text{Months of Supply on Hand}$$

2. **OUTLET LEVEL**

$$\frac{\text{Balance on Hand in Outlet}}{\text{Average Monthly Quantity Dispensed to Users by Outlet}} = \text{Months of Supply on Hand}$$

3. **ALL OUTLETS IN A DISTRICT**

$$\frac{\text{Balance on Hand In All District Outlets}}{\text{Average Monthly Quantity Dispensed to Users by All Outlets in the District}} = \text{Months of Supply on Hand}$$

4. **DISTRICT WAREHOUSE**

$$\frac{\text{Balance on Hand In District Warehouse}}{\text{Average Monthly Quantity Dispensed to Users by All Outlets in the District}} = \text{Months of Supply on Hand}$$

5. **CENTRAL WAREHOUSE**

$$\frac{\text{Balance on Hand in Central Warehouse}}{\text{Average Monthly Quantity Dispensed to Users by All Outlets in the Country}} = \text{Months of Supply on Hand}$$

Once the number of months of supply on hand is calculated for each contraceptive brand in stock, the results should be compared to the recommended maximum and minimum supply levels for the particular program.

This is useful for identifying outlets and storage points that are out of compliance with program policies or recommendations. More importantly, the information gathered during the evaluation can suggest actions to correct or prevent oversupply or undersupply conditions.

Pipeline Analysis

The supply flow as a pipeline

The flow of supplies from the manufacturer to the consumer is frequently referred to as a "pipeline." Water (and similarly supplies) put into the top of a pipeline flows from one point to another, until it eventually exits at a tap (or outlet). In a water pipe, the size of the pipe determines the speed of water flow under a given pressure. Similarly, the capacity of the entire pipeline is determined by the capacity at its narrowest point. Interruptions, leaks, or sudden increases in the flow of supplies through the logistics pipeline can result in breakdowns, losses, and disruptions of service.

Purpose of a pipeline analysis

A pipeline analysis seeks ways to keep the flow of supplies moving smoothly. This analysis can:

- Ensure that supplies reach their ultimate destination point long before they expire.
- Identify bottlenecks that disrupt the flow of supplies.
- Simplify the distribution system by eliminating the causes of bottlenecks.
- Increase levels of service by ensuring continuous availability of contraceptives.

- Reduce program costs by eliminating unnecessary links in the distribution channel.

The steps needed to conduct a pipeline analysis are relatively simple and use data readily available at most program levels. These steps include:

Basic steps for conducting a pipeline analysis

1. Drawing the system in a flow-chart format.

   - **Figure 9** is an example of a basic supply pipeline that receives contraceptives from only one higher-level facility.

2. Identifying the total length of the supply pipeline.

   - If a maximum/minimum inventory control system is used as described in Chapter 3, then the total length of the pipeline is simply the sum of the maximums (expressed in number of months of supply on hand) at all levels.

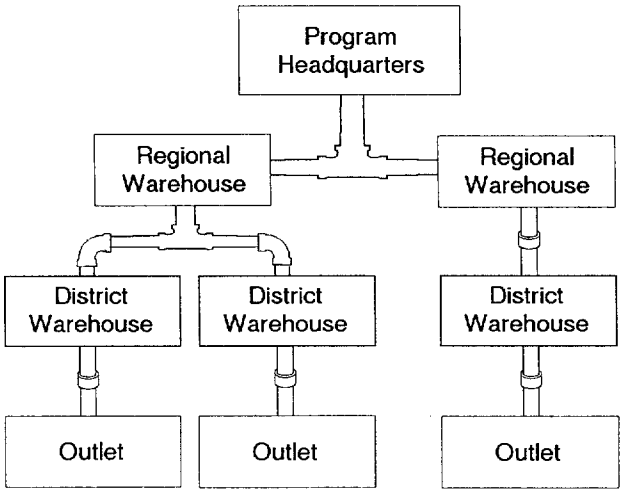
3. Reviewing transportation links and capacity constraints for causes of bottlenecks.

   - This involves reviewing available records and reports for causes of miscalculated lead times, stockouts, emergency orders, transportation problems, inadequate warehouse space, and product deterioration.

   - In a properly functioning pipeline, supply levels at each facility will fluctuate between the maximum and the minimum levels. An order will be placed each review period for the difference between the maximum and the amount of stock on hand. (See Chapter 5, ***Determining Issue Quantities***).

Figure 9

Supply Pipeline



Since many supplies are perishable and most program managers have little control over the external portion of the pipeline (i.e., the time between manufacture and actual shipment to a central warehouse), the in-country segment of the pipeline should be kept as short as possible. This may be achieved by either eliminating intermediate points in the distribution chain or by reducing the maximum and minimum months of supply at each level.

Increasing pipeline capacity

An alternative way to increase pipeline capacity and reduce potential bottlenecks is to increase the frequency of deliveries to a particular link in the pipeline. For example, a single truck that makes a monthly delivery can deliver three times as many supplies as the same truck that makes only one delivery per quarter. Although this may be an obvious solution to ease capacity constraints, the value of delivering supplies more frequently must be weighed against such factors as fuel costs, driver/transport availability, and transportation conditions. In some situations it may simply

not be possible to deliver supplies at more frequent intervals. In such cases, program managers may have to tolerate longer pipelines and try to improve warehouse conditions as a means of extending product shelf-life.

Data sources for conducting a pipeline analysis

Sources of data from which a pipeline analysis can be conducted include the stock transaction and inventory records and the inventory reports described in Chapter 2. Stock transaction or inventory records can be used to calculate and validate lead times. Both inventory reports and stock transaction records can be used to identify outlets or storage points that have experienced lengthy pipeline delays, stockouts, or product deterioration. Interviews with program staff all along the pipeline can also be very informative. The goal of any pipeline analysis is to strike a balance between maximum/minimum stock policies, delivery schedules, and the frequency of data review so problems are detected and corrected at the earliest possible stage.

Determining transportation capacity requirements

Since transportation capacity is crucial to the efficiency of a supply pipeline, program managers should not ignore this factor when reviewing links in the distribution chain. Volume of supplies to be transported can be calculated from the weight and/or volume for any combination of maximum/minimum levels, delivery schedules, or estimated product demand. To analyze possible transportation combinations for a given pipeline, however, managers must know the packing dimensions and weights for each product. Transportation requirements can then be determined, as illustrated in the following example.

EXAMPLE

Condom Type	A.I.D. Carton Size	Pieces per Carton	Weight	Volume (Cube)
52mm	23.5"x15"x18"	6,000	43.5 lb	3.9 ft^3

Assuming quarterly delivery intervals where the minimum stock level = 2 months' supply and the maximum stock level = 5 months' supply, and where estimated consumption is 6,000 units per month, each delivery would be, on average:

18,000 ÷ 6,000 = 3 Cases X 43.5 lb = 130.5 lb
18,000 ÷ 6,000 = 3 Cases X 3.9 ft3 = 11.7 ft^3

The volume that the transportation system must handle can be calculated by simply substituting the "cube" (e.g., 3.9 ft^3) in place of the weight. Totaling weight and volume requirements for each facility at each level provides an accurate estimate of transportation requirements throughout the program. (See Chapter 3 for a discussion of transportation alternatives once weight and/or volume figures for supplies are estimated.)

5

Determining Issue Quantities

Introduction

In determining issue quantities, family planning programs are reminded of their primary logistics objective: to get the right quantities of the right goods to the right places in the right condition at the right time for the right cost. The procedures used to determine the quantities of supplies to be issued by warehouses to clinics should therefore avoid creating an oversupply or an undersupply of contraceptives. An undersupply means the program can serve fewer clients, whereas an oversupply may result in waste.

The impact of oversupply and undersupply

Because an undersupply of contraceptives can result in unwanted pregnancies, a program cannot afford to run out of contraceptives at any outlet and therefore must ensure continuous availability of all contraceptives at each program level. The guidelines and formulas provided in this chapter are applicable to either a *push* inventory system in which the supplier is responsible for issuing supplies to lower-level distribution points, or to a *pull* system in which recipients request supplies from a higher level.

Basic Information Requirements

Information needed to determine issue quantities

To determine the correct quantity of contraceptives to be issued, the following information is needed:

INFORMATION	SOURCE
Average monthly consumption (usually, average quantities dispensed to users in the last 6 months)	Outlets
Quantities in stock	Outlets, Warehouses
Maximum and minimum stock levels	Program Policy

- Data on the *quantities of contraceptives dispensed to users* should be collected from the consumption records (such as daily activity registers) kept by nurses, midwives, and other staff. Adjustments may be needed if stockouts have occurred. (See Chapter 2 for more information on consumption records.)

- Data on *quantities of each contraceptive in stock* can be gathered from an actual inventory count or from stock cards kept by warehouse and clinic personnel for each stocked item.

Frequently, this information is gathered and reported on a quarterly basis, although some programs may collect monthly or even semiannual data on quantities dispensed and in stock. Whatever reporting period is used, the above information must be collected.

A program's choice of reporting frequency actually depends on the final piece of information: the *maximum and minimum stock levels*. For example, program policy may require a maximum of 6 months' supply in all outlets and a minimum

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stock level of 3 months. This means that a particular outlet should never have less than 3 months' supply or more than 6 months' supply of any contraceptive on hand at any time. In this case, quarterly reporting and resupply intervals are the most appropriate. (See Chapter 3 for a more detailed discussion on maximum/minimum levels.)

To avoid confusion, the same maximum and minimum stock levels should generally be assigned to all outlets and the same maximum and minimum levels to all intermediate warehouses. (However, physical or financial constraints in the distribution system may necessitate different levels for some facilities.) The difference between the maximum and minimum stock levels determines the *frequency of resupply.*

Frequency of resupply

EXAMPLE

An outlet assigned a maximum stock level of 6 months and a minimum stock level of 3 months has a resupply frequency of every 3 months (6 - 3 = 3).

Steps for Calculating Issue Quantities

Using the available information on average monthly use, quantities in stock, and maximum and minimum stock levels, planners can calculate the quantities to be issued to clinics and intermediate warehouses, as illustrated below.

FORMULA

$$\text{Quantity to Be Issued} = \left[\text{Average Monthly Use} \times \text{Maximum Months of Supply}\right] - \text{Balance on Hand} - \text{Quantity on Order}$$

Formula for calculating issue quantities

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[**Note:** Where consumption is reasonably stable, it is recommended that programs use 6 months of data to calculate their average monthly consumption. A 6-month average smooths out wide fluctuations in the data better than an average using fewer months.]

The example on the following page shows how to use this formula to calculate issue quantities.

Step 1: Determine Average Monthly Quantity Dispensed to Users

$$\frac{\text{Quantity Dispensed to Users in Last 6 Months}}{6} = \text{Average Monthly Use}$$

EXAMPLE

Cycles of Lo-Femenal Dispensed to Users		Months
316		April
374		May
349		June
358		July
390		August
369		September
Total 2,156	÷	6 = 359.3 (Round up to 360)

Step 2: Determine Quantity to Be Issued

$$\left[\text{Average Monthly Use} \times \text{Maximum Months of Supply}\right] - \text{Balance on Hand} - \text{Quantity on Order} = \text{Quantity to be Issued}$$

EXAMPLE

Assumptions: Maximum months of supply = 6
Stock on hand = 420 cycles of Lo-Femenal
Quantity on order = 570 cycles of Lo-Femenal

360 cycles X 6 months	= 2,160	Cycles of Lo-Femenal
	- 420	Cycles on hand
	- 570	Cycles already on order
	= 1,170	Cycles to be issued
	= 1,200	(For full carton)

Helpful Hints

When determining issue quantities, keep these additional guidelines in mind:

Carton size reminders

- Supplies shipped from central or intermediate warehouses should be sent in unbroken (i.e., complete, full) cartons wherever possible. In the above example, the quantity to be issued is rounded up to the next carton size, 1,200. Contraceptives supplied by A.I.D. are shipped as follows:
    - Oral Contraceptives -- Cartons of 1,200 cycles each, which contain 12 inner boxes of 100 cycles each.
    - Condoms -- Cartons of 6,000 pieces each, which contain 60 smaller inner boxes of 100 condoms each.
    - Foaming Tablets -- Cartons of 4,800 pieces each, which contain 48 smaller inner boxes of 100 tablets each.
    - IUDs -- Cartons of 200 each.
    - Norplant -- Cartons of 50 sets each.
    - Depo-Provera -- For product manufactured in the United States, cartons of 400 single-dose vials and 400 needles and syringes found in four inner boxes.
- Special judgment must be exercised to accommodate actual stock needs and program plans (such as phasing out certain brands and emphasizing others). For example, an outlet with no history of IUD use might have a person assigned who knows how to prescribe and insert IUDs, thereby creating a need for this type of

contraceptive. In such instances, it may be necessary to adjust the figure used for Average Monthly Use, rather than just using a simple average of historical data.

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Warehousing

Introduction

Warehousing is the storage of goods so that supplies are always available, accessible, and in good condition. It is also a critical link in the logistics system that affects many other decisions in family planning programs. The type, location, and size of warehouses within the logistics system all play a vital role in meeting program goals and requirements. This chapter provides guidelines for establishing warehouses, calculating warehouse space requirements, and storing contraceptives properly.

Critical link in the logistics system

Warehouse Types and Locations

Administratively, family planning programs have three types of warehouses (or stores):

- Central level
- Intermediate level
- Outlet level

The central warehouse

Central warehouses receive, store, and ship contraceptives and other supplies. These supplies are procured from local manufacturers, foreign manufacturers, or donor agencies. Normally, central warehouses do not send supplies directly

to outlets. Instead, contraceptive supplies usually move to outlets through intermediate levels, such as regional warehouses, because this path is more efficient and less costly.

Once the number of warehouses is decided, administrative and geographical considerations determine their specific locations. A single central warehouse should be located in or near the port of entry where supplies from overseas are received, in the country's transportation center, or in or near contraceptive production facilities, if they exist. This warehouse (or group of warehouses) must be capable of storing many months of supply for the entire country.

Intermediate warehouses

Intermediate warehouses usually serve entire political subdivisions, such as provinces, states, or districts, unless geographic barriers impede easy transport. A mountain range or large river, for example, may make part of an administrative area more easily accessible from a neighboring administrative area or directly from the central level. Intermediate warehouses should be capable of storing the maximum number of months of supply for each contraceptive distributed at that level.

Some countries have several levels of storage facilities between the central warehouse and the outlets. In other countries, supplies are distributed directly to outlets from a single intermediate level. In small countries or in new programs in large countries, outlets might be served directly from one central warehouse.

Storage at the outlet level

Storage facilities at outlets are usually very simple. In a small facility, a desk drawer might be sufficient; a larger facility might require a cabinet or a small room that is cool and dry. The principles of logistics management apply in the same way to all sizes of storage facilities.

Warehouse Size

Program managers may be asked to calculate the size of a new warehouse to be leased or constructed, or to determine whether an existing warehouse is large enough. The size of the warehouse depends on the maximum amount of stocks to be stored, which is a function of the total amount of supplies moving through a warehouse, the lead time, and the amount of safety stocks required.

The role of stock levels and lead times

Space for contraceptive storage is calculated in terms of the number of months of supply of all items to be stored. Calculations should take into account possible program expansion over at least the next 5 years.

Calculating space requirements

The following formula provides a simple method of determining how much space is needed for a projected order quantity.

FORMULA

Number of cycles/units to be stored	÷	Number of cycles/units per carton	=	Number of cartons
Number of cartons	X	Carton size	=	Storage space required

EXAMPLE

1,000,000 (cycles of Lo-Femenal ordered)	÷	1,200 (cycles per carton)	=	833 cartons
833 (cartons)	X	.04 m^3 (carton size)	=	33 m^3 (or 1,108 ft^3)

Similarly, if a case of condoms containing 6,000 units measures 0.12 cubic meters (3.9 cubic feet), then one million condoms (167 cartons) will require approximately 20 cubic meters (652 cubic feet) of storage space.

Since supplies may be procured from different sources, many different package sizes may have to be measured to calculate the volume of storage space needed. (Note: This calculation only includes the space actually occupied by the cartons. Additional space for aisles, handling, or administrative needs must be considered, as well. See page 6-6.)

Examples of estimating volumes of commonly used A.I.D-supplied contraceptives include:

Condoms

1. **Condoms** (cartons of 6,000 each):

100 cartons
=
approximately 12 cubic meters of space (390 cubic feet)

(an area 2m long x 3m deep x 2m high)

2. **Orals** (Lo-Femenal cartons of 1,200 cycles each):

Oral Contraceptives

100 cartons
=
approximately 4 cubic meters of space (133 cubic feet)

(an area 1m long x 2m deep x 2m high)

3. **Vaginal Foaming Tablets** (cartons of 4,800 each):

Vaginal Foaming Tablets

100 cartons
=
approximately 5 cubic meters of space (157 cubic feet)

(an area 1m long x 2m deep x 2.5m high)

4. **IUDs** (cartons of 200 units each):

IUDs

100 cartons
=
approximately 4 cubic meters of space (132 cubic feet)

(an area 1m long x 2m deep x 2m high)

Assuming that 15 cycles of pills or 150 condoms are a year's supply for a family planning client, one can calculate the warehouse size needed to store a 1-year supply of condoms and pills for a specific number of clients. For example, if a given area expects for the next few years to serve 96,000 family planning clients annually, of which 35% will use oral contraceptives and 15% will use condoms, we can calculate:

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EXAMPLE

Pills		Condoms	
96,000	Users	96,000	Users
x .35		x .15	
33,600	Pill users	14,400	Condom users
x 15	Cycles/year	x 150	Condoms/year
504,000		2,160,000	
= 504,000	Cycles of pills	= 2,160,000	Condoms
divided by 1200 cycles/carton		divided by 6,000 condoms/carton	
= 420 cartons		= 360 cartons	
x 0.04 cubic meters/carton		x 0.12 cubic meters/carton	
= 17 cubic meters for a year's supply of pills		= 44 cubic meters for a year's supply of condoms	

In the above example, 61 cubic meters of storage space are required (17 + 44) for these two contraceptive methods alone. Again, this figure represents only the space actually occupied by the commodities.

When determining the exact floor space needed, consider the following factors:

Considerations in determining floor space

1. Warehouses are usually measured in square feet (or square meters) of usable floor space.

2. Cardboard shipping cartons should be stacked no higher than 2.5 meters (8 feet).

3. Depending on the nature of the storage facility and its functions, the net storage space should be much greater than the total volume of stored supplies to allow for aisles, handling, and ventilation. A 50% greater net storage space might be sufficient if supplies are handled largely in case lots, if there are not many items of supply, if no repackaging is done, and if supplies are merely shipped to lower-level facilities. On the other hand, if large cartons of supplies are frequently repacked in smaller lots for redistribution and there are many items of supply, a greater increase (perhaps 100% or more) would be necessary.

Supply-handling space

4. The depth of shelving and the resulting walkways and aisles between shelves will determine how much more space is needed for handling.

Returning to our last example, assume that our storage facility requires 50% additional space for handling. By multiplying the space requirements by 1.5, we arrive at the number of square feet of warehouse floor space required for storing and handling a year's supply of pills and condoms.

EXAMPLE

61 m^3	(Volume)
÷	
2.5 meters	(Maximum recommended height)
=	
24.4 m^2	(Floor space)
x	
1.5	(Factor used for aisles and handling)
=	
37 m^2	(Floor space about 7.5 meters x 5 meters)

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Therefore, 61 cubic meters divided by 2.5m (the desired stack height) = 24.4 square meters for floor space x 1.5 = 37 square meters; a space measuring approximately 7.5 meters by 5 meters would be sufficient for the immediate future if the maximum to be stored is a 1-year supply. As needed, additional space should be calculated other contraceptive products such as IUDs, foaming tablets, etc.

In many countries the number, location, and size of warehouses are a given; i.e., they are in place and operating and are not subject to immediate expansion. If sufficient space is not available to manage contraceptives, the program may be restricted to lower operating stock levels and may thus have more frequent shipments and higher transportation costs. Also, incoming shipments from abroad may have to be scheduled for more frequent shipments of smaller amounts to prevent overloading the system. Such scheduling would require coordination of all agencies supplying and managing the program.

Solving program planning difficulties

Program planners often have difficulty determining the amount of storage space required in a new program, particularly when they lack very precise data on the number of contraceptive users they expect to serve. In this situation, programs may want to consider renting a large facility for bulk storage until they can determine distribution levels and the amount of storage space required.

Contraceptive Shelf-Life

Factors affecting shelf life

The maximum shelf-life of oral contraceptives and vaginal foaming tablets is about 5 years. (See **Appendix A** for details on contraceptive shelf life.) Condoms, on the other hand, are more perishable. Prolonged exposure to high environmental temperature or humidity, electrical storms, and air pollution can result in severe loss in condom strength due to oxidation of the latex film. Ozone generated by ultraviolet light can destroy condoms within a few hours. Contact with mineral or vegetable oils can deteriorate condoms in minutes to hours.

To ensure maximum shelf-life, contraceptives must be stored in ventilated warehouses with temperatures ranging from 15-30° C. Storage facilities must also protect contraceptives from exposure to high humidity, insects, rodents, or solvents. In tropical countries, it is especially important to keep warehouses as cool as possible by ventilating through windows and/or louvered air vents.

The FEFO storage and distribution method

To ensure that contraceptive supplies do not remain in stock past their maximum shelf-life, all program levels must adopt the FEFO (First-Expiry/First-Out) principle, the preferred method of storage and distribution of supplies. In this system, cartons are clearly marked with their date of manufacture (or expiration) in large, easy-to-read numerals. Supplies should be stacked separately by date of expiration or date of manufacture, so that the oldest can be reached most easily. Cartons with the oldest dates are then issued first; cartons with more recent dates are not issued until all earlier-dated supplies have been used. If the date of expiration or manufacture is not available, the date of receipt should be used. Systems based on date of receipt are called FIFO (First-In/First-Out). If quality assurance monitoring is possible, warehouse distribution procedures should be based on the results of testing. (See Chapter 8, ***Contraceptive Quality Assurance.***)

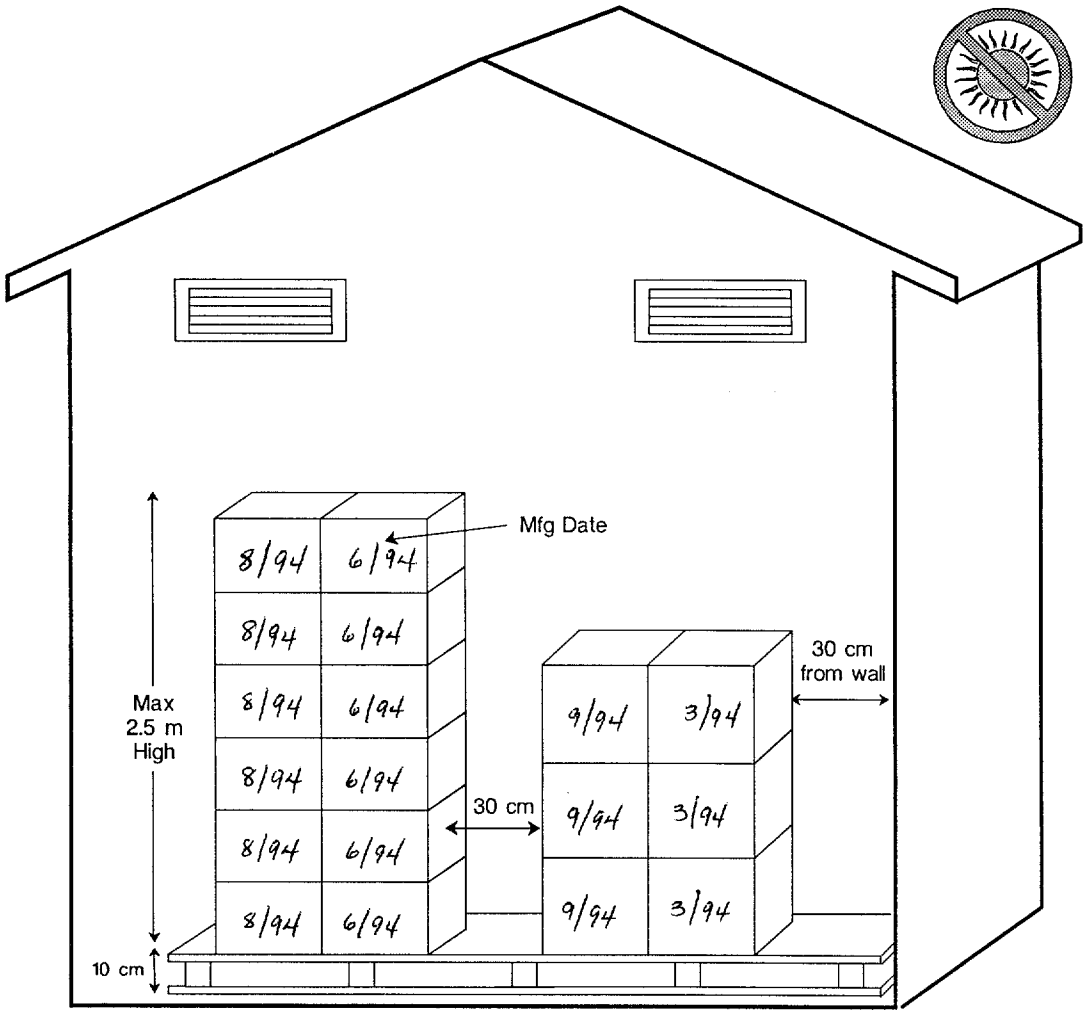
The FIFO storage and distribution method

Both the FEFO and FIFO methods work better if cartons are stacked so all dates of expiration, manufacture, or receipt are visible. Few programs should ever have on hand more than a 1- to 2-year supply at all program levels combined. If proper inventory control procedures are followed, no supplies will be kept on hand beyond their shelf-life.

To allow for air circulation around cartons and to minimize insect infestation, cartons should be stacked on pallets at least 10 cm. (4 inches) from the floor and stacked at least 30 cm. (1 foot) from any wall or ceiling. Stack cartons no more than 2.5 meters (8 feet) high to avoid crushing those on the bottom. (See **Figure 10** on the following page.)

Figure 10

Model for Contraceptive Supplies Storage



In establishing or evaluating warehouse procedures, managers should consider the following guidelines as a checklist for proper storage.

Sample storage guidelines

GUIDELINES FOR PROPER STORAGE

1. Clean and disinfect storeroom regularly.
2. Store contraceptives in a dry, well lit and well ventilated storeroom -- out of direct sunlight.
3. Secure storeroom from water penetration.
4. Assure fire safety equipment is available and accessible.
5. Store cartons of condoms away from electric motors and fluorescent lights.
6. Stack contraceptive cartons at least 10 centimeters (4 inches) off the floor, 30 centimeters (1 foot) away from the walls and other stacks, and no more than 2.5 meters (8 feet) high.
7. Arrange cartons so that identification labels, expiry dates, and manufacturing dates are visible.
8. Store contraceptives in a manner accessible for First-Expiry/ First-Out (FEFO), counting and general management.
9. Store contraceptives separately, away from insecticides, chemicals, old files, office supplies, and other materials.
10. Separate and dispose of damaged or expired contraceptives without delay.

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Physical Inventories

On a periodic basis, programs should conduct physical inventories to:

Purpose of inventory

- Determine how many usable items of each contraceptive are in the warehouse
- Verify that the balances on hand match the quantities entered on stockkeeping records
- Determine how many items of stock are unusable because of damage, loss, or expiration
- Identify any corrective actions needed to ensure that contraceptives are safely and effectively received, stored, and accounted for

Inventory frequency

Physical inventories should be conducted at least once a year and at all program levels. More frequent inventories should be conducted if there are numerous discrepancies between the actual balances on hand and the balances listed on the stock cards.

Outside auditors may be used to conduct physical inventories in larger facilities where substantial quantities are stored. If outside auditors are used, a date for conducting the inventory should be selected in advance so the person in charge of the warehouse can:

Inventory preparation

- Arrange for staff to be present on the day of inventory (including people to move and restack cartons)
- Make warehouse keys available to the auditor(s)
- Halt or minimize shipping and receiving activities that might interfere with the inventory
- Ensure that all stock records are up-to-date

- Arrange for cartons to be stacked so that all commodities are readily accessible

For accuracy, physical counts should be made by two different individuals on the day of inventory. If the two independent counts are not the same, a recount should be made until any discrepancies are clarified. At the outlet level or at smaller warehouses, a single person might undertake the entire task of counting and recording stocks on hand.

Since carton quantities may vary by manufacturer, physical counts should be recorded in single units of issue (such as number of cycles of pills), not in number of larger boxes or cartons. For sealed cartons, the number of units in inventory may be calculated by counting the number of sealed cartons of each brand and multiplying that by the number of pieces per carton. For opened cartons, the actual number of units must be counted.

Inventorying multiple lots, types, or brands

If the same contraceptive has multiple lots, types, or brands, totals for each should be counted and recorded separately, even if the quantity per carton is the same.

Any supplies that are damaged or expired should also be recorded separately.

Once the physical inventory is complete, physical counts should be compared to stock card (or bin card) totals to identify any discrepancies. A form such as the one provided in **Figure 11** should be used to record the results of the physical inventory. This form should be signed and dated by both the person who performed the inventory and the manager in charge of the warehouse.

Figure 11

Physical Inventory

Program: _____

Warehouse/Location: _____

Product	Lot No. or Bin No.	Balance on Hand	Balance on Stock Cards	Discrepancy	Comments

Comments: _____

Signature: _____ Signature: _____ Signature: _____

Title: _____ Title: _____ Title: _____

Date: _____ Date: _____ Date: _____

Source: World Health Organization, Global Programme on AIDS

7

Forecasting

Introduction

Forecasting is the prediction of future events. In the field of family planning logistics, forecasting means estimating what quantity of family planning supplies are needed for a given amount of time. In its simplest form, forecasting occurs when the person responsible for supplies in an outlet determines the quantities of contraceptives to order and submits a requisition. The message delivered is, "We need this many supplies to meet the demand for a given period of time."

Primary component in the logistics system

Forecasting is a primary component of the logistics system, since other system components are affected by the quantities of supplies to be managed. Thus, forecasting for a program involves considering not only the *quantities* needed, but *when* they will be needed, *where* they will be stored, *how* they will be transported, and *how* they will be managed. Serious problems arise if the forecasts for supplies are accurate, but the facilities for moving or storing them are inadequate. This point is frequently overlooked.

Most programs have multiple sources for the various contraceptives that they purchase with program funds or procure through donations or loans. Lead times vary with different supply sources and even with different items coming from the same source. Lead times may be short for items bought from a local supplier but can be a year or more for the

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procurement of large quantities from non-local sources. The time required to obtain funds to pay for contraceptives can also be critical. Forecasting must be done far enough in advance to obtain funds for timely procurement of the goods.

The effectiveness of the logistics system depends heavily on the program's ability to forecast its needs accurately. Over-stocking or stockouts of supplies will occur if forecasting calculations are not reasonably correct.

Incorporating future program needs

More precise forecasting can be achieved by collecting, processing, and analyzing data that is relevant to future program needs, i.e., the balances on hand and the quantities dispensed to users, recorded by method and brand. Persons responsible for forecasting must also be informed of future program plans. For example, resources will be wasted if managers order large quantities of oral contraceptives for a program that plans to emphasize the use of IUDs. Similarly, forecasters must be told of program plans that could increase the number of new family planning users. For these reasons, those responsible for forecasting must be part of the management team.

Methods of Estimating Contraceptive Needs

Three sources of data are commonly used to estimate contraceptive needs:

Common data sources

- Logistics data
- Service data or targets
- Population-based data

To increase the likelihood of accurate estimates, supply managers are encouraged to use all three of these estimating methods and to compare the results with the assistance of the program manager. Differing results could indicate problems which must be addressed in the program's data collection methods.

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Logistics-Based Estimates

Preferred method for ongoing programs

Logistics-based estimates are useful where good historical data exist on quantities dispensed to users at all program levels. This method is most appropriate for well established programs but requires a reasonably accurate information system that has tracked logistics data for at least one year. Sources of logistics-based estimates can include data from:

- Distribution (or issues)
- Sales
- Consumption (or dispensed to user)

The best results are achieved when reports of quantities dispensed to users at the *lowest level* in the distribution system are used to estimate program-wide needs. If data at the lowest level are incomplete or inaccurate, the forecaster should use reliable data from the next level up in the distribution system.

Advantage of logistics-based estimates

Since they rely on past performance, logistics-based estimates have the built-in advantages of measuring both levels and trends in quantities distributed, thereby eliminating the additional assumptions and calculations required by other forecasting methods.

Disadvantages of logistics-based estimates

However, there are also disadvantages to this method:

- Logistics-based estimates cannot predict programmatic changes such as new clinic openings or increased preference for a particular contraceptive method.

- They may not reflect true demand or distribution system capacity if stockouts or oversupply conditions occurred during the time periods used for the forecast.

When using logistics data to forecast needs, a good rule of thumb is to use at least 3 years of past data for annual forecasts, or at least 6 quarters of data for quarterly forecasts. It is also important for forecasters to determine whether past usage patterns are stable or rapidly changing. If the quantities dispensed are relatively stable over time, then a simple averaging formula can be used in forecasting future needs.

Using consumption data to forecast needs

STABLE CONSUMPTION

Estimated Use for Next Quarter = Number of Units Dispensed in Past 6 Quarters ÷ 6

If usage is steadily increasing or decreasing, a slightly more complex formula is needed.

CHANGING CONSUMPTION

Estimated Use for Next Quarter = Number of Units Dispensed This Quarter + Average Change in Use Over Past n Periods

where Average Change in Use Over Past n Periods = $\frac{\text{Use in Period } n - \text{Use in Period } 1}{n - 1}$

EXAMPLE

If use in the 6th quarter was 200 units and use in the first quarter was 50 units:

Average Change in Use Over Past 6 Quarters = $\frac{200 - 50}{6 - 1}$ = $\frac{150}{5}$ = 30

Therefore, estimated use for next quarter is: 200 + 30 = 230

It should be noted that the above formula works well only where consumption is changing in a steady, linear fashion, because only the first and last periods' data are used to make the forecast. If these two periods are not representative, a forecast made using this formula may be misleading.

Alternate consumption forecast methods

Realistically, historical data rarely fall neatly in such a straight line. In such cases, another option is to calculate a simple average for the first half of the data and another for the second half, using the formula for stable consumption shown above. For example, a projection based on monthly data from the past calendar year might be made by taking the simple average of January - June data, and the simple average of July - December data. The first of these points would be plotted at the midpoint of the January - June series (i.e., between March and April) and the second at the midpoint of the July - December series (i.e., between September and October). Finally, a straight line would be drawn through the two points and into the future for the time period covered by the projection, and the forecast would be read from the graph. This is call the procedure of "semi-averages".

It may also be possible to use this procedure to prepare forecasts from data which show more complex patterns, by dividing the data into a larger number of segments for averaging. Calendar year data might be divided into quarters, for example, with a point plotted for each quarter, in cases where consumption follows an annual seasonal pattern.

These consumption forecast formulas can be used in estimating by year, by quarter, or by month as long as all calculations are based on one or the other of these time periods and not a mixture of the three.

The farther into the future a forecast is made, the less accurate it is likely to be. For this reason, it is important that all forecasts be recalculated at the end of each future time period, as soon as the most recent period's data are available.

Requirements for accurate calculations

Also note that the formulas provided above are only valid if:

- Past usage is representative and not substantially affected by seasonal or programmatic variations.
- Data used in the calculations are complete and accurate.
- The underlying usage trend is more or less linear.

If consumption patterns are erratic or complex, more sophisticated statistical methods and/or computer modeling may be needed to make the forecast.

Using issue voucher data to forecast needs

When estimates are based on data from quantities issued to outlets rather than quantities dispensed to clients, the reliability of the estimate depends on the accuracy of the management information system. Often, warehouse-level issue records are not a good indicator of use at the clinic level. In a perfectly operating maximum/minimum system, however, the quantities shipped from one level to the next will closely approximate quantities dispensed because the system operates by replacing the stock that has been dispensed. Issue data should be collected at the lowest possible level in the distribution chain to help eliminate distortions and produce more accurate supply estimates.

Service Data Estimates

Service data recorded at clinics and other service delivery sites can be used to forecast contraceptive needs for a given time period. Commonly reported service data include:

Sources of service data

- New clients - The number of clients using the clinic for the first time.
- Revisits - The number of repeat visits made by all clients during a particular period.

- Current users - The number of individuals who are users of a program method during a particular period, whether or not they actually made a visit during the reporting period.

Forecasts made from service data have two major advantages:

Advantages of service data estimates

- They automatically take program limitations into account.
- When program targets are expressed in term of users or visits, estimates based on the same data take into account any planned growth or other management-directed program changes.

However, difficulties may be encountered using this data source if:

Disadvantages of service data estimates

- There have been interruptions in service during the time periods on which the forecast is based.
- The targets for program growth are unrealistic.
- The number of contraceptive units needed per user per time period is misjudged.

The number of total visits or current users for upcoming periods can be estimated using formulas similar to the consumption-based estimating methods described on page 7-4. If the number of total visits by method is known, and there is a standard policy for amounts of contraceptives given at each visit, then the supply requirement is:

Estimates based on visits

ESTIMATES BASED ON VISITS

Estimated Use of Method for Next Period	=	Estimated Total Visits for this Method	X	Number of Units Dispensed at Each Visit

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Estimates based on current users

Similarly, if the total number of current users can be estimated from service data, the supply requirement is:

ESTIMATES BASED ON CURRENT USERS				
Estimated Use of Method for Next Period	=	Estimated Current Users for this Method	X	Number of Units Required to Serve a Current User

Supply quantities for 1 year of service

A.I.D. estimates the quantity of each method required to serve one user for a year as approximately:

- 15 cycles of pills
- 150 condoms
- 150 foaming tablets
- 1 unit for each new diaphragm user (or 0.3 pieces per continuing user)
- 6 tubes of jelly per diaphragm user
- 1 unit for each new IUD user
- 1 set of implants for each new Norplant® user
- 4 doses of Depo Provera®
- 6 doses of Noristerat®

For supply methods, especially condoms, foaming tablets and jellies, there is little research data to support these general figures; for injectables and orals, they are probably more accurate. If local data on use can be obtained, it is far better to substitute it for these estimates.

There are also likely to be problems with definitions of "user" and with collection of accurate user data. This forecasting method assumes that user data represents the total number of individual clients actively using a particular contraceptive at a particular point in time. Especially where a manual management information system is used, it is very difficult to obtain these data, and many systems have a different definition of "user." In such cases, this forecasting method should not be used.

Since forecasts rely on the accuracy of information reported, service data forecasts should always be compared against forecasts made from supply data. If the two forecasting methods produce vastly different results, the assumptions used for each method should be reviewed. As needed, the accuracy of both the logistics and service data reporting systems should be improved.

Population-Based Estimates

This method is often used with new programs where there is little or no prior experience on which to make logistics- or service-based estimates. Contraceptive requirements are instead based on census results, surveys, or studies of a geographical area or specific population group to be served. Population-based forecasts can be advantageous because they:

Advantages of population-based estimates

- Are independent of the service delivery system and can therefore be used when historical program data are unavailable or inaccurate.
- Provide estimates of the maximum need for services (or people at risk) versus the number currently being served.

Disadvantages of population-based estimates

The disadvantages of population-based estimates are:

- Requirements are often overestimated, since planners tend to be optimistic in setting their targets. This leads to oversupply in the program, particularly if the commodities are "pushed" to the field.
- Planners tend to use the same proportional targets for all areas of the country, thus creating supply imbalances throughout the program.
- The method tends to assume that contraception will be provided primarily through the program, whereas in some countries contraceptives are available through a variety of public, private, and commercial channels.

The following steps show how population-based estimates are calculated.

Calculating population-based estimates

CALCULATING POPULATION-BASED ESTIMATES

Step 1: Estimate the Number of Contraceptive Users

All women in union, ages 15-44	x	Estimated proportion that will use contraception in the program	=	Number of users

Step 2: Estimate the Number of Users of a Given Method

Number of users	x	Estimated proportion that will use a given method	=	Number of users of a given method

Step 3: Estimate the Requirements of a Given Method

Number of users of a given method	x	Number of units used per year*	=	Annual usage of a given method

* The number of units used per year is estimated as described under the service-based methodology above.

Forecasting New Program Needs

Target population

Forecasting contraceptive needs in new family planning programs uses the population-based forecasting technique, and must begin with estimating the target population. This is often expressed as a percentage of married women of reproductive age (MWRA), usually ages 15-44 years, in the population of the country.

For example, a program's goal might be to provide family planning services to all who want or need these services or to reduce the rate of natural population increase to a certain percentage by a certain year. To reach the population goal, program planners estimate the proportion of MWRA that must practice modern contraception in order to reach that goal. In tabular form, these data are:

BIRTH RATES AND CONTRACEPTIVE USE

Estimated Level of Crude Birth Rate*	Estimated Percentage of Married Women 15-44 Years of Age Using Contraception
45	22%
40	32%
35	42%
30	52%
25	62%
20	72%

*Number of births per 1,000 population.

If a program's goal is to reduce the crude birth rate from 35 to 30 per 1,000 population, approximately 52% of MWRA would need to use modern methods of contraception by the final year of the plan. The crude birth rate of 35 per thousand at the start suggests that approximately 42% of MWRA are now

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using a contraceptive method. If the plan being designed is for 5 years, then the annual increase in contraceptive use needs to be 2 percentage points. The target for the end of the first year might be 44%, the second 46%, and so on.

Number of users to be served

The next step is to estimate the proportion of the target population that will use the services of the program. This requires knowledge of other sources of contraceptive services within the country and the number of users they serve. Other sources would include public and private family planning organizations, as well as pharmacies. For example, if your target population is 20,000 MWRA and you estimate your new program will serve about 5% of the target population in the first year, then you should be prepared to serve 1,000 clients.

After estimating the total number of users to be served by the program, the next step is to estimate the proportions of that number who will use each different contraceptive method. This is often based on previous records of distribution or number of users by method. These figures are then used to calculate the overall quantities of contraceptives that must be procured by the program each year for the duration of the projection, using the population-based estimation formula above.

Calculating Procurement Quantities

Once the forecast of usage is agreed upon, it is necessary to calculate amounts required to meet these needs. The quantity to procure is calculated as follows:

Yearly supply requirements

ESTIMATING YEARLY SUPPLY REQUIREMENTS

Beginning of Year Stock	+	Shipments Already Ordered/ Received	-	Estimated Annual Usage	-	Losses	-	Desired End of Year Stock	=	Net Supply Requirement

The results of this formula are then used to prepare purchase orders or requests to donor agencies. Programs that purchase these items must estimate their cost and secure the funding. As part of procurement, shipping schedules must be designed so that the systems and facilities necessary for handling the commodities can be updated or established.

For further forecasting support

Note: Most programs have procedures and reporting forms for collecting information on contraceptives distributed and on users of family planning services. This information can be tabulated manually to forecast needs; a few countries use computer-based systems. Further information on support for both manual and computerized systems is available from the Commodity and Program Support Division, Office of Population, Agency for International Development, Room 803, SA-18, Washington, D.C. 20523.

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Contraceptive Quality Assurance

Introduction

Sound logistics practices and adequate facilities for the storage and transport of supplies are the surest ways to protect and maintain the quality of family planning contraceptive commodities. All activities that comprise the logistics system have a direct or indirect effect on product quality. Therefore, improvements in the effectiveness and efficiency of the primary logistics activities help ensure the quality of contraceptives provided to consumers.

Importance of storage conditions

In many countries, however, major components of the logistics system may be less than optimal. For example, storage conditions are extremely important for maintaining product stability, since any product, no matter how stable it is, can suffer damage and deteriorate rapidly if storage conditions are not adequate. Environmental conditions known to reduce product stability include excessive heat, poor ventilation, and extreme humidity. Please refer to Chapter 6, ***Warehousing,*** for important storage guidelines that affect contraceptive quality.

This chapter was developed by the Program for Appropriate Technology in Health (PATH).

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Since the conditions under which contraceptives are transported and stored affect their quality and stability, a quality assurance program must be developed to monitor product quality within the system.

Quality assurance activities involve product sampling, inspection of products, record-keeping, and corrective measures--all designed to ensure that contraceptives remain suitable for use as they pass through storage facilities and distribution channels to consumers. Product quality should be evaluated as part of planning, procurement, and distribution decisions.

Essentially, two methods can be used to identify potential quality problems:

Quality assurance methods

- Laboratory analysis (e.g., physical, chemical, or biological tests)
- Visual inspection

Laboratory analysis of contraceptive products tends to be complex and costly. In addition, test requirements vary according to the product specifications and local policies or standards regulating drugs and medical devices. Although special cases may warrant analytical testing, it is not recommended as the mainstay of a contraceptive quality assurance program. Laboratory testing should be undertaken only at the request of appropriate professional authorities.

This chapter focuses on visual inspection of contraceptive commodities. Although, unlike laboratory analysis, visual inspection is essentially a subjective assessment, criteria and guidelines can help standardize inspection and evaluation procedures. In most countries, some form of visual inspection of commodities is already carried out; for example, upon receipt of product, or as part of an annual inventory.

The systematic approach proposed in this chapter can build upon those activities. A system of visual inspection, then, can serve as the first step in identifying potential quality problems. Latex condoms are the exception to this general rule. Latex condoms are especially vulnerable to deterioration in conditions of high heat and humidity, and critical defects in condoms are not readily discernible by visual inspection. Consequently, condoms stored at the central warehouse that are greater than two years from the date of manufacture should be sampled and tested in a laboratory prior to distribution.

Condom deterioration and testing

Visual Inspection Overview

Most simply put, visual inspection is the comparison of a commodity's attributes to those of a standard or norm (such as the procurement specification). Any deviation between the inspected product and the applicable requirements constitutes a defect. Defects can range from minor and unimportant to critical and significant. During a visual inspection, the condition of the packaging and labeling as well as the contraceptive unit may be assessed. The inspection results are recorded and reported to the relevant authority for appropriate action. A formal visual inspection should be undertaken for any of the following six reasons:

Reasons for visual inspection

1. Compliance with procurement specifications
2. Inspection upon receipt of commodity
3. Periodic quality monitoring of goods in inventory
4. Response to complaints
5. Aged product
6. Evidence of damage

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An extensive set of visual inspection criteria and an example inspection form for each major type of contraceptive product are presented in **Appendix B**. These inspection criteria are guidelines only and must be adapted to meet individual program needs, policies, and local conditions. For instance, while the labeling criteria presented in **Appendix B** are relatively comprehensive, the extent and nature of labeling used at any given packaging level is specified in procurement documents. Therefore, when producing country-specific quality inspection guidelines, programs must take care to ensure the labeling inspection criteria are consistent with local regulations and standard practices of the procurement or donor agencies. Countries or programs undertaking their own procurement can use the labeling guidelines offered in **Appendix B** as a reference for developing comprehensive labeling specifications in procurement documents.

Sampling

Visual inspection involves drawing a sample of boxes or units from an "inspection lot," visually examining the sample, and recording the results. An inspection lot is the collection of similar commodities from which the sample will be drawn.

Inspection lot definition

Inspection Lot Definition

Commodities in a designated inspection lot must be the same product and share some common characteristics:

- Same manufacturer's lot, if feasible
- Same shipment
- Same or similar dates of manufacture
- Stored under similar conditions

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Sampling rationale

Sampling and inspecting a portion of the inspection lot rather than inspecting the entire lot is the only practical and economical way to assess product quality. Also, inspecting a sample reduces product handling, thus minimizing damage potential.

Sample size

The size of the sample depends on many factors, such as the reason for inspection, access to the product, and whether or not standard sampling procedures are followed. For example, a large sample is not necessary if an inspection is carried out in conjunction with an annual product inventory and there is no reason to suspect quality problems. If the inspection is being carried out in response to product complaints, however, stricter sampling rules should be applied and the sample size should be larger. In general, the larger the sample size, the more reliable the inspection will be (since a greater proportion of the lot is inspected).

As the sample size increases and more rigorous sampling procedures are used, sampling and inspection costs also increase. Therefore, a sample size should be chosen for the most desirable balance between the cost of collecting samples and the cost of supply errors.[1]

When a sample is removed for inspection, the sampler should initial each level of packaging (carton and inner boxes) from which the sample was taken and note the date the sample was drawn and the total number of boxes or units sampled. This will serve to document exactly from where the sample was taken.

[1] One reference that addresses formal sampling is *Statistical Methods*, International Organization for Standardization Standards Handbook 3, 3rd Edition, 1989. The ISO handbook is available from the ISO Central Secretariat, Case Postale 56, CH-1211 Geneve 20, Switzerland.

Inspection Points

Cases warranting inspection

As noted, there are at least six different cases that warrant inspection: compliance with procurement specifications, inspection upon receipt of a commodity, as part of periodic monitoring or inventory, in response to complaints, if the product is aged, or if there is evidence of damage. The sampling procedures, extent of inspection, and implication of the results differ among these six cases. For example, inspection for compliance with procurement specifications is the responsibility of the procuring agency; the other five inspection points are the recipient/consignee's responsibility.

Compliance with Procurement Specifications

Commodity procurement is based on detailed specifications for the product, packaging, and labeling. The procurement or donor agency uses the specifications to define for the manufacturer exactly what is needed. Explicit and comprehensive specifications help ensure that the purchased contraceptive product is suitable for use in a family planning program.

Purpose of compliance inspection

A "compliance inspection" serves to assure the contraceptive procurer that the products meet or comply with all of the requirements of the specification. A compliance inspection is usually carried out just before the product is shipped from the manufacturer. Procurement documents and the contract with the manufacturer spell out what constitutes a product defect. If more defects are found than are allowed by these documents, the procurement agency has the right to refuse the product and the manufacturer typically must replace it with acceptable product.

A comprehensive visual inspection undertaken as part of a compliance evaluation includes a careful evaluation of the condition of the individual units as well as packaging and labeling for conformance with the specification. Analytical

tests also may be carried out as part of a compliance inspection. The compliance inspection is the responsibility of the procuring agency.[2]

Procuring agency responsibility

When dealing with a new or unknown supplier, the procurement agent is advised to retain at the central warehouse a small sample of the product from the initial shipment, and to examine it periodically. If significant changes are noted, the procurement agent should conduct an immediate investigation of the product in the pipeline. As a general rule, the size of a retained sample should be sufficient for two complete sets of appropriate laboratory analyses. Inspection of the retained sample is carried out as part of quality monitoring after the product has passed compliance inspection.

Inspection Upon Receipt of Commodity

Products should be inspected upon receipt at the port or warehouse, depending on which is the first local receipt point. Receipt inspection is important since it can prevent products damaged during shipment from entering the distribution pipeline. Receipt inspection is the responsibility of the consignee. Ideally, this inspection is carried out at the point of entry within days of arrival of the shipment. Timing of this inspection is important, since it may affect insurance coverage of products during shipment.

Timing of inspection

All shipping cartons should be inspected for damage. If any cartons appear damaged, a sample of their contents should be carefully inspected. If no damage is apparent, only one or two cartons selected at random should be opened to ascertain

[2] For compliance inspection, a formal statistical random sampling plan should be used. Compliance inspections are frequently carried out by professional sampling and testing agencies, who then submit their reports to the procuring agency.

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that the contents coincide with the shipping documentation and with the procurement order. If the inspection of carton contents reveals no problems, the cartons should be resealed.

Using results as a baseline

Receipt inspection and all other in-country inspections described in this chapter focus on the condition of the commodities and their packaging rather than the presence or absence of labeling information. Receipt inspection results serve as the baseline against which subsequent in-country results will be compared. As such, receipt inspection results should be carefully documented and filed.

Periodic Quality Monitoring/Inventory

Inspection during physical inventory

A physical inventory provides an opportunity to inspect the condition of commodities stored in the central and regional warehouses.[3] During a monitoring or inventory inspection, 100 percent of shipping cartons should be carefully inspected for any storage damage. If any cartons show signs of environmental damage, they should be opened and all the inner boxes and a sample of the units should be inspected. Even if no cartons are damaged, it is prudent to inspect a small sample of inner boxes and units selected at random from the inspection lot. If the primary packaging is opaque, such as foil outer packages for oral contraceptives, it is not necessary to break the primary package seal to inspect the unit of product unless the outer packaging appears damaged and/or there is reason to suspect that the unit is damaged. The labeling on the shipping cartons, inner boxes, and individual units should be inspected for legibility and consistency.

[3] In some countries it may be feasible to incorporate monitoring inspection findings at the retail or clinic levels into the quality assurance documentation system. At the very least, however, staff at the retail or clinic level should be encouraged to report on an ad hoc basis any visible product abnormalities or discrepancies to the appropriate supply authorities.

The three types of inspection discussed thus far are conducted as part of routine logistics management. The final three types of inspection are undertaken in response to potential problems.

Response to Complaints

Sources of complaints

Product complaints should be monitored carefully. If it is determined that the complaints are the result of unanticipated product problems, an inspection is warranted. Complaints may originate from a variety of sources, including clinicians, consumers, or warehouse personnel, and may center around the appearance of the product or packaging or may reflect problems with its use.

Documenting complaints

To the extent possible, the specifics and number of complaints should be documented. In the case of user complaints, documentation may be difficult, but is critical to establish the validity and reliability of complaints. If a number of similar complaints are received about a product, an effort must be made to trace the complaints to a specific manufacturer's lot or shipment and even possibly a specific warehouse or distribution point. Once this link is made, the remaining stored stocks of the commodity should be sampled and inspected. In carrying out an inspection in response to complaints, the aim should be to isolate and remedy the cause of the problem.

Targeting specific problems

The extent and scope of the inspection will depend upon the nature of the complaint. For example, if the complaint relates to the condition of the inner boxes, shipping cartons and inner boxes will be the focus of the inspection. Alternatively, if the complaint relates to the product itself, the unit of product will be the target of the inspection. The program should seek guidance on specific sampling procedures from the donor or local authorities. In some cases it may be appropriate to arrange for analytical testing in response to specific product complaints.

Aged Product

Preventing waste

In some extreme cases, a product may have remained in storage so long that it is near its expiration date.[4] If it is determined that deterioration will occur before the product can be expected to reach the consumer through normal distribution, the product should be inspected to determine whether or not an effort to accelerate distribution is worthwhile. Alternatives to the normal distribution channels within a country may need to be identified to prevent wastage of still-usable products.

When inspecting aged products, the samples of the unit of product must be drawn and inspected even if the shipping cartons and inner boxes show no visible signs of damage or deterioration. Samples of the product should be large enough to accurately represent the condition of the entire inspection lot. If the inspection results reveal problems, the product should be quarantined and destroyed according to appropriate product destruction policies. For products that cannot reasonably be expected to be used by their expiration date or within their known shelf life, stock should be quarantined and destroyed, following the regulations of appropriate local authorities and/or the products' donor.

Evidence of Damage

The above cases describe damage to contraceptive stocks that may be uncovered in the course of compliance, receipt, or inventory inspections, or in response to problems of aged product or complaints about product quality. However, signs of damage to contraceptive stocks warrant an inspection any time they are noted.

[4] Not all contraceptives are marked with an expiration date. It is therefore important for the procurement agency to provide guidance on expected product shelf-life. Even without an assigned expiration date, product aging can effect changes in the stability, potency of active ingredients, and packaging integrity that can result in a loss of product effectiveness.

Examples of damage conditions

Examples of conditions under which damage might be sustained are exposure to water, rodents, insects, or from unpalleted cartons. Warehouse workers should be mindful of the conditions that can cause damage to contraceptives. Any visible damage to contraceptive cartons should be followed up with an inspection of inner boxes within the cartons. If inner boxes appear to be damaged, individual unit packages should be inspected. (**Appendix B** contains a list of possible defects and their classification.)

Corrective Action

Corrective action should be taken if the inspection reveals product defects. Defects are classified according to their implications for product use.

Defect Classification

A defect or nonconformity is:

1. Any change in the inspected product that interferes with intended normal use and/or effectiveness, or
2. Any discrepancy between the characteristics of the inspected product and applicable requirements and specifications.

The significance of defects varies widely. Therefore, it is important to classify defects according to their implication for product use. The classification of defects also helps to determine what type of programmatic response is required. Defects can be classified as follows:

Classification by implication for product use

Critical defect - A defect that, according to experience and professional criteria, threatens the safety and efficacy of the product for its intended use.

Major defect - A defect that is likely to reduce usability and may make product use more difficult, but does not have the safety or efficacy risk associated with a critical defect.

Minor defect - A defect that is unlikely to affect usability of the product, but represents a departure from the specifications.

Reporting major and minor defects

If minor or major defects are found in a sample, even if the sample is suitable for distribution, a report detailing the observation should be submitted to the local procurement agent, whether it is a donor representative or government procurement entity. In most cases, products with minor or major defects can still be used in the program; however, attention should be paid to whether these defects will lead to more rapid deterioration or illegible labeling. Although a detailed report is indicated for findings of both major and minor defects, concerns about major defects should be pursued more vigorously.

Handling critical defects

If any critical defects are reported, the affected contraceptives should not be distributed without further investigation. This investigation may involve the local procurement agent, the local donor representative, and/or local regulatory authorities. The products should be clearly identified (labeled) and quarantined to prevent accidental disbursement of the critically defective units, and the program should submit the findings to the procurement agent. If laboratory testing is required, the program should request instructions from the local regulatory authority, procurement agent, or donor on how to draw samples for such testing and where to send them for laboratory analysis.

If laboratory testing is deemed unnecessary, one hundred percent of quarantined contraceptives should be inspected by visually examining each individual contraceptive unit or unit package to separate and total the units with critical defects. After sorting, non-defective units may be distributed according to instructions from the local regulatory authorities and the procurement agency. The defective units should be destroyed upon receipt of approval from relevant authorities, including the donor as required. The program should check the appropriate procedure for destruction, since it varies from country to country, donor to donor, and product to product.

Documentation

Documentation is an essential component of both logistics management and quality assurance. In order to improve the reliability of the inspection, operating procedures for drawing samples, performing visual examinations, and recording observations should be standardized and documented at all levels of warehouse storage. Standard forms for completing the inspection and inspection report should be used to ensure consistent examination criteria. **Appendix B** provides an example of a comprehensive checklist for visual inspection.

Recommended use of standardized forms

The relevant local or donor's contraceptive specifications should constitute the basis of inspection and report forms. These forms are a subset of logistics information systems (see Chapter 2). For a sample Inspection Control Report Form, refer to Figure 7 in this manual.

While basic logistics information focuses on such items as stock on hand, rate of consumption, and lead time, quality assurance information concentrates on contraceptive quality trends. An assessment of these trends requires that a summary of documented visual examination over time be established. Visual inspection observations recorded when contraceptives are received in a country serve as "baseline" quality data. Subsequent inspection results can be compared to the receipt/baseline information and to the product specifications. Documented quality trends can be used to make informed decisions about distribution, storage, and future procurement.

Quality assessment trends

Contraceptive inspection records should be filed by product and shipment. Identifying information includes the type, brand, age of contraceptive, and warehouse location, in addition to sampling and visual inspection data. This information should be recorded and filed according to established procedures. However, the following is recommended as a minimum:

Minimum documentation requirements

- One copy remains with the commodities for as long as they are stored at the central or regional warehouse (if inspection occurs at other levels, documentation procedures may need to be adapted accordingly).

- One copy is sent to the program/supply or medical/technical authority (and used to monitor trends and make informed recommendations about distribution or corrective action); this copy should be filed by product and shipment to make subsequent comparisons easier.

- One copy is sent to the donor or, when commodities are procured independently, to the central authority responsible for procurement.

Subsequent inspections of the same inspection lot of contraceptives should be documented in the same manner. The most recently collected data on physical characteristics can then be compared with previous inspection results to detect changes in the appearance of commodities or packaging.

By observing changes over time, program managers can work to improve the logistics system so as to minimize contraceptive deterioration during storage and distribution. Well documented data on contraceptive quality also can be used by the procurement agent or donor to support product development, improved formulations, and more appropriate specifications.

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Evaluating the Logistics System

Introduction

When evaluating a logistics system, general observation can usually indicate how well the system is functioning and identify areas that require further investigation. Since the component activities of logistics management are highly interrelated, if a problem is found in one component, it is likely to affect other activities.

Initial inspection

Ideally, the evaluation should start by observing a sample of outlets to determine whether sufficient quantities of contraceptive supplies are on hand and to evaluate storage conditions and logistics data. This initial inspection need not be detailed or in depth.

Further analysis

If the evaluator has a strong initial impression that the contraceptives are in good condition and continuously available for distribution at the field level, it can be assumed that the system is working, even if not in the most efficient manner. On the other hand, if the system is not working well, the evaluator can determine the direction and scope of further analysis. Absent or inaccurate data might indicate that conditions are not normally as good as they appear at the time of the evaluation.

Checklist for field evaluation

To conduct an evaluation of the logistics system at the field level, we recommend use of a simple checklist (see **Appendix C**). To assess logistics system effectiveness at different

administrative levels, supply data found in reports and the number of Couple Years of Protection the program provides should be analyzed. **Appendix D** outlines procedures for using supply data analysis and the Couple Years of Protection (CYP) Index as indicators of logistics system effectiveness.

System evaluation versus audit

A supervisor's *evaluation* of a logistics system differs from an *audit*. The purpose of an evaluation is to identify problems in the system so steps can be taken to correct them. An audit, on the other hand, may be conducted for more specific purposes, such as determining whether the system complies with program policy and regulations, and whether equipment and materials are accounted for. Both evaluations and audits are useful and should be conducted periodically.

Outlet Problems

Problems encountered in the logistics system at outlets can include:

Storage

The storage capacity and condition of outlets varies. Field visits frequently show that some outlets can store more contraceptive supplies than they do, whereas others lack sufficient storage space.

Underutilized capacity

Often, storage capacity can be increased by cleaning and rearranging the existing storage area or by finding underutilized space within the facility. By increasing current stock levels, planners can reduce the frequency of resupply and the risk of stockouts. However, stock levels should not be so high that commodities cannot be safely stored or that stocks cannot be used before their date of expiration.

Accommodating security needs

Lack of security is often mentioned as an excuse for not maintaining higher stock levels. Often, a small investment

can be made to secure a room or to obtain locking cabinets. The community served by the outlet may also offer secure storage space.

At times, outlets do not manage supplies by using the recommended First-Expiry/First-Out (FEFO) principle or by the less reliable, but still useful, First-In/First-Out (FIFO) principle of distribution. This usually happens because staff have not been trained or do not have written guidelines on supply management.

Finally, if more than one type of oral contraceptive is dispensed by the program, the outlet staff may mix the different brands together in a drawer or cabinet and dispense them indiscriminately to clients. This could lead to medically undesirable side effects and cause clients to drop out of the program.

Inventory Control

Lack of inventory control procedures

The most common problem found in outlets is a lack of inventory control procedures in the following areas:

- Shipments are not always checked against packing lists.

  Shipments of supplies may be received in quantities that are more or less than those indicated on the packing list, and the difference goes undetected.

- Staff do not understand the importance of properly maintained stock cards in supply management.

  If stock cards are used, they may be inaccurate, out-of-date, or missing vital information such as requisition numbers or dates. Stock cards that quantify items by boxes, cartons, or packets rather than by units, may lead to inaccuracy and confusion.

Under these conditions, quantities of stocks on hand are not known and usage rates cannot be calculated. Supply reorders may then be made haphazardly, when someone discovers a potential stockout. If stock cards are not used, the history of movement of supplies is not known, and order quantities are based on guesswork (e.g., the same amount ordered last month, plus 10%). This leads to stock imbalances and possibly stockouts or expired stock.

- Monthly inventory reports contain only aggregate quantities of orals dispensed rather than the quantities of each formulation. As a result, imbalances may occur in the different formulations of oral contraceptives available to consumers. This is true of any contraceptive with multiple brands.

- In an inadequately supervised "pull" system, staff at the outlet level may falsely report stockouts and other emergency situations when they think contraceptive supplies are low at intermediate and central levels. Outlet personnel may assume that there is a greater probability of receiving the items requested if they report lower amounts than they actually have on hand.

Central and Intermediate Warehouse Problems

At the central and intermediate warehouse levels, problems in the logistics system can be related to:

- Stacking contraceptives
- Broken lots
- Stock cards
- Failure to practiceFEFO/ FIFO
- Physical inventory
- Forms and reports
- System documentation

Stacking Contraceptives

Improper stacking of contraceptives

If cartons of contraceptives are stacked so not all rows or levels are visible, it is possible that:

- **The FEFO or FIFO principle of distribution is not observed.**

  If this is the case, the warehouses and distribution points may be issuing/dispensing newer stocks of contraceptives before those with older manufacturing or expiration dates. Inevitably, some supplies on hand will expire before they are issued.

- **Different commodities are stored together.**

  Many types of oral contraceptives are boxed in similar containers. If these contraceptives are indiscriminately stacked together, staff working in the supply system and at distribution points may be unaware of differences in formulations. Receiving different types of oral contraceptives in a single shipment may indicate to them that there are no differences. Thus, family planning clients may be given one type of oral contraceptive during one visit and another type on the following visit.

Incomplete Cartons

Management by cartons encouraged

Central warehouses should manage contraceptives in whole cartons. For example, orders for contraceptives supplied by A.I.D. should be filled in case lots of 1,200 cycles for orals and 6,000 units for condoms.

Intermediate warehouses should also manage contraceptives in case or package lots. For example, the present shipping cartons of Lo-Femenal (oral contraceptives) contain 12 packages of 100 cycles each, whereas cartons of condoms contain 60 packages of 100 each. Because of low patient loads,

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some outlets will require fewer than 1,200 cycles or 6,000 condoms when they are resupplied by the intermediate warehouse. In this case, intermediate warehouses should issue oral contraceptives in package lots of 100 cycles and condoms in package lots of 100 units.

Assuming that quantities per carton are not excessive, the same principles should be applied to contraceptives purchased locally or supplied by other donors.

Problems related to issuing less than full cartons

Less than full cartons encountered during an inspection of a central or regional warehouse facility may indicate that:

- Contraceptives are not being stored and shipped in full cartons, thus decreasing the efficiency of the warehouse operation.
- Lower-level distribution points have not been instructed to order supplies in full cartons.
- The warehouse is receiving damaged or pilfered shipments, or commodities are subject to pilfering or pest infestation in the warehouse.
- The maximum and minimum supply levels assigned to a given distribution point are too low or not followed, resulting in the need for emergency orders. (Fill-in orders should be avoided, since they are costly to process and require the inefficient use of transport.)

Stock Cards

Valuable distribution/issue information

A stock card should be maintained for each brand of each item in the inventory. Otherwise, commodities may become "lost" in the warehouse and expire before they are issued to distribution points. In addition, without a stock card the rate of distribution of different brands, formulations, or types cannot be determined, which can result in inaccurate forecasting.

Review of the stock cards and requisition and issue vouchers maintained by the central and intermediate warehouses and using the checklist at **Appendix C** will reveal:

Lower level shipments

- **The size and frequency of shipments to the next lower level.**

  If a given location is issued small quantities of supplies on a frequent basis, this may indicate that supply levels for this facility are too low, storage space at the facility is inadequate, or transportation facilities are inefficiently used.

Supply bottlenecks

- **Bottlenecks in the flow of supplies.**

  A comparison of the stock cards maintained by central and regional warehouses or an analysis of supply data at the national level may indicate that large quantities of supplies are being moved from the central to the regional warehouses but that smaller quantities are moving from regional to lower levels.

  In this case, the regional warehouses will eventually reach their capacity. This indicates that problems may exist in the flow of information and supplies between the regional warehouses and the distribution points or that supply policies practiced at the central level are not being applied in the field.

Incorrect system operation

- **Incorrect operation of the system.**

  A frequent problem in a "push" system is that all distribution points of the same type are periodically shipped the same quantities of contraceptives. This results in imbalances (oversupply and undersupply) in the system because demand for contraceptives varies from one facility to another.

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For example, visits to different outlets served by a regional warehouse might reveal one outlet with a 2-year supply of a specific contraceptive, and another with insufficient quantities of the same item.

During these visits, an evaluator can determine whether the staff at the family planning outlets served by the warehouse are trained and qualified to offer methods of contraception that require specialized knowledge (i.e., IUDs and diaphragms). If these methods are on hand and no one is trained to use them, the supplies should be moved to a facility that can use them.

Pull system shortfalls

On the other hand, a frequent problem in a "pull" system is that the full quantities requested are not always shipped, possibly indicating that lower-level personnel are ordering too many supplies, the shipper is short of stock, or arbitrary decisions are being made regarding shipping quantities.

- **Variations in lead time.**

  For the system to work efficiently, lead time between request and delivery should be reasonable and consistent.

- **Whether supplies are specified by cycles and units.**

  If supplies are specified by boxes, cartons, or packets, confusion and inaccuracy may result, since quantities per box, carton, etc. may vary from one manufacturer to another.

Physical Inventory

Stock card and inventory comparisons

Comparing the results of a physical inventory with stock cards can reveal whether the stock cards are up-to-date and

accurate. Here again, the checklist in **Appendix C** is useful. If the physical inventory and the quantities recorded on stock cards vary by more than small amounts, there has been pilferage or other losses, shortages in shipments, or clerical errors.

Forms and Reports

Presence or absence of reports

The presence or absence of forms, especially stock cards and requisition and issue vouchers, indicates how well the logistics system is managed and whether forecasts are based on demand. In some programs, requests for supplies are made informally, i.e., by telephone, telegram, or note, with little documentation of issues and receipts.

Similarly, the absence or presence of reports will indicate whether someone is paying routine attention to simple performance indicators, such as:

- Trends in the quantities of contraceptives stocked by outlets compared to the actual use
- The proportion of outlets with stock levels below the minimum, or above the maximum, desired supply level
- The number of emergency shipments sent out from the warehouse in a given month
- The average and range of lead time
- Inventory fluctuations

Documentation of the System

Documentation enables training

In many programs, the supply system procedures are not documented and supply personnel are not always trained in

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supply management. In this situation, decisions are often made on an ad hoc basis.

Supply system procedures and guidelines should be documented in a supply manual and given to staff at all program levels. Management personnel should also be trained in the procedures of the system.

An essential task of program supervisors is the periodic evaluation of the supply system during routine supervisory visits. For this reason, the supervisors' training must be thorough. They must have a complete understanding of the supply system and a helpful attitude toward support staff. The value of good supervision in any supply system cannot be overemphasized.

General Logistics System Problems

Indicators of other logistics system problems

Other logistics system problems to watch for are:

1. Deterioration of supplies or packaging materials because of water, heat, insects, or other damage. Even if the contraceptives are usable, they may not be attractive to users if packages are dirty or in poor condition.

2. Insufficient funds for transport. A related problem arises in programs where field staff must use public transport to collect supplies from the warehouse and insufficient funds are budgeted for this purpose or reimbursements are slow.

3. Incomplete data on quantities dispensed to users and quantities on hand. The result is that historical data are of poor quality or do not exist, thus making it difficult to detect changes in demand. The insufficient data cause serious problems when forecasts are being prepared.

4. Poor documentation of system transactions. This makes it more difficult to detect problems.

5. Inexperienced program managers. The logistics component of the program is often relegated to low-ranking staff with limited experience, little access to training, and little authority to correct problems.

6. Lack of supervision. This can lead to lower-level staff not understanding their tasks or not thinking the tasks are important.

Summary

This chapter has discussed examples of the most common problems found in supply systems. Other problems occur and can be detected by inspecting warehouses and inventory records, as well as by carefully questioning personnel at all levels. Basic questions to ask during the evaluation process are:

Basic evaluation questions

1. How often are supplies reordered?

2. How do you determine what quantity to order?

3. Who makes these decisions?

4. What are the usage rates of the different items of supply and are there any anticipated program changes that would affect these rates?

5. When and how frequently are emergency orders made?

6. How long is the lead time for supplies? Is it consistent? Where are supplies ordered from, and what is the usual route and mode of transport used?

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Operating a successful logistics system requires common sense and the ability to prevent problems and detect and resolve them when they do occur. Organizational factors are also determinants of a successful system. Program procedures, organizational policies, and an ill-defined scope of responsibility for supply management personnel can constrain a logistics system. Once these constraints are identified and understood, however, the logistics system can be modified to better meet program needs.

Appendix A

Contraceptive Shelf Life

Contraceptive Shelf Life

A product expiration date is sometimes required by regulation in various countries. Generally, this date indicates that the manufacturer of the product has determined the product's effective life based on an actual time study of the product stored from the date of manufacture to the indicated expiry date under controlled conditions. A product's effective life may end sooner than the expiry date if the product is not properly stored or if it is exposed to adverse conditions. The following is a discussion of shelf life and product efficacy of some A.I.D.-supplied contraceptive commodities. Although the examples are brand specific, the quality control procedures apply to all brands.

Expiration dates

For all contraceptives, good management promotes the maintenance of product integrity. For instance, stress caused by excess weight damages most products, with condoms being particularly vulnerable. Therefore, all products should be stored on pallets in stacks not touching walls and no more than 8 feet (2.5 meters) high with room for air circulation around individual stacks. Adhering to recommended procedures for issuing products and for managing inventories will ensure that products are distributed within acceptable shelf life periods.

The following information for the shelf life of A.I.D-supplied contraceptives has been established by the manufacturers and, in most cases, by the U.S. Food and Drug Administration.

Oral Contraceptives

Five-year shelf life

Oral contraceptives have a shelf life of 5 years. This shelf life is based on a test of the actual life of the products stored in blister packs in moderate temperature (65°-77° F or 18°-25° C) and low relative humidity.

Visual indicators of oral contraceptive deterioration

The first indication of product deterioration will likely be a reduction in the hardness of the pill. If the pills crush when pushed through the foil backing of the blister pack, the quality of the product is suspect. Other indicators of deterioration may be color change or cracks in pills. While not absolute tests of product integrity, these are obvious and easy indicators that program managers can use to spot-check inventories or supplies distributed to users. The paper-lined foil pouch for the 100-cycle shelf cartons and the shipping cartons provides extra protection; products should remain in this packaging until needed.

Condoms

Condom storage

Condoms stored in a temperate environment and protected from exposure to high heat, humidity, light, ozone, and chemical damage have a 5-year shelf life. Exposure to the higher temperatures and humidity associated with tropical climates will most likely shorten the useful life of this product. Hence, greater care should be taken in storing condoms in such environments.

Specific "don'ts" include avoiding exposure to fluorescent lighting, direct sunlight, and electric motors, and not storing chemicals in the same facilities where condoms are stored. Regarding this last point, chemical damage can occur from fumes or gases from stored petrol, halogen gases (such as freon), or various types of liquid solvents.

IUDs

Copper-T IUD

The Copper-T 380-A IUD has an established shelf life of 7 years. This shelf life is based on the length of time the packaging materials can maintain product sterility. Shelf life differs from use life, which is currently 8 years for the Copper-T 380-A IUD. Thus a Copper -T 380-A IUD could be stored for up to 7 years, inserted, and worn for 8 years.

Program managers should not be alarmed by a darkening in the copper color in the Copper-T. This copper tarnish does not affect product efficacy nor does it indicate that the device is not sterile. Managers should know, however, that any break or perforation of the sterile wrapper makes the product unacceptable for use unless it is chemically resterilized.

Spermicides

Conceptrol, a vaginal foaming tablet, has a shelf life of 5 years. Signs of deterioration to watch for include puffy packaging, crumbling tablets, or discolored tablets. Emko Foam has a shelf life of 3 years.

Norplant®

Stored at room temperature away from excess heat and moisture, Norplant has a shelf life of 5 years.

Depo Provera®

Depo Provera manufactured in Belgium has a shelf life of 5 years. Depo Provera manufactured in the USA has a shelf life of 2 years. The shelf life of the USA-manufactured product is expected to eventually reach 5 years, following approval by the U.S. Food and Drug Administration. Separation of Depo Provera within the vial is not uncommon, and generally not a problem. The Depo Provera can be resuspended by shaking the vial.

Product Testing Procedures

Product quality testing

If the program manager suspects, either by inspection or from user complaints, that a product is no longer effective, samples of these products should be tested before further distribution to program outlets. Product quality testing is done by most U.S. manufacturers of the product and/or independent testing laboratories at no cost to the local A.I.D. mission. For

a preliminary assessment of product quality, A.I.D. missions and local programs should proceed as follows:

Submitting descriptive information

- Request guidance on numbers and procedures for sampling from A.I.D. at the following address:

  Agency for International Development
  R&D/POP/CPSD
  Room 803 - SA-18
  Department of State
  Washington, D.C. 20523

- Send descriptive information to A.I.D. on warehousing conditions when requesting guidance. This includes temperature, humidity, and stacking information and an explanation of why testing is requested. This is particularly relevant for condoms because they are susceptible to multiple sources of damage and are more affected by adverse storage conditions than are oral contraceptives and IUDs.

- Sample and ship products to be tested, in accordance with instructions received from A.I.D.

- Withhold further distribution of the product in question until a response is received from A.I.D. Feedback may take up to one month from the time of receipt of the product.

- Contact A.I.D. for disposal procedures if test results show the product is no longer usable.

Appendix B

Visual Inspection Review Guidelines

Oral Contraceptives

Oral contraceptives come in cycles of 21 or 28 tablets. In the 28-day cycles, seven placebo or iron tablets are provided in addition to the contraceptive tablets. Iron tablets generally are larger and brown in color. Most oral contraceptives are packaged in blister packages with a cardboard overpack. Frequently, three cycles are packaged together in a sealed foil overpack. Oral contraceptive shelf life ranges from three to five years at 37° C although the majority of brands have a five-year shelf life. Blister packaging provides good protection from adverse environmental conditions.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. (For example, the oral contraceptives donated by AID do not contain the expiry date -- only the date of manufacture. Therefore, the N/A box should be checked). Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor

Oral Contraceptives (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
Carton condition/content:	Yes	No	N/A	
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor
INNER BOXES				
Inspection Criteria				
Inner box labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner boxes in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Arrow indicating sequence of pills	☐	☐	☐	Critical
Contents and quantity	☐	☐	☐	Major
Drug registration number	☐	☐	☐	Major
Storage instructions	☐	☐	☐	Minor
Print on unit package is legible	☐	☐	☐	Minor
Product use instructions properly folded	☐	☐	☐	Minor
Unit package condition/content:				
Unit package in good condition (undamaged, unopened)	☐	☐		Critical
Pills in good condition (unbroken, correct color, none missing)	☐	☐		Critical
Good package seal, no breaks	☐	☐		Critical
Unit package contains no foreign matter	☐	☐		Critical

Intrauterine Devices

IUDs come in a variety of designs. The majority of IUDs in use today have a frame of molded plastic with some form of copper attached. The shelf life for IUDs ranges from three to seven years.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug or device registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Carton condition/content:				
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor

Intrauterine Devices (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
INNER BOXES				
Inspection Criteria				
Inner box labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug or device registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner boxes in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product information card within sterile package	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Contents and quantity	☐	☐	☐	Major
Drug or device registration number	☐	☐	☐	Major
Print on insert card or use instructions is legible	☐	☐	☐	Minor
Unit package condition/content:				
Unit package in good condition (undamaged, unopened)	☐	☐		Critical
All components present, none missing (inserter tube, flange, IUD, tail, copper components if relevant, inserter rod, insert card, or information)	☐	☐		Critical
Components in good condition, not misshapen	☐	☐		Critical
Good package seal, no breaks	☐	☐		Critical
Unit package contains no foreign matter	☐	☐		Critical

Spermicides

A variety of spermicidal contraceptives are available, including forming tablets, foam, jellies, and suppositories. Shelf life for spermicides ranges from three to five years depending upon the type. Suppositories melt at high temperatures, but can be rehardened by refrigeration with no loss in potency.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Carton condition/content:				
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor

Spermicides (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
INNER BOXES				
Inspection Criteria				
Inner box labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner boxes in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Contents and quantity	☐	☐	☐	Major
Drug registration number	☐	☐	☐	Major
Storage instructions	☐	☐	☐	Minor
Print on unit package is legible	☐	☐	☐	Minor
Product use instructions properly folded	☐	☐	☐	Minor
Unit package condition/content:				
Unit package in good condition (undamaged, unopened)	☐	☐		Critical
Unit package contains no foreign matter	☐	☐		Critical
Foaming Tablets				
Tablets in good condition (unbroken, correct color)	☐	☐		Critical
Tablets hard, not crumbly feeling	☐	☐		Critical
Packages in good condition, not puffy	☐	☐		Critical
Good package seal, no breaks	☐	☐		Critical
Container tube properly sealed	☐	☐		Critical
All tablets present, none missing	☐	☐		Major

Spermicides (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
Suppositories	Yes	No	N/A	
Tablets hard (or refrigerate for hardening)	☐	☐		Critical
Tablets in good condition, unbroken	☐	☐		Critical
Applicator present	☐	☐		Critical
Good package seal, no breaks	☐	☐		Critical
Foam				
Applicator present	☐	☐		Critical
Dispenser mechanism properly functioning	☐	☐		Critical
Cap present, not missing	☐	☐		Critical
Foam in good condition (correct color, consistency)	☐	☐		Critical
Jelly				
Applicator present	☐	☐		Critical
Tube in good condition, not leaking	☐	☐		Critical
Cap present, not missing	☐	☐		Critical
Jelly in good condition (correct color, consistency)	☐	☐		Critical

Condoms

Because of their sensitivity to deterioration during storage, condoms stored longer than two years at the central warehouse level should be routinely tested in a laboratory. The inspection criteria described below should be used before the product is two years old. A visual inspection may identify condom lots that require laboratory testing. Condom shelf life is generally five years for all sizes and brands (if not exposed to temperatures in excess of 37° C). However, because condoms are so vulnerable to environmental conditions, expiration dates generally are not useful.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Device registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor

Condoms (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
Carton condition/content:	Yes	No	N/A	
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor
INNER BOXES				
Inspection Criteria				
Inner box labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Date of expiration or manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Device registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner box in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration or manufacturing date	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Device registration number	☐	☐	☐	Major
Storage instructions	☐	☐	☐	Minor
Unit package condition/content:				
Unit package in good condition (undamaged, unopened)	☐	☐		Critical
Packaging in good condition (no breaks in strips)	☐	☐		Critical
Package free of any leakage of lubricant	☐	☐		Critical
Unit package contains no foreign matter	☐	☐		Critical
Package free of any discoloration	☐	☐		Major

Injectable Contraceptives

Injectable contraceptives are available in several formulations, including oil-based and aqueous suspension and dosage forms. Contraceptive protection per dose ranges from one month to three months depending upon the product. Injectables are available in pre-filled syringes, but are most commonly provided in single- or multi-dose vials or ampoules with disposable syringes. Shelf life for injectable contraceptives ranges from two to five years depending upon the formulation. Recommended storage temperature generally is 15-30° C. Storage temperature is critical to product stability; oil-based solutions become rancid at elevated temperatures; particle size in aqueous suspension can change with temperature fluctuation and affect drug efficacy. Manufacturers' recommended storage conditions should be followed.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor

Injectable Contraceptives (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
Carton condition/content:	Yes	No	N/A	
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor
INNER BOXES				
Inspection Criteria				
Inner box labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner box in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Dosage	☐	☐	☐	Critical
Contents and quantity of doses	☐	☐	☐	Major
Drug registration number	☐	☐	☐	Major
Storage instructions	☐	☐	☐	Minor
Unit package condition/content:				
Glass vial or ampoule in good condition (undamaged, unopened)	☐	☐		Critical
Vial or ampoule contains no foreign matter	☐	☐		Critical
Vial or ampoule free of leakage	☐	☐		Critical
Vial or ampoule free of solid material or caking	☐	☐		Critical
Correct Color	☐	☐		Critical
Sufficient number of syringes for contraceptive doses	☐	☐		Critical
Good vial seal, no breaks	☐	☐		Critical

Implants

Currently, Norplant® is the only contraceptive implant in worldwide use. Norplant® implant system consists of six silicone rods that are inserted under the skin of a woman's arm and are effective for five years from date of insertion. The implants are sterile and are packaged in a sealed pouch for storage. Norplant® insertion requires a surgical trocar that must be sterilized between uses. The shelf life of Norplant® is five years when stored at temperatures ranging between 20°-50° C.

The labeling criteria listed below are comprehensive and useful not just in identifying the product, but in managing it successfully within the logistics system. However, not all contraceptives are procured with such extensive labeling specifications. If any of the labeling criteria listed below are not applicable, mark the appropriate box in the N/A column. Product procurement specifications should be consulted prior to finalizing the inspection criteria.

Date: _____	Receipt Report Number: _____
Product: _____	Lot Number: _____
Brand Name: _____	Manufacturer: _____
Expiration Date: _____	Date of Manufacture: _____
Inspection Lot Size: _____	Sample Size: _____
Warehouse Location: _____	Second Sample Size: _____
_____	
_____	

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
SHIPPING CARTONS				
Examine 100% of the shipping cartons against the shipping documents.				
Inspection Criteria				
Carton labeling:	Yes	No	N/A	
Product/brand name	☐	☐	☐	Major
Lot/batch number	☐	☐	☐	Major
Expiration date	☐	☐	☐	Major
Manufacturer's name, address	☐	☐	☐	Minor
Date of manufacture	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor

Implants (continued)

VISUAL INSPECTION CRITERIA	MEETS CRITERIA			DEFECT CLASSIFICATION
Carton condition/content:	Yes	No	N/A	
Carton in good condition, undamaged	☐	☐		Major
All inner boxes present, none missing	☐	☐		Major
Proper flap closure	☐	☐		Minor
INNER BOXES				
Inspection Criteria				
Inner box labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Minor
Manufacturer's name, address	☐	☐	☐	Minor
Contents and quantity	☐	☐	☐	Minor
Drug registration number	☐	☐	☐	Minor
Storage instructions	☐	☐	☐	Minor
Inner box condition/content:				
Inner box in good condition (undamaged, unopened)	☐	☐		Major
All unit packages present, none missing	☐	☐		Major
Inner box contains no foreign matter	☐	☐		Minor
UNIT PACKAGES				
Inspection Criteria				
Unit package labeling:				
Product/brand name	☐	☐	☐	Critical
Lot/batch number	☐	☐	☐	Critical
Expiration date	☐	☐	☐	Critical
Date of manufacture	☐	☐	☐	Critical
Manufacturer's name, address	☐	☐	☐	Critical
Product use instructions	☐	☐	☐	Critical
Contents and quantity	☐	☐	☐	Major
Drug registration number	☐	☐	☐	Major
Storage instructions	☐	☐	☐	Minor
Unit package condition/content:				
Unit package in good condition (undamaged, unopened)	☐	☐		Critical
All components present, none missing, no excess components	☐	☐		Critical
Good package seal, no breaks	☐	☐		Critical
Unit package contains no foreign matter	☐	☐		Critical
Implants in good condition, not bent or broken	☐	☐		Critical
Implants correct color (white or off-white)	☐	☐		Critical

Appendix C

Sample Logistics Evaluation Checklist

Date: _____
Time: _____
Location: _____

1. ☐ Clinic ☐ District ☐ Region or Depot ☐ Central Warehouse

Brands	Stockout at Time of Inspection? Yes/No	Any Stock Expired Yes/No	Physically Counted Stock on Hand (# Units)	Quantity Recorded on Bin Card (Stock Ledger)
Pills:				
Injectable:				
Implant:				
IUD:				
Condoms:				
Foaming Tablets:				
Other:				

Evaluating Supervisor: _____

Title: _____

Contact - Person Interviewed:

_____

_____

Comments:

_____

_____

_____

_____

2. Inspection of Stock

a. Who makes the decision as to timing and amounts of supplies delivered to this facility?

A person at this facility ☐

A person at a higher level facility ☐

b. How much time is normally required between ordering and receiving supplies?

(Lead time) _____ Does lead time vary? By how much? _____

c. As supplies on hand decrease, at what point are resupply orders made?

_____

d. By what method of transport (road, rail, air, bicycle, public transport, other) do supplies arrive?

_____

Is the transport private or government-owned? _____

Who pays for the transport? _____

e. Have there been stockouts of contraceptives within the last year?

If yes: Which methods? _____

For how long and when? _____

f. Do the quantities actually counted reflect accurate recording on bin cards and other records?

_____

3. Condition of Storage Area

a. Security? ☐ Acceptable ☐ Unacceptable

b. FEFO or FIFO system used according to manufacture or expiration dates?

☐ Yes ☐ No

c. Building waterproof and well ventilated? ☐ Acceptable ☐ Unacceptable

d. Supplies neatly stocked, labeled, and protected from light, heat sources, and pests? ☐ Acceptable ☐ Unacceptable

4. Analysis of Data from _____ to _____

a. Calculate the average monthly distribution of each method during the last six months.

Product / Month	1	2	3	4	5	6	Total	÷	Average Distribution
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	
								6	

b. Divide the quantity remaining in stock at the end of last month by the average monthly distribution to determine how many months of supply you have on hand.

Product	Quantity in Stock at End of Last Month	÷	Average Monthly Distribution	=	Number of Months' Supply on Hand
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	
		÷		=	

5. Comments:

Appendix D

Supply Data Analysis

Program Efficiency

Supply data can provide a useful estimate of family planning program efficiency at all administrative levels. These data include the total amount of contraceptive supplies **dispensed** and the balance of supplies **on hand** at the end of the month. With these data, the supply status of the program can be expressed in terms of the number of months of supply on hand, by method, by brand.

Monitoring variations and sudden fluctuations

These data should be reported by all program levels and should be analyzed by supervisory staff. Sudden fluctuations in the amounts dispensed to users, or inventory levels that depart from desired maximum and minimum levels, indicate that deficiencies in supplies may exist.

An example of a report based on supply data for several clinics in a district is shown in **Figure 12** on the following page.

Although this example is computer-generated, it can also be prepared manually by clerical staff. An asterisk (*) indicates that the stock level in a particular place or group of places does not comply with program policy or is not within the desired supply limits.

Figure 12

Sample Supply Status Report

District X Month: A					MIN/MAX Number of Months Supply Clinic Min-2, Max-4		MIN/MAX Number of Months Supply District Min-4, Max-8		
	Lo-Femenal (Cycles)			No-Logo Condoms (Units)			Conceptrol Foaming Tablets (Units)		
Clinic Name	Monthly Amount Dispensed To Users (6 Mos. Aver.)	Stock End of Month	No. Mos. Supply in Stock	Monthly Amount Dispensed To Users (6 Mos. Aver.)	Stock End of Month	No. Mos. Supply in Stock	Monthly Amount Dispensed To Users (6 Mos. Aver.)	Stock End of Month	No. Mos. Supply in Stock
A	255	918	3.6	960	3,750	3.9	92	278	3.0
B	103	452	4.4 *	324	580	1.8 *	36	75	2.1
C	137	310	2.3	420	1,130	2.7	24	8	3.3
D	89	137	1.5 *	280	460	1.6 *	12	30	2.5
E	198	560	2.8	540	1,730	3.2	48	178	3.7
F	72	210	2.9	220	500	2.3	22	40	1.8 *
District Total	854	2,587	3.0	2,744	8,150	3.0	234	609	2.6
District Warehouse		2,860	3.3		23,598	8.6 *		1,320	5.6

* Indicates above maximum or below minimum.

In this example, clinics B, D, and F and the district warehouse have stock levels that fall outside those desired for one or more methods. Clinic B should order condoms and foam but postpone ordering pills. All other clinics should order all supplies to bring all inventory levels up to the maximum.

This example illustrates that supply imbalances can exist at different levels of the program. An imbalance may be due to one or more of the following:

Causes of supply imbalances

1. Changes have occurred in the amount of supplies dispensed to users or issued to lower levels from central or intermediate warehouses. This indicates that the system is not keeping up with changes in program performance. A detailed study may be needed to determine whether the problem is specific to certain areas or items or is more general in nature.

2. If an oversupply at a higher level is accompanied by an undersupply at a lower level, the supply system is not properly meeting demand at the lower level. This would most likely be seen in a national-level analysis if the problem existed in one or more regional warehouses. In some countries, supply personnel are overly conservative when filling requests from lower levels, particularly when large amounts are involved.

3. An oversupply at the central level may indicate that projections of program performance have not been achieved or that supplies are not moving down the system according to program policy.

4. If undersupply is a problem at all levels, either performance exceeds projections, lead time is longer than planned, or adjustments are not being made in the quantities that represent a month's supply.

5. An undersupply at the central level may indicate a shortfall of supplies being procured because of inaccurate forecasting, insufficient lead time in placing orders, or difficulties in clearing commodities through customs.

Estimating Couple Years of Protection (CYP)

CYP: a method of measuring family planning output

Statistical systems for family planning program services often produce inaccurate data on "current users" of a program, which is one of the most important measures of program output. In this section, another method of measuring family planning output is described--the Couple Years of Protection (CYP) Index, which summarizes the overall output of a program in terms of the potential contraceptive protection dispensed by the program. CYP is sometimes called CYP achievement, and is expressed as a number. This number is the theoretical number of couples receiving contraceptive protection for a year.

The CYP index is a way to determine the total contraceptive protection offered by the different methods issued by a program during a certain time period. One CYP is equal to 12 couple-months of protection, which could be attributed to any person-time combination, from one couple practicing birth control for one year to 12 couples practicing birth control for 1 month each. CYP indicates how much contraceptive protection time could result from the quantity of contraceptives dispensed.

The procedure for estimating CYP consists of these steps:

Procedure for estimating CYP

1. Determine the quantities dispensed for each method during the time period being analyzed. This information should come from outlet records such as daily activity registers. If information is not easily available from the outlets, estimate the quantities dispensed from higher-level data, such as warehouse issues.

[Note: higher level data are less accurate because it is impossible to know whether the entire amount has been dispensed to users.]

2. Determine the conversion factor, which is the amount of each method needed to provide one CYP. This may vary from country to country. Ideally, program managers determine conversion factors for themselves from local evidence. However, in most instances a program will have to use estimates that have been developed on the basis of relevant experience elsewhere. The following estimates are used by A.I.D. as conversion factors for one CYP:

Amounts needed for one CYP

- 15 cycles of pills
- 150 condoms
- 150 foaming tablets
- 1 unit for each new diaphragm user (or 0.3 units per continuing user)
- 6 tubes of jelly per diaphragm user
- 1 unit for each new IUD user (or 0.3 units per continuing user)
- 1 implant for each new Norplant® user (or 0.3 implants per continuing user)
- 4 doses of Depo Provera®
- 6 doses of Noristerat®

To calculate CYP for each method, simply divide the quantity of each contraceptive method dispensed in a year by the average quantity of each method used by a couple in a year. These results can be calculated as shown in the following table.

Sample CYP calculations

SAMPLE CYP CALCULATIONS

Contraceptive Method (1)	Amount Issued (2)	÷	Average No. Needed per Couple per Year (3)	=	CYP Achievement (4)=(2)/(3)
Pill	290,416		15 cycles	=	19,361
Condom	193,596		150 units	=	1,291
IUD	540		0.3 units	=	1,800
Jelly (including diaphragms)	1,116		6 tubes	=	186
Foaming Tablets	87,221		150 tablets	=	581
Depo Provera	9,260		4 injections	=	2,315
				TOTAL	25,534

The above example shows that contraceptives sufficient to provide 25,534 couple-years of contraceptive use were dispensed through program activities during the year. This type of analysis can be done by clinic or region, or for the entire program.

However, in calculating CYP achievement, keep in mind that certain assumptions are necessary. These include that all supplies dispensed are *used* and that there is *no* hoarding, improper use of contraceptives by clients, or use for *other purposes* such as STD prevention. In practice, these assumptions are often difficult to validate.

Comparing Program Output

In evaluating contraceptive prevalence, it is important to know how regions, health areas, districts, or other subdivisions compare in overall success and whether total contraceptive output is decreasing, increasing, or remaining the same. Comparing the CYP achievement of different program subdivisions is one way to estimate contraceptive prevalence.

In comparing program outputs using CYP achievement, it is necessary to have current population data for the country, preferably by geographic subdivision. The information normally used to calculate CYP achievement is the number of married women aged 15-44. Some countries use the total number of women aged 15-44, regardless of marital status, and some use 15-49 as the age group. These data are usually found in published census documents.

The procedure for converting CYP achievement into CYP prevalence consists of three steps:

Converting CYP achievement

1. From recent census volumes or relevant sample survey reports, obtain the number of married women 15-44 years of age living in the program subdivisions under study.

2. Calculate the CYP for these subdivisions.

3. Divide the CYP of each subdivision by the number of married women 15-44 years of age living in each subdivision and multiply by 100. The resulting figure is the "CYP prevalence" or percent of the population covered by the program. This is almost always lower than overall contraceptive prevalence because some persons obtain contraceptives from private sources.

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The following example illustrates how CYP prevalence is calculated for various program regions:

CALCULATING CYP PREVALANCE

Program Region (1)	1989 CYP (2)	Married Women 15-44 (3)	CYP Prevalence (4)=(2)/(3) x 100
I	13,444	263,608	5.1
II	16,742	201,711	8.3
III	18,375	680,556	2.7
IV	2,503	125,150	2.0
V	7,319	159,109	4.6
TOTAL	58,383	1,430,134	4.1

Measure of program performance

CYP prevalence is a useful measure of program performance for management purposes, particularly when comparing one time period or location with another.

EXAMPLE

Program Region	CYP Achievement 1989	1990	1991
I	13.6	14.8	15.1
II	14.2	10.8	13.7
III	19.5	21.4	20.9
AVG	15.8	15.6	16.6

Appendix E

Glossary

A.I.D.	The United States Agency for International Development.
Allocate	To assign, apportion, or set aside. The allocation of supplies refers to the designation of supply quantities to be issued or "pushed" to various program levels.
AMC	Average monthly consumption. This is the average amount of a contraceptive that is dispensed to users.
Bill of Lading	A detailed list of supplies and quantities included in a particular shipment.
Bin Card	A card used to record inventory levels which is physically located with the product at the central or lower-level warehouse.
Blisterpack	The foil and plastic packaging in which oral contraceptives are typically sealed.
Bottleneck	A point in the supply system where the flow of supplies or information is obstructed or slowed down.
Broken Lots	Opened cartons or cases that contain less than the number of units originally packed in the carton/case.
Case Lots	Unopened shipping cartons that contain inner boxes, cartons, and/or units.
CDC	The Centers for Disease Control and Prevention.
Commercial Retail Sales (CRS)	Contraceptive sales through existing private commercial channels, usually at a subsidized price. The aim is to take advantage of existing commercial logistics systems to make contraceptives widely available.

Contraceptive Stability	The ability of a contraceptive to maintain its efficacy under various storage and usage conditions.
Couple Years of Protection (CYP)	The amount of contraceptive protection provided in a year. It is calculated by dividing the quantity of a given contraceptive method dispensed during a certain time period by the number of units of that method normally used by a couple during that time period. For example, if 30,000 cycles of pills are distributed by a program in one year and a couple would normally use 15 cycles per year, then 30,000 divided by 15 equals 2,000 couples protected by pills for the year, or 2,000 CYP.
Dispense (to user)	The provision of an item of supply to its ultimate user by a contraceptive outlet, distribution point, clinic, household distributor, etc.
Emergency Order	Nonroutine order that is placed when it is anticipated that a stockout will occur before the next routine order can be filled.
First-Expiry/First-Out (FEFO)	A method of managing supplies in a storage facility to ensure that the stock which expires soonest is issued before newer stock.
First-In/First-Out (FIFO)	A method of managing supplies in which the first stock received is issued before stock received more recently.
Forecasting	Estimating the quantity of supplies that are needed to serve a given number of anticipated users over a particular period of time.
Indent System of Supply	See pull system.
Inventory Control Card	A stockkeeping record, or stock card.
Issue	The provision of an item of supply by one storage facility to another or to a service provider (for example, from a warehouse to an outlet).

Issue Data	Data on quantities distributed at all program levels. The analysis of issue data is commonly used in forecasting supply needs. Sources of issue data include stock cards, requisition and issue vouchers, consumption records, distribution logs, and sales receipts.
IUD	Intrauterine device.
Lead Time	The time interval between the time supplies are ordered (or, in a push system, allocated) and when they are received and available for use.
Married Women of Reproductive Age (MWRA)	Usually defined as women aged 15-44 who are in union. This is the target group for most family planning programs. Other programs may also target unmarried women, particularly adolescents, and some use 15-49 as the age group.
Maximum/Minimum Inventory Control System	A system to control supplies so that quantities fall within an established range.
Maximum Quantity	The quantity of stock above which inventory levels should not rise under normal conditions. Routine stock orders should be the amount required to bring inventory levels up to this point.
Method	A contraceptive method, such as oral contraceptives, IUDs, or condoms.
Minimum Quantity	The actual quantity of articles represented by the minimum months of supply. In the forced ordering version of max-min, an emergency order may be needed when stock on hand reaches this level. In the standard and continuous review versions, orders are initiated when stock on hand falls below this level.
Operating Stock	The difference between maximum and minimum quantity. The quantity represented by the order interval.

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Order Interval	The routine interval of time between reviews of stock levels to determine whether or not an order should be placed; also known as "review period" or "resupply interval."
Pipeline	The flow of supplies from the manufacturer to the consumer.
"Pull" or Requisition System of Supply	A system in which decisions on the timing and quantity of shipments are made by the lower administrative level or recipient. Also called "Indent" system.
"Push" or Allocation System of Supply	A system in which decisions on the timing and quantity of shipments are made by the higher administrative level or the shipper.
Receipt	The arrival or receiving of supplies; can also refer to a written acknowledgment or "voucher" of goods received.
Requisition	Requesting or ordering supplies through appropriate program or distribution channels.
Requisition and Issue Voucher	A stock transaction record.
Reserve Stock	See safety stock.
Resupply Interval	See order interval.
Review Period	See order interval.
Safety Stock	The buffer, cushion, or reserve stock kept on hand to protect against stockouts caused by delayed deliveries or markedly increased demand.
Stock Card	An inventory record often kept in the central warehouse or at other central or regional levels. Same as inventory control card.

Stockkeeping Record	A constantly updated record of the number of items received, issued, and on hand in a storage facility. Example: inventory control card or bin card.
Stock Order	Routine prescheduled order.
Stockout	Refers to a situation in which a storage facility has no stock on hand of a particular item.
Stock Transaction Records	Documents that initiate or support receipts and issues at a storage facility. Example: requisition and issue voucher.
Target Population	The specific population eligible to be served by a family planning program. This can be either all or a subset of potential contraceptive users in a particular geographic area.
Voucher	A written acknowledgment or confirmation (for example, of receipt of supplies).