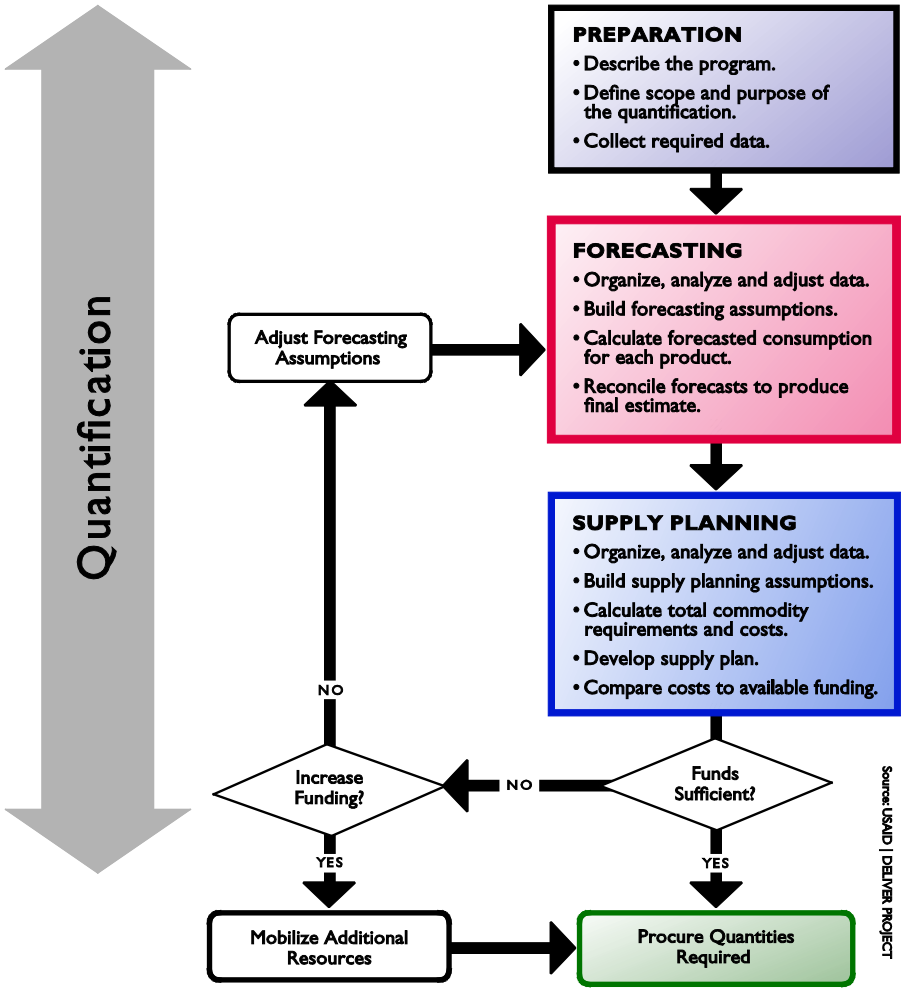
USAID | DELIVER PROJECT

Quantification of Health Commodities

A Guide to Forecasting and Supply Planning for Procurement



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A Guide to Forecasting and Supply Planning for Procurement

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Abstract
The USAID | DELIVER PROJECT, Task Order 4, developed this guide for quantifying health commodities; it will assist technical advisors, program managers, warehouse managers, procurement officers, and service providers in (1) estimating the total commodity needs and costs for successful implementation of national health program strategies and goals, (2) identifying the funding needs and gaps for procuring the required commodities, and (3) planning procurements and shipment delivery schedules to ensure a sustained and effective supply of health commodities.

The step-by-step approach to quantification presented in this guide is complemented by a set of product-specific companion pieces that include detailed instructions for forecasting consumption of antiretroviral drugs, HIV test kits, antimalarial drugs, and laboratory supplies.

Cover graphic: Steps in Quantification, USAID | DELIVER PROJECT, December 2010

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Tables

Acronyms

3TC	lamivudine
AIDS	acquired immunodeficiency syndrome
ANC	antenatal care
ART	antiretroviral therapy
ARV(s)	antiretroviral (drug(s)
AZT	zidovudine
CHAI	Clinton Health Access Initiative
CIDRZ	Center for Infectious Disease Research in Zambia (University of Alabama)
d4T	stavudine
ddI	didanosine
DHMT	District Health Management Team
EID	early infant diagnosis
EFV	efavirenz
FPLM	Family Planning Logistics Management (project)
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV	human immunodeficiency virus
HMIS	health management information system
LMIS	logistics management information system
LPV/r	lopinavir/ritonavir
max-min	maximum-minimum (type of inventory control system)
M&E	monitoring and evaluation
MOH	Ministry of Health
MOS	months of stock
NGO	nongovernmental organization
NMCC	National Malaria Control Council
NVP	nevirapine
OI	opportunistic infection
PITC	provider-initiated testing and counseling
PMTCT	prevention of mother-to-child transmission (of HIV)

RH	rifampicin/isoniazid
RHZE	rifampicin/isoniazin/pyrazinamide/ethambutol
SOW	scope of work
STG	standard treatment guideline
TB	tuberculosis
USAID	U.S. Agency for International Development
UTH	university teaching hospital
VCT	voluntary counseling and testing (HIV and AIDS)

Acknowledgments

This publication is dedicated to the many individuals from communities, nongovernmental organizations (NGOs), faith-based organizations, ministries of health, and other organizations that have consistently fought for access to essential medicines and health services. The publication is also dedicated to friends and counterparts who have worked with the USAID | DELIVER PROJECT and its predecessor projects, the John Snow, Inc. DELIVER project, and the Family Planning Logistics Management (FPLM) I, II, and III; and to the thousands of committed professionals in ministries of health and NGOs who work daily to supply their customers and programs with essential public health commodities.

The U.S. Agency for International Development (USAID) contracts funded the technical assistance, in-country projects, and research that produced the written experiences and lessons in this guide. We are deeply grateful to the team of professionals in the Office of HIV/AIDS, and the Commodity Security and Logistics Division in the Office of Population and Reproductive Health of the USAID Global Health Bureau's Center for Population, Health, and Nutrition, for their encouragement and advice and for their commitment to improving human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) laboratory and public health programs through logistics.

Sincere thanks go to the extended core team of dedicated technical staff from the field and from the project office in Arlington, Virginia, who developed and wrote parts of this guide. The lessons drawn from the experience of the USAID | DELIVER PROJECT and its predecessor projects in conducting quantification exercises, in multiple countries, across commodity categories, would not have been possible without these valuable contributions.

Purpose

Who Should Use This Guide?

This practical guide for quantification of health commodities was intended to be a reference for technical advisors, program managers, procurement officers, warehouse managers, service providers, government officials, implementing partners, donor agencies, and others on how to conduct a national-level quantification exercise. Individual members of the quantification team, who are responsible for program planning, budgeting, and mobilizing resources for procuring commodities, will also find this guide useful for using the output from the quantification to support these activities.

What Is the Purpose of This Guide?

This guide is designed to assist users in applying a systematic, step-by-step approach to quantifying health commodity requirements and costs. It should be used when conducting a national-level quantification exercise and includes specific guidance on how to use the results of the quantification to do the following:

- Identify the funding needs and gaps for procuring the required commodities.
- Coordinate procurements and shipment delivery schedules to ensure a sustained and effective supply of commodities.
- Implement a process for reviewing and updating the results of the quantification to maintain and improve the validity, accuracy, and usefulness of current and future quantifications.

While several software programs are available to complete the forecasting and the supply planning steps in a quantification exercise; currently, a single tool that does it all does not exist. This guide is not intended to train users how to use any specific software tool, but rather to guide users through the process of conducting a quantification. It is important to note, however, that the process explained in this guide for supply planning is linked to the PipeLine software. More than 20 years working with a wide range of commodities has shown the project that using PipeLine software is best for preparing supply plans. Several of the currently available software programs are referenced in *appendix B. Software Programs for Quantification of Health Commodities*.

The step-by-step approach to quantification of health commodities presented in this guide will enable users to—

- List the specific data required at each step of the quantification.
- Collect and analyze the available data.
- Identify and obtain consensus on the forecasting assumptions needed to account for missing data and to estimate the effect of key programmatic and environmental factors expected to influence the demand for commodities.

- Organize forecasting data and assumptions and structure the *forecasting tree* for morbidity-based forecasts.
- Utilize the forecasting data and assumptions to calculate the quantity of each product expected to be dispensed or consumed during each year of the quantification.
- Identify the key supply chain parameters required to estimate the total commodity requirements and costs for the country or the program.
- Identify and obtain consensus on the supply planning assumptions needed to account for missing data and to estimate the effect of the key supply chain factors expected to influence the supply of health commodities.
- Calculate the total commodity requirements and costs for each year of the quantification.
- Plan shipment quantities and delivery schedules to ensure continuous supply for each year of the quantification.
- Compare the amounts and timing of funding commitments for procurement with the total commodity costs and required shipment delivery dates as the final step in the quantification.
- Explain the benefits of using the PipeLine software to obtain the final outputs of the quantification.

How to Use This Guide

This general guide should be used with the companion pieces that have been developed for different categories of commodities. This guide describes the overall quantification process from start to finish, provides instructions for each step in the quantification process, and cites challenges and examples from actual quantification exercises.

The product-specific companion pieces provide detailed guidance on forecasting consumption for antiretroviral (ARV) drugs; HIV test kits; laboratory supplies; antimalarial medicines; contraceptives; and select reproductive, maternal, neonatal, and child health commodities. A separate quantification exercise must be conducted for each category of commodities. Companion pieces include information on the products; how they are prescribed, dispensed, and used; the types of data required; and the common assumptions that should be incorporated into the forecasting step for these commodities. These companion pieces are necessary to complete a quantification for each of these commodity categories:

Introduction to Quantification

Role of Quantification in the Supply Chain

The approach to quantification developed by the USAID | DELIVER PROJECT and its predecessor projects is based on more than 20 years of experience conducting quantifications for a wide range of public health commodities. Quantification is the process of estimating the quantities and costs of the products required for a specific health program (or service) and determining when the products should be delivered to ensure an uninterrupted supply for the program. Quantification is a critical supply chain activity that links information on services and commodities from the facility level with the program policies and plans at the national level; it is then used to inform higher-level decision-making on the financing and procurement of commodities. The results from a quantification can be used to help maximize the use of available resources for procurement; advocate for mobilization of additional resources, when needed; and inform manufacturer production cycles and supplier shipment schedules.

Quantification is not a one-time exercise, but it is an iterative process, which includes reviews and updates required year-round.

Quantification is not a one-time, annual exercise that ends when the final quantities and costs of the commodities have been determined. The outputs from the exercise should drive an iterative process of reviewing and updating the quantification data and assumptions, and recalculating the total commodity requirements and costs to reflect actual service delivery and consumption; as well as changes in program policies and plans, over time. The results of a quantification should be reviewed and updated at least every six months, and more frequently for rapidly growing or changing programs. The *Reviewing and Updating the Quantification* section in this document provides more detail on monitoring and updating quantifications.

Please see the *References* section of this guide for other USAID | DELIVER PROJECT documents and software products related to quantification of health commodities in resource-constrained settings.

Quantification and Supply Chain Integration

With the increase in funding—from the U.S. Government (USG) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) for program commodities, such as HIV and malarial commodities and an increased focus on maximizing resources—countries have concentrated on estimating their requirements in a more systematic fashion to reduce overstock and wastage.

A key factor impacting the quality of quantification is the data available. Large investments to support programs, such as HIV and AIDS and malaria, in this area have brought some rigor to the process. Periodic forecast reviews and supply plan updates have helped countries focus their resources on improving their information systems and, in general, their logistics system performance.

As such, improving the efficiency with which quantification is done can potentially contribute significantly to accelerating the evolution of a supply chain, from the ad hoc to the organized stage (refer to *Supply Chain Evolution: Introduction to a Framework for Supply Chain Strengthening of Developing Country Public Health Programs).*

Who Should Conduct a Quantification?

For a quantification exercise to be useful and effective, the right people need to be involved in each step of the process, from data collection and analysis to presenting the final results to the Ministry of Health (MOH) and other relevant authorities. Logistics managers, policymakers, program managers, technical experts, procurement officers, warehouse managers, and service providers are the people most often involved in a quantification. The policies determining the selection and use of the products being quantified are also specific to each program, type of service, and type of commodity being used. Therefore, it is important to consult with clinical, pharmacy, and laboratory staff who are closely involved in providing these services and managing the commodities throughout the quantification process.

One or more of the quantification team members should have significant software database management skills, which are required to structure the quantification databases and then enter the forecasting and supply planning data and assumptions into the database, calculate the final drug quantities and costs, and plan the required shipment quantities and schedules to meet the total program or country requirements.

Institutionalizing local skills and capacity in quantification requires resources and a commitment by all key players.

Depending on the capacity of in-country program managers and staff, external technical assistance is often required for national programs that want to apply a proven approach to quantification. The success of capacity-building efforts and institutionalization of local capacity in quantification of health commodities will depend on the level of investment in the process and the commitment of local staff to make quantification part of their job responsibilities. See the *Reviewing and Updating the Quantification* section for detailed information on the level of effort, specific activities, and the staff skills and experience required to conduct, review, and update national quantifications.

Appendix A includes a sample schedule for conducting a quantification using external technical assistance that also builds in resources and time for using a capacity-building approach.

Standardization As a Prerequisite to Quantification

A prerequisite for conducting quantification for any health commodity is clear, well-defined, and disseminated standard treatment guidelines (STGs), testing protocols, and laboratory testing menus for defining how specific products should be administered for treatment or used for testing. This is especially true when reliable consumption data are not available. A critical assumption when using demographic data, morbidity data, and services data is that service providers are following established standard guidelines. Therefore, standardization should precede quantification, as these guidelines are the basis for the assumptions in the forecasting step of the process.

In the case of new, rapidly expanding programs, the importance of STGs and testing protocols is magnified, because sufficient quantities of commodities must be procured to allow for expansion. In

addition, many health services require multiple products to be available at the same service delivery point (SDP) at the same time.

Sometimes, when conducting a national-level quantification, which could encompass programs run by the MOH and with other donors, there can be more than one set of STGs. For example, an NGO-run treatment program may use its own guidelines and will not adhere to national STGs. In this case, the programs must have a separate quantification.

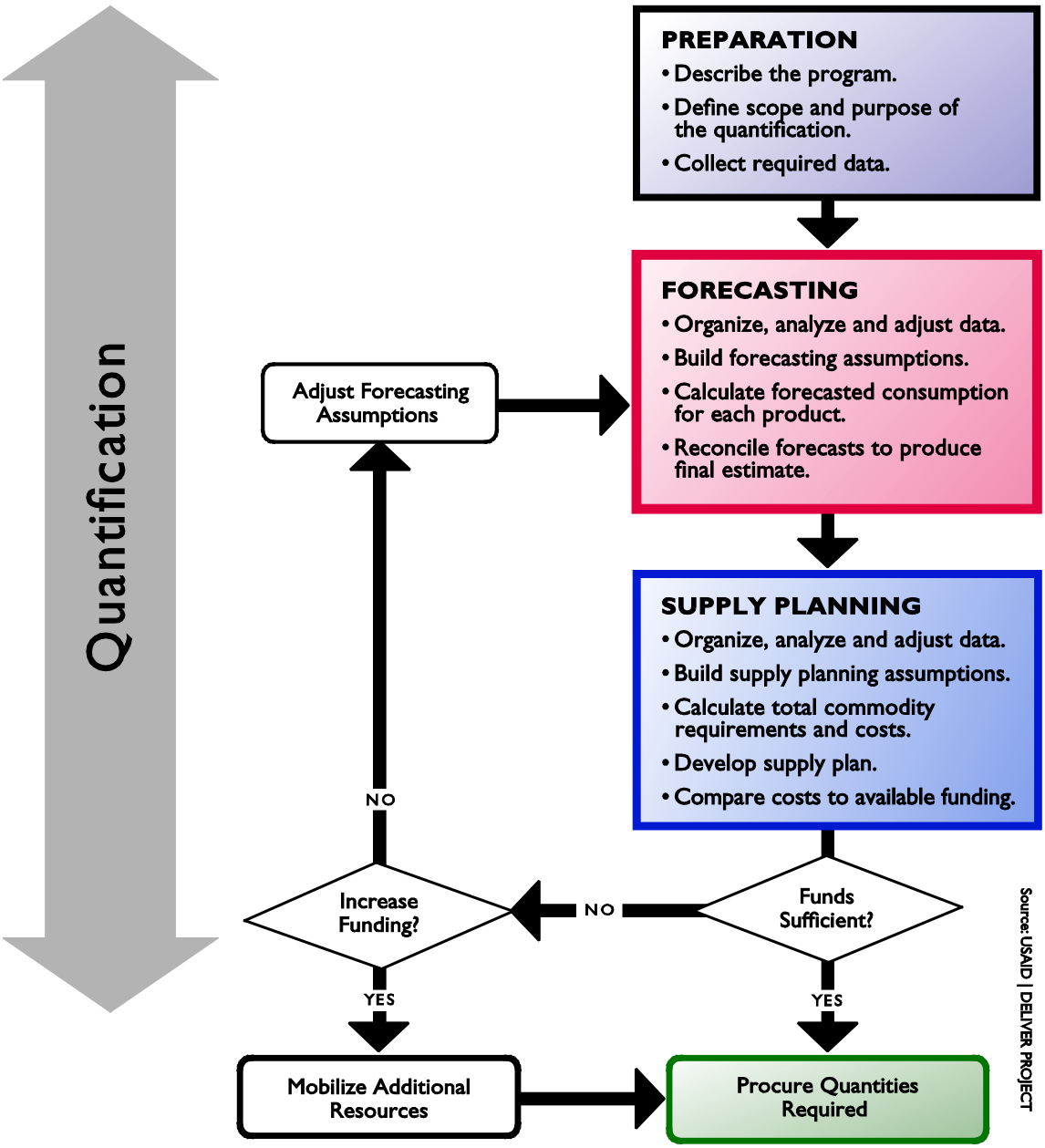
Adherence to STGs can help ensure that products are used as intended and can also enhance the accuracy in the forecasting step of the quantification. Noncompliance with STGs may compromise the validity of the forecasting results and can lead to procurements that result in overstocking and wastage of some products and stockouts of others.

It is also essential to consult the essential drugs list and/or list of drugs previously procured to ensure the forecast inputs and outputs are standardized with the approved and registered medicines in the country.

Steps in Quantification

This section offers a standardized, step-by-step approach to quantification. It follows the steps outlined in figure 1. The three basic steps are preparation, forecasting, and supply planning.

Figure 1. Steps in Quantification



Preparation (prepare for the quantification)

Prior to collecting data, two initial steps should be taken: (1) describe the program; and (2) define the scope, purpose, and timeframe of the quantification.

Describe the Program

PREPARATION

- Describe the program
- Define scope and purpose of quantification
- Collect required data

Summarize the background, current status, and performance of the program for the commodities being quantified. The summary should include a review of program goals, strategies, and priorities, and any expansion plans or change in policies that could significantly influence the uptake of services and demand for commodities. It should also include a brief description of the service delivery model, supply chain, level of political commitment, and financial support for services and for commodities. It should note any challenges the program has encountered in ensuring the supply of commodities for the program and the availability of products at SDPs.

Define the Scope, Purpose, and Timeframe of the Quantification

Scope of the Quantification

It is necessary to define which programs and which commodities will be included in the quantification exercise. Quantification of one category of commodities, such as ARV drugs, may include commodity requirements for the public-sector antiretroviral therapy (ART) program or it could include the NGO and faith-based sectors, as well. A quantification could also be conducted for a particular funding agency, implementing partner, geographical region, or specific population group. Best practices in supply chain management have shown that a national-level quantification of commodity requirements to cover all demands for a particular category of commodities is the most useful. A national-level quantification enables key stakeholders to know the full extent of the commodity needs and to coordinate mobilization of resources for procurement.

The specific list of commodities to be quantified should be agreed-upon in defining the scope of the quantification, which could include a combination of branded and generic products; products procured by governments and local institutions and donated by different funding agencies; or products procured from multiple suppliers.

Purpose of the Quantification

It is important to identify the purpose of the quantification and how it will address the program's needs. Examples of the purpose of a quantification include the following:

- Provide data on specific commodity requirements and costs for the government's annual budget allocations.
- Inform donors about funding requirements and advocate for resource mobilization for commodity procurement.
- Estimate commodity needs and assess stock status of the in-country supply pipeline to identify and correct supply imbalances.
- Support an estimate of commodity procurement, storage, and distribution costs.

Time Period for the Quantification

For maximum effectiveness and usefulness for procurement, a quantification of commodity requirements and costs for a rolling two-year period is recommended. This should include not only the actual quantities of each product to be procured and when they should be procured, but also a shipment delivery schedule based on funding available and the established program stock levels that consider procurement and supplier lead times and maximum-minimum stock levels. Quantifying commodity requirements and costs for a two-year period facilitates timely procurement and identification of funding gaps to mobilize needed resources before stockouts occur, or to adjust shipment schedules to avoid overstocking. Although a quantification should be prepared for two years, in most cases, actual procurement should cover a rolling one-year period. Limiting the actual procurement to one year enables program managers to adjust future procurement quantities.

Collect Required Data

The importance of available and quality data cannot be underestimated. These data include services data on the number and type of health services being provided and logistics data on the consumption and stock levels of commodities for informing the quantification. A well-functioning health management information system (HMIS) and logistics management information system (LMIS) are central to improving the accuracy and usefulness of health commodity quantifications. In addition, morbidity data, demographic data, and information on national program policies, strategies, and expansion plans should be used to inform the assumptions in the forecasting step of the quantification.

Different types of data and information will be required at each step in the quantification. The data and information can be collected through interviews and consultative meetings with key stakeholders, including program managers, policymakers, donors, and implementing partner organizations, procurement officers, warehousing managers, and clinical and other technical experts, as well as from direct service providers.

Specific data on the number and type of health services provided can be collected through the existing HMIS reports; the consumption and stock levels of individual commodities can be collected through the existing LMIS reports. In some cases, it may be necessary to directly collect data at health facilities. In addition, current policy and technical documents and reports, and any epidemiological surveillance data, demographic health surveys, census data, or special survey studies should be reviewed to collect morbidity and demographic data that can be used in the quantification.

Data for Forecasting

- **Consumption data: Quantity of each product dispensed or consumed during the past 12 months**

  Consumption data are historical data on the actual quantities of a product that have been dispensed to patients or consumed at SDPs, within a specified period, which can be reported monthly, bimonthly, or quarterly. Daily consumption data can be found in pharmacy dispensing registers or other point-of-service registers. Where a well-functioning LMIS captures and aggregates these data from SDPs, aggregated consumption data can be found in monthly facility-level and annual program-level reports. When consumption data are used, the forecast is based on the quantities of products consumed in the past.

  Example: From February to March, 50,000 tablets of co-trimoxazole were consumed.

Consumption data are most useful in mature, stable programs that have a full supply of products and reliable data.

- **Services data: Number of visits, number of services provided, lab tests conducted, disease episodes treated, or number of patients on treatment during the past 12 months**

  Service data are historical program-level or facility-level data on the number of patient visits to facilities, the number of services provided, the number of disease (or fever) episodes, or the number of people who received a specific service or treatment within a given period. Service statistics data can be found in program monitoring reports, HMIS data, facility-level data on service utilization and attendance rates, or patient records.

  Example: In 2013, 76,000 cases of TB were treated.

- **Morbidity and demographic data: Total population, population growth rates, incidence and prevalence of specific diseases/health conditions—it may be available by population group or through surveillance or research study group, and extrapolated to estimate national-level incidence and prevalence of specific diseases/health conditions**

  Demographic data include the data on the number and characteristics of the population targeted for services, i.e., age breakdowns. Morbidity data are estimates of the number of episodes of a specific disease or health condition that will occur in a common denominator of the population (e.g., number of episodes per 1,000 or per 100,000 population).

  Example: The overall HIV prevalence rate is 12%,
  Example: The population of a country is 12 million,

  Demographic and morbidity-based estimates are often used to estimate the total unmet need for a service or treatment in a program or country; and, therefore, it would represent the uppermost bounds of the potential drug requirements for a program.

- **Information on current program performance, plans, strategies, and priorities, including specific program targets for each year of the quantification.**

  The quantification team may be able to use target data. In some situations, program targets are also *political targets* that do not relate to the actual number of patients being served, or who can be served by a program. Broad *program targets* of this type are best used for advocacy and resource mobilization, and should not be used for quantification of products for procurement. Sources of program target data include program planning documents, national policy and strategy documents, and materials published for dissemination and advocacy.

  Example: During the next program year, 100,000 IUDs will be inserted.

See figure 2 for more information on each type of data for forecasting.

Data for Supply Planning

Data for the supply planning step are not the same as the data for the forecasting step. However, data for both steps can be collected at the same time, such as during meetings or consultative workshops with stakeholders. For example, if a quantification is being conducted for a national ART program and there are multiple donors, each with its own recordkeeping system; the easiest

approach may be to gather data on both the past program performance and any shipments on order at the same time.

The monthly forecasted consumption of each product for each year of the quantification is the major output of the forecasting step and **is also the key input data to the supply planning step**. Other data that are required for the supply planning step include the following:

- national- or program-level stock on hand (preferably from physical inventory) of each product to be quantified (should include losses and adjustments)
- expiration dates for the products in stock to assess whether they will be used before expiration
- quantity on order: any shipment quantities of product(s) already on order, but not yet received
- established shipment intervals and current shipment delivery schedule
- established national- or program-level maximum and minimum stock levels
- product information:
  - patent status, registration status, prequalification status, if applicable
  - status of products on the National Essential Medicines List
  - specific product characteristics (formulations, dosages, number of units per pack size, unit cost, and others).
- supplier information:
  - supplier prices
  - supplier packaging information
  - supplier lead times
  - shipping and handling costs.
- funding information:
  - all funding sources for procurement of commodities
  - amount and timing of funding commitments, by funder
  - funding disbursement schedules to determine when funding will be available for procurement from each source.
- procurement information:
  - all procurement mechanisms—e.g., competitive international bidding/tendering, donor procurement, or local procurement—for all products to be quantified
  - procurement lead time for each procurement mechanism.
- distribution information:
  - customs' clearance fees
  - in-country storage and distribution costs, if applicable
  - in-country sampling/quality testing costs.

Information on Programmatic, Environmental, Societal, and Behavioral Factors Expected to Influence Demand for Services and Commodities

The following are examples of programmatic and environmental factors that may affect demand for services and commodities and may need to be considered in the forecasting assumptions:

- changes in policies and STGs mandating product selection and how products are to be prescribed, dispensed, and used
- emergence of new products and formulations on the market
- changes in amounts and timing of financing available for commodity procurement
- changes in program priorities, strategies, and goals, particularly targets for coverage—e.g., provider-initiated testing and counseling (PITC), emphasis on early infant diagnosis (EID), pediatric ART, laboratory diagnostics and monitoring, increased focus on home-based care and nutritional support—that result in demand for new commodities or may create variations in the consumption of existing commodities
- seasonality in incidence of specific diseases/health conditions
- geographical variation in incidence of specific diseases/health conditions
- changes in political, legal, or regulatory environment—e.g., community-based distributors have been recently authorized to distribute injectable contraceptives, second-line ARV drugs are rolled out to the intermediate levels, or products are now available free of charge
- societal and behavioral factors—e.g., reduction in stigma affects demand for ARVs, wider use of bed nets reduces incidence of malaria.

Forecast Consumption/Forecasting

Organize, Analyze, and Adjust the Data

Multiple types and sources of data may have been collected, ranging from LMIS reports to number of patients treated or clients served, to incidence and prevalence rates of disease. After the forecasting data have been collected, they should be organized by type: either consumption, services, morbidity, or demographic (see figure 2). Program targets for the two-year quantification period should also be included, if available.

One of the most critical steps for the quantification team is to assess the quality of the data to determine if they can be used for the quantification. Some considerations for data quality include the following:

- What is the facility reporting rate? How many of the facilities that should be reporting consumption and/or services data have reported? Of the facilities that reported, how representative are they of the non-reporting facilities? Reported data must be adjusted to accommodate for non-reporting facilities. The lower the reporting rate, the lower the quality of the data. With very low

FORECASTING

- Organize and Analyze Data
- Select Forecasting Method(s)
- Build Forecasting Assumptions
- Calculate Forecasted Consumption for Each Product

reporting rates, it is not likely that data can be extrapolated to represent a national picture.

- For consumption data, did facilities have stockouts at any time? If the program had stockouts of products, past consumption data will underestimate what the consumption would have been if products had been continuously available at all facilities. Adjustments will be needed to cover the stockout periods.
- How recent are the data? This is critical for all types of data, whether consumption, services, morbidity, or demographic data. The older the data, the lower the quality.
- Are historical data predictive of future need? Is current program performance an accurate reflection of the demand for services that will be provided or quantities of drugs that will be dispensed in the future? For new or expanding programs, the rate of increase in services to be provided or products to be dispensed should consider past performance and historical growth rates.

It is helpful to organize the data you have collected and analyzed into a table. Table 1 shows data that could be collected for conducting a quantification of HIV tests.

Table 1. Example Data for a Sample Quantification of HIV Tests

Type of Data	Data	Quality of Data	Other Notes
Consumption data	Central-level issues data Central-level stock on hand	Complete monthly issues data for the past 12 months	No stock on hand at facilities available Site-level consumption data not available
Services data	Number of clients tested, according to MOH monitoring and evaluation reports, including number of people tested for voluntary counseling and testing (VCT) and prevention of mother-to-child transmission. Number of antenatal care visits	75% reporting rate for the past 3 months	No data available on numbers of tests used for blood safety No data available on numbers of tests used for training
Morbidity data	HIV prevalence rate	1 year old	Adult prevalence rate only; no prevalence rate available for under 15 years old.
Demographic data	Total population	3 years old	No population growth rate available

The quantification team will need to formulate assumptions on current program performance where data are missing or of questionable quality—such as unreliable, outdated, or incomplete data. After all historical data have been evaluated and adjusted, the quantification team will need to formulate and ensure consensus on all assumptions about future program growth and any increase or decrease

in demand for services and commodities; this will be used to forecast quantities of each product that will be needed during each year of the quantification.

When using consumption data, the quantification is based on quantities of products historically consumed. These historical consumption trends need to be analyzed and assumptions made about factors that are expected to influence the demand for individual products during the period of the quantification.

When using services data, the number of patients or clients served, or number of treatment episodes, is used as the starting point. Similar to consumption data, these historical trends need to be analyzed and assumptions made about future number of patients or clients served, or number of treatment episodes. These must be converted into quantities of products.

When using morbidity, demographic, or services data, the estimated number of people or episodes of a disease that are expected to be treated, must be translated into the number of products expected to be consumed.

When using morbidity or demographic data, the starting point is population-based figures. As with services data, these data on people must also be converted into quantities of products expected to be consumed. See the *Calculate Forecasted Consumption for Each Product* section for more information on converting the total number of episodes/clients/population into numbers of products.

Regardless of which type of data are used, the final outcome will be the quantity of each product expected to be dispensed or consumed during the quantification period.

Assessing Data Quality

The most common data quality issues are inaccurate, incomplete, or outdated data. Where data quality is lacking or weak, you will need to use calculations and/or assumptions to account for the missing or unreliable data.

In general, to assess data quality, determine the—

- Facility reporting rate: How many facilities that should be reporting did report? The lower the reporting rate, the less reliable the data. Adjust the data to account for non-reporting facilities.
- Stockouts: If there have been stockouts, past consumption data will underestimate what consumption would have been if the product had been continuously available. Adjust the data to cover the stockout period(s).
- Timeliness of data: The older the data, the less representative and predictive of future consumption it will be. It is important to document the dates of the data sources used.
- Any factor that may influence future demand: How closely will historical data predict future need? Are there policy or programmatic changes anticipated that could affect the quantities to be dispensed in the future? You will need to make assumptions to estimate how expected changes will influence future demand for products.

You can use various adjustment techniques to address incomplete or incorrect consumption or services data. Following are suggestions for adjustments that can be made to the most common data-quality issues.

Adjusting for incomplete reporting

Reports are often missing or incomplete; reporting rates are rarely 100 percent. To adjust for missing reports, you need to know the following:

- Which facilities' reports are missing? Are those facilities different in any way from the facilities that submitted reports?
- You may assume that clients at all the missing facilities consume products at the same rate as other facilities, but this assumption can result in significant errors. For example, if the missing facilities are in a densely populated area, you could underestimate consumption by using consumption rates from facilities located in sparsely populated areas.
- If geographic location, population, seasonality, or another factors can affect consumption at the missing facilities, you can make an additional adjustment up or down to reflect the unique characteristics of the missing facilities.
- Sometimes, too many reports are missing to make consumption data useful, even with adjustments. If reporting rates are routinely low, seriously consider using issues data as a proxy—but remember that issues data may also be affected by less-than-perfect reporting, therefore, it is also important to verify reporting rates if you decide to use issues data.

Adjusting for aggregated data

Depending on the LMIS, consumption data may be aggregated into annual quantities; therefore, you may not be able to divide them into smaller units of time for analysis. Remember that two assumptions are implicit in data organized this way:

- All facilities consume products at the same rate.
- Consumption is the same for all the time periods covered (e.g., it does not show an increasing or decreasing trend).

You could make adjustments to correct for data aggregation if you have information that indicates facilities consume products at different rates—see the earlier discussion of incomplete reporting—or information that indicates the consumption trend during the year was not flat.

Reports can also consolidate groupings of products—such as various brands of oral contraceptives grouped together under pills. To create a forecast and a supply plan, you will need to sort the product by brand. This can happen with any type of data—consumption, service, or demographic—but it occurs most often with demographic data, where progestin-only pills and combined oral pills are rarely separated.

If any available surveys indicate the breakdown percentage of brands among users, to estimate each brand's use, apply those percentages to the total number of pills consumed. Issues data can also be used by taking the percentage of each brand issued over a period of time, and applying it to the consumption data to estimate the consumption, by brand.

Adjusting for stockouts

Forecasting of health commodity requirements should be based on a reasonable estimate of actual demand. Even when logistics records accurately reflect true consumption, they may not reflect true demand. This can happen when some contraceptives are out of stock for extended periods. The

period of stockout can potentially mask the true demand for the commodity because this demand is not met during the stockout and so will not be reflected in the consumption data.

If facilities reported that 850,000 tablets of albendazole were dispensed last year, and it is known they were stocked out, on average, 25 percent of the time, then—

Consumption adjusted for 25% stockout rate = 850,000 tablets ⁄ 0.75 =

1,133,333 tablets dispensed if the stockout had not occurred

This calculation assumes that all facilities were stocked out, which may or may not be true. If stockouts affect your consumption data, ask the following questions:

Were all the facilities stocked out at the same time, or only a certain percentage of facilities? How long was the stockout? What caused the stockout?

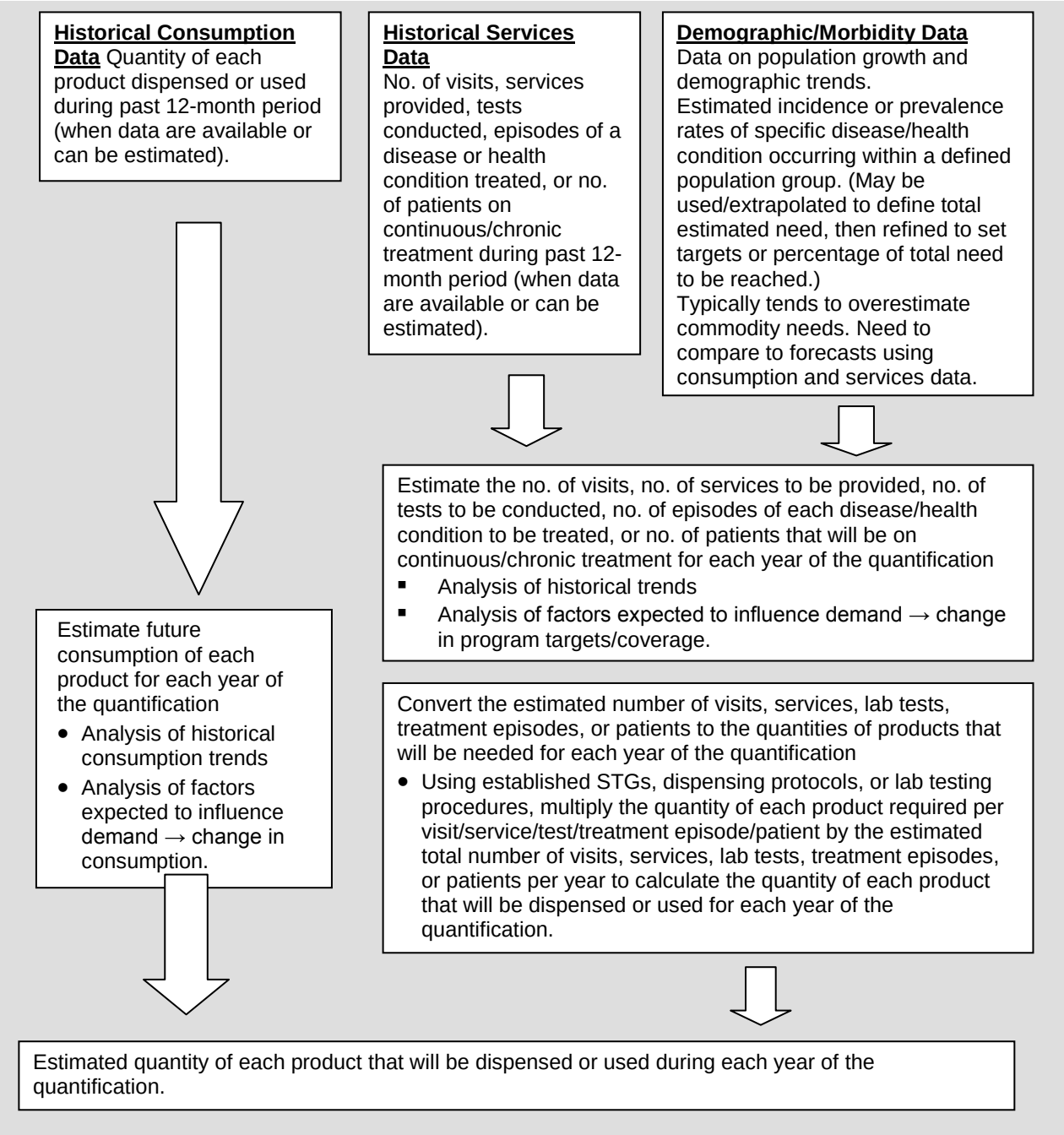
Facilities may be effectively stocked out even if their inventory records do not show zero stock balances. It is common for staff to hoard quantities for emergency use or other reasons, especially if a stockout is imminent. If consumption of a method suddenly stops or drops off significantly, you may suspect hoarding or rationing. Because of hoarding or rationing, you may need to further adjust your data to account for a period when consumption was below normal.

This formula may also misrepresent true demand if consumption trends varied from a steady, straight-line increase. If consumption was rapidly rising until the stockout, the formula assumes the same rate of increase as the period when stocks were available.

Adjusting for outdated data

Adjusting for outdated data is often necessary when you use demographic data to forecast, especially to obtain current population estimates. You may need to make assumptions about trends in many variables, not just population growth. No single demographic data source will provide all the data points needed; demographic data are often bundled from multiple data sources that represent different time periods, some or all of which may need to be adjusted so they reflect the same period of time. These additional assumptions may cause significant errors in the forecast. To minimize the number of adjustments, for the base or starting year of the forecast, select the date of the survey that you used as the major data source for the projection.

Figure 2. Types of Data for Forecasting Consumption of Health Commodities



Build the Forecasting Assumptions

Two kinds of assumptions need to be made during the forecasting step:

1. Assumptions on adjustments made to historical program data when data are missing, unreliable, outdated, or incomplete.
2. Assumptions on future program performance, based on factors influencing demand for services and commodities.

Sample assumptions for a national quantification of HIV test kits for PITC and prevention of mother-to-child transmission for 2009–2011

- Number of women receiving an HIV test as part of prevention of mother-to-child transmission (PMTCT) services will grow by 10%, corresponding to an average of antenatal care (ANC) attendance growth rates observed during 2007 and 2008.
- HIV prevalence rate for PMTCT is 18%, based on 2008 MOH monitoring and evaluation (M&E) reports.
- New policy of PITC is expected to be rolled out nationally and to significantly increase number of individuals tested. Pilot PITC programs showed a growth rate of 60%, which was utilized during the first year of the quantification.
- Prevalence rate for PITC is 10%.
- 2,000 individuals are expected to be trained in rapid HIV test use, according to MOH training plans.

Most often, complete data are not available for a particular quantification. The most critical point in making assumptions is to document clearly and specifically which assumptions were made and on what basis. If there are few or no data, the forecast will rely heavily on assumptions. Assumptions may include issues, such as a change in STGs, products, program strategies, priorities, expansion plans (and when these changes will be implemented); or service capacity (infrastructure, human resources availability, and capacity); client awareness of and access to services; and timing and amount of funding commitments for procurement, seasonality, or geographical differences in disease incidence and prevalence.

It is critical for the quantification team to reach consensus on the forecasting assumptions. A quantification workshop is often an effective forum to achieve consensus; it should include dedicated time for clarifying, agreeing upon, and documenting assumptions. This should be a consultative process with a wide range of program implementers, including program planners, procurement specialists, clinical experts, pharmacists, and warehouse managers. It is important to document the sources of information and input from key informants used in making the forecasting assumptions. The quantification should be revised if any of the forecasting assumptions change.

For forecasts based on morbidity or demographic data, after the data have been collected, analyzed, evaluated, and adjusted, and the forecasting assumptions have been determined, a *forecasting tree* can be a helpful tool to organize and utilize the data and assumptions to help estimate future

consumption. A forecasting tree is not needed for a consumption-based forecast, because the starting point is already quantities of products.

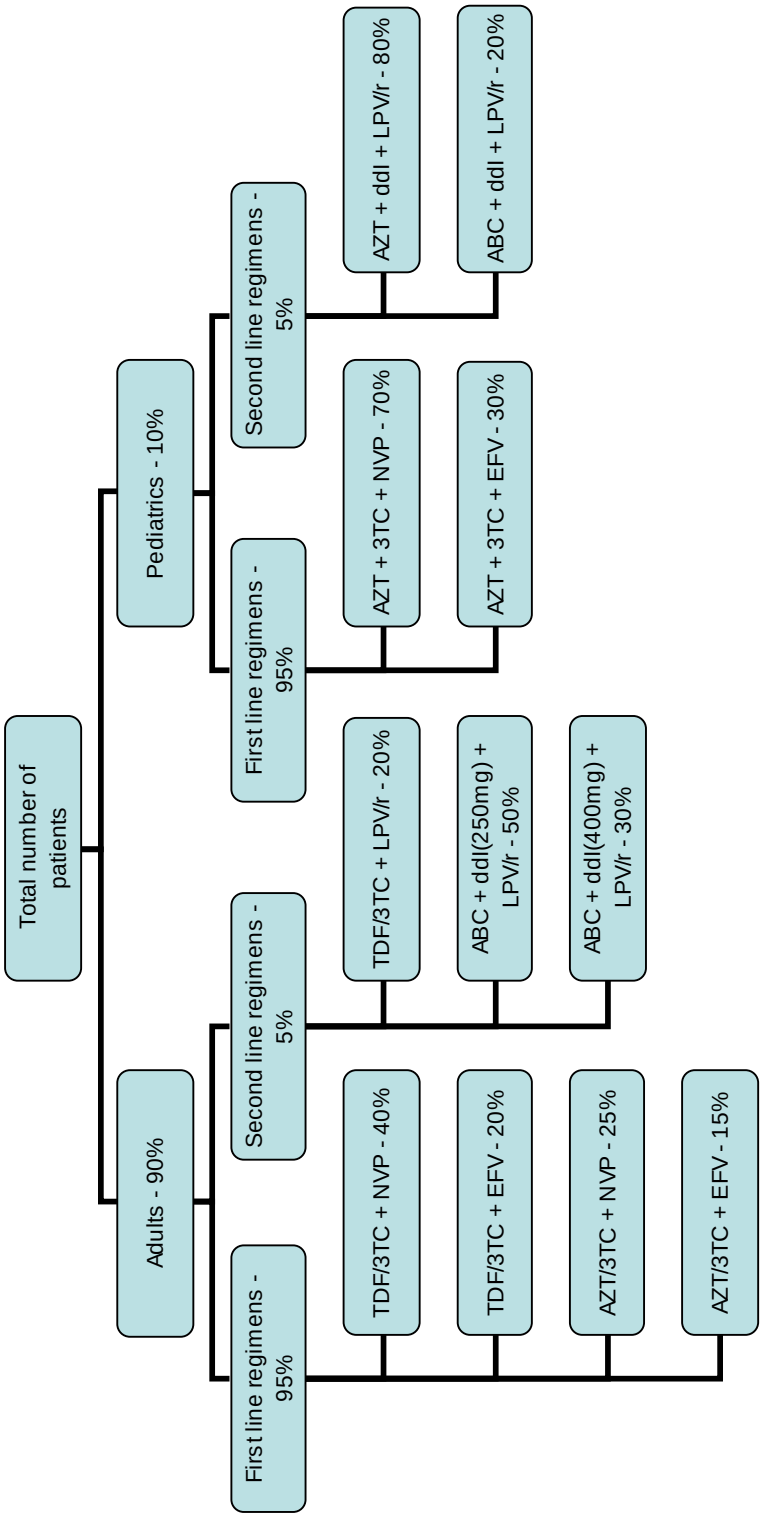
The forecasting tree is a diagram of patient groups (or health conditions) and the products required to treat one patient or one episode (see figure 3). It can be completed with a pencil and paper—no software is needed. Data required to conduct a forecasting tree are—

- STGs, treatment regimens, testing protocols, or lab testing procedures, including the list of products and specific product characteristics: e.g., formulations and dosages, and pack sizes
- specific patient groups or health conditions.

Steps for constructing a forecasting tree are—

1. Identify the specific disease or health condition: e.g., ART, malaria treatment, or tuberculosis (TB) treatment.
2. Separate the logical patient groups or health conditions to be treated:
    a. For antimalarial drugs, the patient groups could be adults versus children, further separated into complicated versus uncomplicated malaria.
    b. For ARV drugs, the patient groups could be adults versus children, further separated into first line versus second line patients.
    c. For TB drugs, the patient groups could be adults versus children, further separated into Category I versus Category II patients.
3. For each of the patient groups, list all the possible treatment regimens for each group.
4. Assign the specific drugs required for each of the possible treatment regimens within each patient group.

Figure 3. Sample Forecasting Tree for an ARV Drug Quantification



Calculate Forecasted Consumption for Each Product

Forecasts done using services, morbidity, demographic, or program target data must be converted from number of patients, visits, or episodes treated into estimates of quantities of products consumed. This conversion requires assumptions about the application of and adherence to current STGs, dispensing protocols, testing algorithms, or lab testing procedures. These assumptions should include information on product characteristics and how products should be prescribed and dispensed. The following example demonstrates how this can be presented and calculated:

the number of basic units of product (tablet, capsule, ampoule, bottle, test strip, ml of liquid, etc.) that should be dispensed or consumed per visit, per service, per treatment episode, or per patient, and the quantities of each product required per day or per year if forecasting for a chronic health condition

MULTIPLIED BY

the total estimated number of visits, services, lab tests, treatment episodes, or patients expected to be treated/ receive services for each year

Example of calculating TB drugs for adult Category I patients:

- Each TB case requires 60 tablets of rifampicin/isoniazid/ pyrazidamine/ ethambutol (RHZE) and 180 tablets of rifampicin/isoniazid (RH).
- There are an anticipated 20,000 adult Category I TB cases each year.
- This yields a yearly total of 1,200,000 tablets of RHZE and 3,600,000 tablets of RH.
- Because TB is not seasonal, the annual number of tablets can be divided by 12 to calculate a monthly estimation of consumption.
- This means 100,000 tablets of RHZE and 300,000 tablets of RH will be needed each month.

This will yield the quantity of each product expected to be dispensed or consumed (i.e., the forecasted consumption). The forecasted quantity of each product to be dispensed or consumed should be estimated monthly, for each year of the quantification, for programs that are new, scaling-up services, or planning to implement significant changes in polices or strategies that will affect the demand for products; as well as for new products that will be introduced or products that will be substituted or replaced with others during the year for which there are no historical data. Table 2 shows the conversion factors that should be applied for the different types of forecasting data.

Table 2. Conversion Factors for Forecasting Data

Type of Data	Conversion Factor			Forecasted Consumption	
Consumption	Estimated quantity of product to be dispensed/used	X		=	Quantities of Product
Services	Estimated no. of patients, no. of episodes of disease or health condition; no. of lab tests	X	STGs, testing algorithm, lab procedure	=	
Demographic/ morbidity	Estimated no. of patients, no. of episodes of disease or health condition; no. of lab tests	X	STGs, testing algorithm, lab procedure	=	
Program targets	Targeted no. of users, no. of patients, no. of episodes of disease or health condition, no. of lab tests	X	STGs, testing algorithm, lab procedure	=	

At this point in the quantification process, software can be utilized to calculate the total estimated quantity of each product to be dispensed or consumed, for each year of the quantification.

For forecasts using consumption data, PipeLine software should be used. For forecasting HIV test kit needs (regardless of the forecasting method used), the ProQ software can be used. Forecasting consumption using the services, demographic or morbidity data can be calculated using Excel spreadsheets, or a number of other software programs. A software tool commonly used for forecasting drug requirements with these data types is Quantimed. See *appendix B* for a summary of available software programs.

Reconcile Forecasts to Produce Final Estimate

Ideally, multiple types of data should be used to calculate one or more forecasts. Then these results should be compared to arrive at the final forecast consumption figures. For example, a quantification team could conduct one forecast with morbidity data, another with services data, and another with consumption data. The results from these different forecasts should be compared, and a final forecast must be selected. If data from one type are of very poor quality, the team may decide not to base a forecast on those data. For example, if no consumption data exist, the quantification team may elect to use morbidity data instead.

At this stage in the quantification, the monthly forecasted consumption for each product should have been calculated, and the team will then move on to supply planning. Output from the forecasting step is a major input to the supply planning step. See *appendix C* for a diagram of the flow of data throughout the quantification process.

Supply Planning

Typically, to identify funding sources and to mobilize additional resources to meet funding gaps, if needed; national quantification exercises include a commodity *forecast for a two-year period*. Although the forecast should be done for two years, an actual procurement plan should be for one year, where orders have been placed with suppliers and shipment dates negotiated. To ensure a continuous supply of products, and to maintain stock levels between the established maximum and minimum levels, developing the supply plan entails coordinating the timing of funding disbursements from multiple funding sources with procurement lead times and supplier delivery schedules.

SUPPLY PLANNING

- Organize and Analyze Data
- Build Supply Planning Assumptions
- Estimate Total Commodity Requirements and Costs
- Develop Supply Plan
- Compare Funding Available to Total Community Cost

Organize and Analyze the Data

At this stage in the quantification, monthly forecasted consumption of each product, for each year of the quantification, has been calculated. To determine the total quantities to procure, other data must be used. During the preparation stage, data should be collected for the supply planning step. These data, which should now be organized and analyzed, include—

- national/program-level stock on hand (physical inventory) of each product to be quantified
- expiration dates for products in stock, to ensure they will be used before expiration
- quantity on order: any shipment quantities of product(s) already on order, but not yet received
- established program-level maximum and minimum stock levels
- supplier information
  - — supplier prices
  - — supplier packaging information
  - — supplier lead times
  - — shipping and handling costs.
- Funding information:
  - — all funding sources for procurement of commodities.
  - — amount and timing of funding commitments, by funder
  - — funding disbursement schedules to determine when funding will be available for procurement, from each source.
- Procurement information:
  - — all procurement mechanisms (e.g., government or international bidding/tendering, donor procurement, or local procurement) for all products to be quantified
  - — procurement lead time for each procurement mechanism.

- Distribution information:
  - in-country storage and distribution costs, if applicable
  - in-country sampling/quality testing costs
  - customs' clearance fees.

As with the forecasting step, where data are unavailable, incomplete, unreliable, or outdated, assumptions must be made.

Example of assumptions from HIV test kit quantification for 2010–2011:

- Central-level minimum stock level is four months, and maximum is nine months.
- GFATM Round 8 funding will be available for procurement until beginning of February 2010.
- MOH will have $700,000 available for HIV test kit procurement in March 2010.

Build the Supply Planning Assumptions

As previously mentioned, the most critical point in the assumptions building process is to document clearly and specifically the sources of information and the key informant inputs on the assumptions. And, as in the forecasting step, consensus must be reached by the quantification team on the supply planning assumptions. For the supply planning step, assumptions may need to be reached on the timing of available funds, lead times for each supplier, exact amounts of funding available, and estimates on arrival dates of supplies.

If a maximum-minimum inventory control system has not been formally established, the quantification team will need to make assumptions about the maximum and minimum stock levels at each level of the logistics system: for example, facility- and central-levels.

Estimate the Total Commodity Requirements and Costs

Estimating the total commodity requirements consists of determining the quantity of each product needed to—

1. meet the forecasted consumption
2. ensure that the in-country supply pipeline has adequate stock levels to maintain a continuous supply to SDPs.

The estimate of the total commodity requirements for the forecast period is determined by calculating the additional quantities of product needed to cover procurement and supplier lead times and buffer stocks, and then subtracting (1) the quantity of each product already in stock in the country (stock on hand), (2) any quantities that have been ordered but not yet received (quantity on order), and (3) any products that will expire before they are used. In some cases, shipment delivery schedules need to be adjusted to accommodate constraints in the storage and distribution capacity of the logistics system (i.e., scheduling more frequent shipments of reduced quantities rather than larger shipments).

At this point in the quantification, regardless of the forecast method used, PipeLine software is strongly recommended to facilitate the preparation of a supply plan. In cases where pipeline is not used, staff can use the following formula to estimate the quantities required:

Forecast consumption quantities

+

[(Forecast consumption quantities/12) × Maximum stock level for the entire pipeline]

It is important to use the maximum stock level for the entire pipeline, which is calculated by adding the established maximum stock levels for each level of the system. This formula is an estimate of the quantities required and does not take into account all the variables included in the pipeline database. PipeLine was specifically developed to address the unique considerations of supply planning and pipeline monitoring for public health programs in resource-poor and limited settings; using it is recommended as a best practice.

If a pipeline database is being created for the first time, the quantification team should enter program, product information (including pack sizes and prices), and supplier data. Please see the *PipeLine User's Manual* for specific guidance on how to use the software.

If a PipeLine database already exists, the quantification team should update all data inputs, including the timing and quantities of any shipments received and entered into inventory, the actual consumption of each product, and any losses and adjustments to inventory that have occurred since the last update.

Whether a new PipeLine database is being created or an existing PipeLine database is being updated, the following data should be entered:

- national stock on hand of each product at the time of the quantification, whether from a physical count, routine LMIS data, or review of stock card entries
- all shipments currently on order, by supplier, with the expected arrival date
- all planned shipments by supplier, with the expected arrival date
- monthly forecast consumption for each product (If Quantimed was used in the forecasting step, the forecast consumption can be directly imported into PipeLine. See *appendix D* for more information on how to export data from Quantimed and import it into PipeLine.)

At this step in the quantification, an assessment of the in-country stock status is needed to calculate the quantities of each product to be ordered, which can reasonably be expected to be stored, distributed, and used before expiration. Assessment of the in-country stock status (months of stock [MOS]) for each product should estimate how long the existing stocks of each product are going to last.

Develop the Supply Plan

A shipment should be scheduled to arrive when the national MOS reaches the established minimum stock level. The quantity of product to order should bring the national MOS back up to the established maximum stock level. Round the quantity to order up to the nearest whole unit of supplier packaging.

The next step is to estimate the cost of the total commodity requirements.

Updated sources of information on drug prices and supplier rates are needed to estimate the cost of the quantities of drugs to be ordered. In addition, information on the cost of insurance and freight, customs clearance and duties, and in-country storage and distribution costs may need to be added to the cost of the quantities of drugs to be procured, if it is not included in supplier rates or budgeted for through other mechanisms or waiver agreements.

If price data have already been entered into PipeLine, the costs associated with a shipment will automatically be calculated.

Flexible procurement contracts with suppliers are recommended so that shipment quantities can be adjusted to respond to an uptake in services; and fluctuations in patient demand, existing stock levels, and rates of consumption. Agreements with suppliers may also need to include flexibility in delaying shipments into the year following the year of the forecast, if uptake of services does not meet expected demand.

Compare Funding Available to Total Commodity Costs

The final decision on the quantities to procure will be determined by the amount of funding available for procuring the products. As a result of the quantification, where sufficient funding is available, the final quantity to procure of each drug will be the same as the quantity to order.

If resources are insufficient and there is a funding gap, it is critical that the required reduction in quantities be calculated after revisiting and adjusting the forecasted quantities, instead of reducing the quantities needed to fill the in-country supply pipeline. Shortchanging quantities to fill the pipeline will result in stockouts and will undermine program goals.

If funding is insufficient, the quantification team will need to determine whether additional resources can be mobilized. An effective mechanism for this can be presenting the quantification results, illustrating what the funding gap is in order to ensure all stakeholders are aware of the funding gap and if possible can provide additional resources for procurement of the required quantities of products.

In situations of non-full supply, when it is impossible to mobilize additional resources to procure the full quantities of products required, the forecasted quantities of products expected to be dispensed will need to be reduced. This is done by returning to the forecasting step in the quantification and engaging in further consultation and consensus building to adjust the forecasting assumptions. For example, for ARV drugs, the total number of patients expected to start treatment each month will need to be reduced. For antimalarial drugs, the number of malaria episodes to be treated will need to be reduced. Adjusting the forecasting assumptions will reduce the total quantities of products expected to be consumed.

After adjusting the forecasting assumptions, the quantification team will need to repeat the steps in the quantification process by calculating the forecasted monthly consumption of each product to the final calculation of the actual quantities of each product to procure, to reconcile the results of the quantification with the funding constraints.

Using the Results of the Quantification

The quantification team should formally present the results of the quantification to stakeholders. This enables the team to receive feedback about the assumptions that were made during the forecasting step, as well as the data sources used. By presenting the results of the quantification, the team can present to all stakeholders the national stock status levels for commodities and outline the actions required to maintain adequate stock levels.

By presenting the quantification results to policymakers, program managers, procurement managers, funders, and commodity managers, the following decisions and actions can be facilitated:

- program planning and budgeting decisions
- mobilization and allocation of funding for commodity procurement
- coordination of multiple sources of funding for procurement
- informing procurement actions on which products to procure, how much to procure, and when to procure
- adjusting timing of procurements and shipment delivery schedules to ensure continuous supply while avoiding stockouts and overstocking.

When conducting a presentation, the quantification team should prepare slides explaining each step of the quantification, including—

- scope, purpose, and timeframe of the quantification
- review of all data sources used, and challenges in data collection
- summary of the major forecasting assumptions and description of what data sources were used to make those assumptions
- summary of supply planning assumptions (especially if assumptions about amounts and timing of funding commitments will affect procurement and delivery)
- total quantities of each product required for each year of the quantification
- national stock status (MOS on hand) for each product (PipeLine Stock Status Graphs are very useful to convey this information); highlight products that are about to expire, stocked out, or overstocked, based on stock status analysis (MOS on hand)
- summary of shipments, by supplier
- total funding gaps for the next 24 months
- specific actions required to address any critical stock imbalances and to maintain stocks at the established levels.

Reviewing and Updating the Quantification

Quantification does not end when the final quantities and costs have been determined; it is an ongoing process of monitoring, reviewing, and updating the forecasting data and assumptions; which, in turn, may require a recalculation of the total commodity requirements and costs. For the quantification exercise to be useful and effective, the forecasting assumptions and the supply plan should be reviewed and updated at least every six months, and more often for rapidly growing or changing programs. Ongoing monitoring and updating of the quantification is critical to keeping program managers, donors, and other stakeholders informed on the availability of drugs; it is a vital precondition for timely decisionmaking on product selection, financing, and delivery of commodities.

Reviewing and updating the quantification involves the following activities:

- Updating the actual consumption for each product, and comparing the actual consumption against the forecast consumption, to determine the degree of error.
- Reviewing and updating the forecasting data and assumptions.
- Calculating or recalculating the forecasted consumption using Quantimed, Excel spreadsheets, or other software.
- Updating the stock on hand for each product.
- Assessing national stock status for each product, based on product consumption and stock levels.
- Reviewing and updating shipment delivery schedules to ensure continuous supply and to maintain desired stock levels.
- Updating the amounts and the timing of funding commitments.
- Recalculating the commodity requirements and costs, over time.
- Estimating and updating funding needs and gaps for procurement.

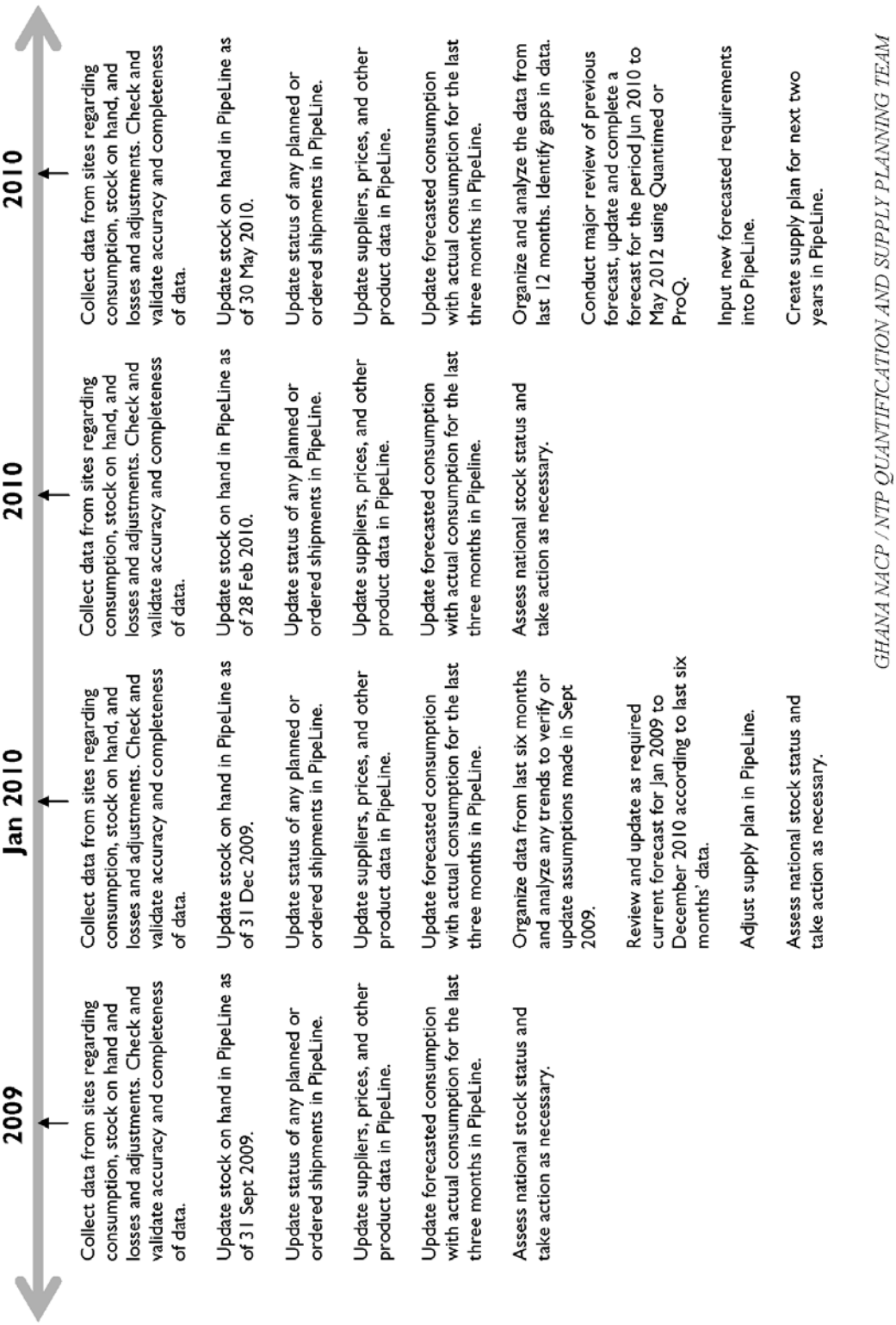
Knowledge and Skills Required

Ideally, the same core team of people who conducted the initial quantification should conduct routine updates. The knowledge and skills required to complete a quantification for health commodities include the following:

- for each commodity category, expertise in the specific program area and knowledge about the commodities and how they are used
- computer literacy and proficiency in using Microsoft Excel spreadsheets or software programs to create and manage databases
- commitment to conduct ongoing monitoring, data collection, and updating of the forecasting data and assumptions, and supply planning data, to update the PipeLine database

- preparation and presentation of quantification data and methodology and final quantification results to key stakeholders and implementers. Figure 4 shows the activities that need to be done routinely to update a national quantification.

Figure 4. Timeline for Updating and Reviewing Forecast and Supply Plan



GHANA NACP / NTP QUANTIFICATION AND SUPPLY PLANNING TEAM

References

John Snow, Inc./FPLM. 2000. *Contraceptive Forecasting Handbook.* Arlington, Va.: John Snow, Inc./FPLM, for the U.S. Agency for International Development (USAID).

John Snow, Inc./DELIVER. 2004. *ProQ User's Manual.* Arlington, Va.: John Snow, Inc./DELIVER, for the U.S. Agency for International Development (USAID).

John Snow, Inc./DELIVER. 2004. *ProQ Software.* Arlington, Va.: John Snow, Inc./DELIVER, for the U.S. Agency for International Development (USAID).

USAID | DELIVER PROJECT, Task Order 1. 2007. *PipeLine Software Version 4.0.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2007. *PipeLine Version 4.0 User's Manual.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2008. *Guide for Quantification of Antimalarial Drugs. A Practical Guide to Forecasting and Supply Planning of Antimalarials. DRAFT.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2008. *Guide for Quantifying Laboratory Supplies.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2008. *Guide for Quantifying ARV Drugs.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2008. *Quantification of HIV Test Kits: A Practical Guide for Estimating National HIV Test Kit Requirements and Costs.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

APPENDICES

Appendix A

Sample Schedule for Quantification Activity

May 19–June 6, 2008						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
19 **Morning** Schedule and statement of work (SOW) review Lusaka District Health Management Team (DHMT) **Afternoon** Meetings with key-stakeholders - MOH Facility survey - Chilenja - Center	20 **Morning & Afternoon** Kabwe DHMT Facility surveys Kabwe General & Mine Hospitals Kalingalinga Health Center - Lusaka Center for Infectious Disease Research in Zambia (CIDRZ) - Lusaka	21 **Morning** Visit to central medical stores **Afternoon** Meeting with key stakeholders in National Malaria Control Center	22 **Morning & Afternoon** Assumption-building workshop preparations Survey compiling and data collection	23 **Morning** Assumption-building workshop preparations **Afternoon** Facility Survey - University Teaching Hospital (UTH), Cancer Center Meeting with MOH and data collection	24 **Morning & Afternoon** Preparation work for upcoming antimalarial and drugs for opportunistic infections (OIs) assumption-building workshop	25 **Morning & Afternoon** Preparation work for upcoming antimalarial and drugs for OIs assumption-building workshop

26 **Morning** Preparation for antimalarial and drugs for OIs assumption-building workshop **Afternoon** Workshop site visit	27 **Morning & Afternoon** Assumption-building workshop for antimalarials *Crestview Hotel*	28 **Morning & Afternoon** Assumption-building workshop for drugs for OIs *Crestview Hotel*	29 **Morning & Afternoon** Assumption-building workshop for drugs for OIs Statistics collection from University Teaching Hospital	30 **Morning** Assumption target review at National Malaria Control Center with key stakeholders **Afternoon** Initial data entry into Quantimed	31 **Morning & Afternoon** Data entry into Quantimed and PipeLine software packages	1 **Morning** Data entry into Quantimed and PipeLine software packages **Afternoon** Quantification results analysis for antimalarials
2 **Morning & Afternoon** Review of results of antimalarial data with NMCC Preparation for antimalarial stakeholder meeting	3 **Morning** PipeLine data entry for OI drugs Visit to central medical stores **Afternoon** Preparation for antimalarial & OI drugs stakeholder meetings	4 **Morning & Afternoon** Stakeholders' debriefing for antimalarials *Crestview Hotel* Preparation for OI drugs stakeholder meetings	5 **Morning & Afternoon** Stakeholders' debriefing for OI drugs *Crestview Hotel* Trip report preparation	6 **Morning & Afternoon** Trip report preparation		

Appendix B

Software Programs for Quantification of Health Commodities

Different software tools facilitate the completion of the forecasting step: collection, organization, and analysis of the forecasting data and assumptions, and using data to calculate the quantity for each product needed. These tools include ProQ, Quantimed, Clinton HIV/AIDS Initiative (CHAI)–developed tools, and Excel spreadsheets. The PipeLine software is used to calculate consumption-based forecasts. Regardless of the forecast method used, PipeLine is also used for the supply planning step: aggregating the total commodity requirements and costs, determining funding needs and gaps, and planning timing of procurements and shipment delivery schedules.

I. Forecasting Tools

The following software tools can be used to assist in completing the forecasting step of the quantification.

ProQ

ProQ quantifies HIV test requirements, based on realistic forecast demand, assessment of existing supply chain capacity, and availability of resources for procurement. ProQ offers four methodologies—consumption, services, demographic, and target—for quantifying HIV tests for national programs; it also allows for comparison of results from these different methodologies. ProQ can be used in both data-poor and data-rich situations.

The ProQ software and user's manual can be accessed through the USAID | DELIVER PROJECT by sending an email to askdeliver@jsi.com.

Quantimed

Quantimed, a tool developed by Management Sciences for Health, calculates the forecast quantities and costs of medicines and medical supplies needed to provide services for health programs. Quantimed offers three methods for forecasting medicines and medical supplies: (1) consumption, (2) proxy consumption, and (3) morbidity. Quantimed can be used to forecast needs for a single health facility, a national program, or a group of geographic or administrative areas; and for a variety of medicines or medical supplies, including antiretrovirals and drugs to treat opportunistic and sexually transmitted infections, malaria (bed nets and drugs), and tuberculosis drugs. To obtain Quantimed, email quantimed@msh.org.

CHAI Forecasting Tools (adult and pediatric ARVs and lab supplies)

The Clinton Health Access Initiative has developed Excel spreadsheets for forecasting adult and pediatric ARVs, and for laboratory commodities. These spreadsheets utilize services data and demographic data for ARVs, and demographic data for laboratory supplies. To obtain access to these tools, email procurement@clintonfoundation.org.

Excel Spreadsheets for Forecasting

Excel spreadsheets can be to do forecasts. Spreadsheets will vary from user to user, but can be formatted to follow the steps in quantification outlined in this guide.

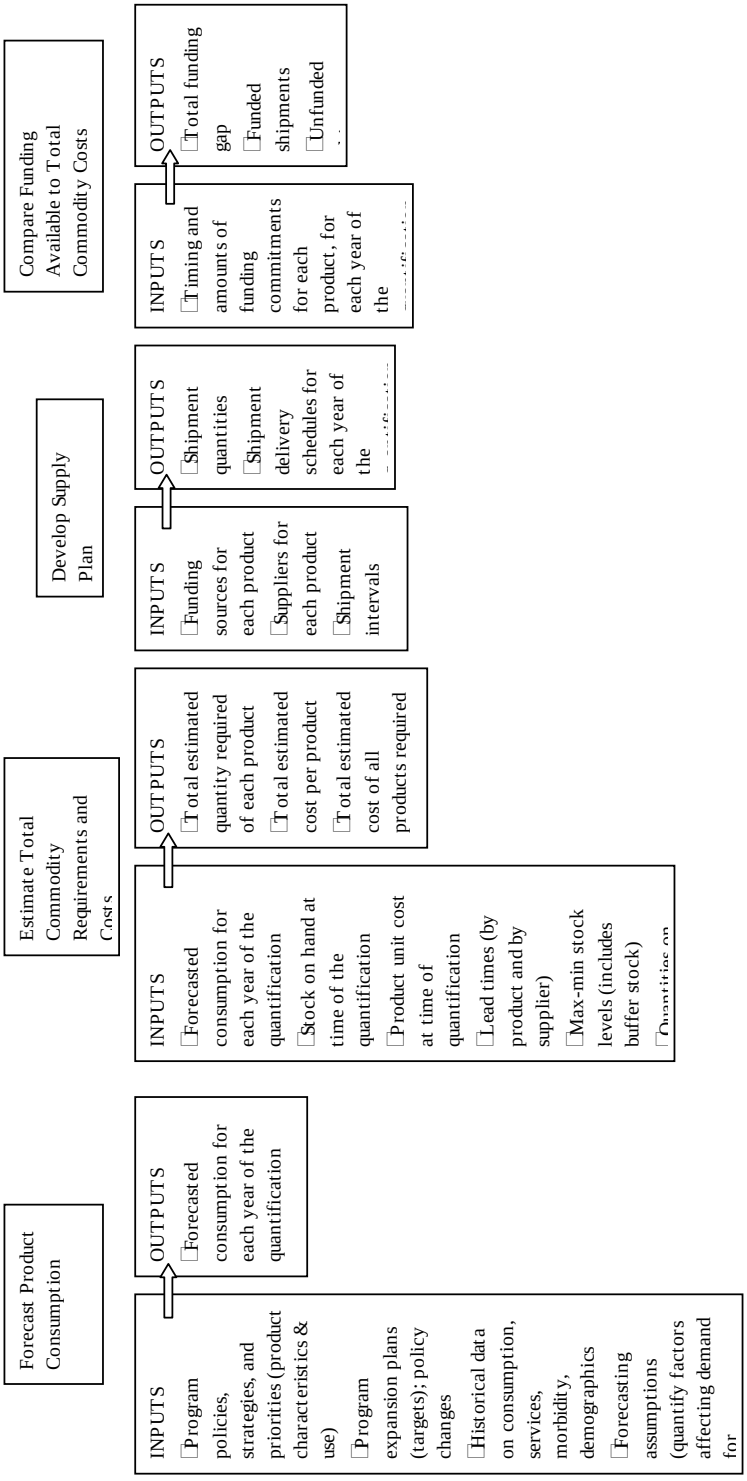
II. Supply Planning and Pipeline Monitoring Tools

PipeLine software

The PipeLine software for procurement planning helps program managers enter and track critical forecasting data, ensure timely procurement and delivery of products, and maintain stock levels between established maximum and minimum levels at the program or national level to prevent stockouts and overstocking. PipeLine is a central-level tool that helps users plan optimal procurement and delivery schedules for health commodities and to monitor the status of shipments. Policymakers, product suppliers, and donors can generate reports, monitor the status of shipments, and use the software as a key tool in program planning. PipeLine can be used for any type of health commodity.

To access the PipeLine software and user's manual, go to the USAID | DELIVER PROJECT's website at www.deliver.jsi.com.

Appendix C: Flow of Data in Quantification

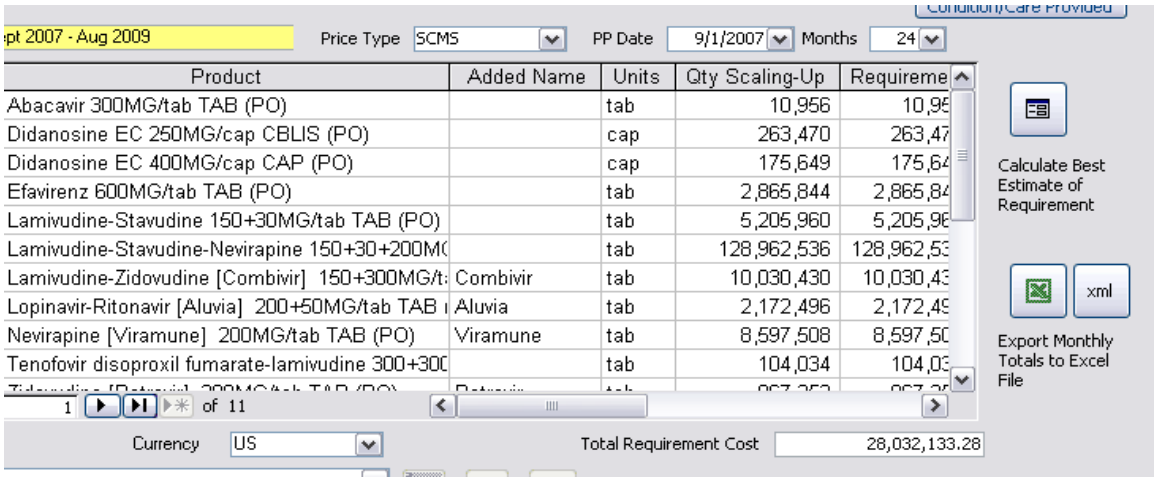


Appendix D

Instructions for Exporting Monthly Forecast Data from Quantimed into an XML File (for subsequent import into PipeLine)

Verify that the version has two buttons on the right-hand side above script *Export Monthly Totals to Excel File*, as in figure 5.

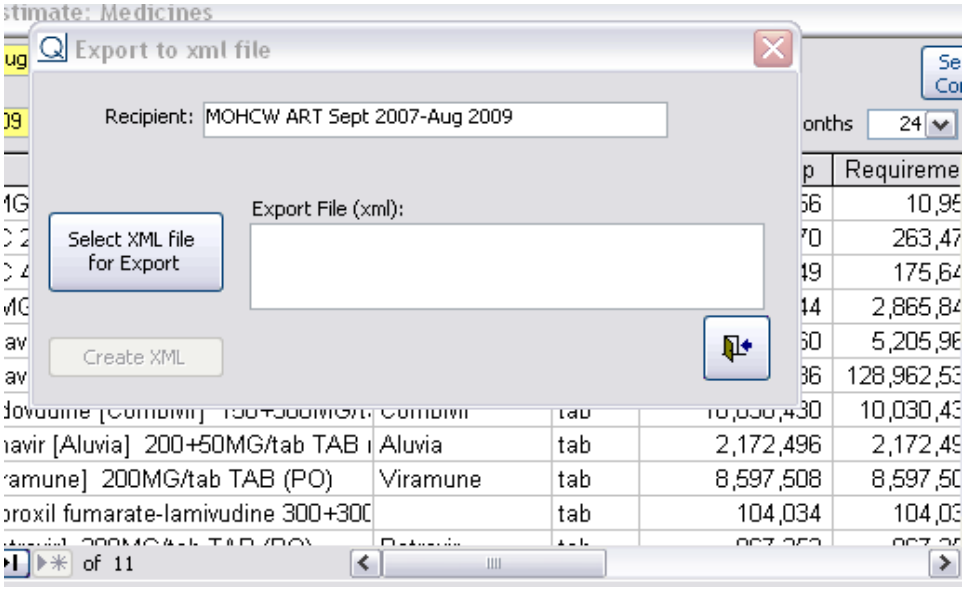
Figure 5: Export Monthly Totals to Excel File



Ensure that the quantities displayed in the *Analysis and Reports>Scaling-up Morbidity-Based Estimate: Medicines* screen meet your required parameters for the Price Type, PP Date, and Months, and include all the Condition/Care Provided you want included in the calculation.

Click on the button marked "xml," and the screen "Export to xml file" appears (see figure 6).

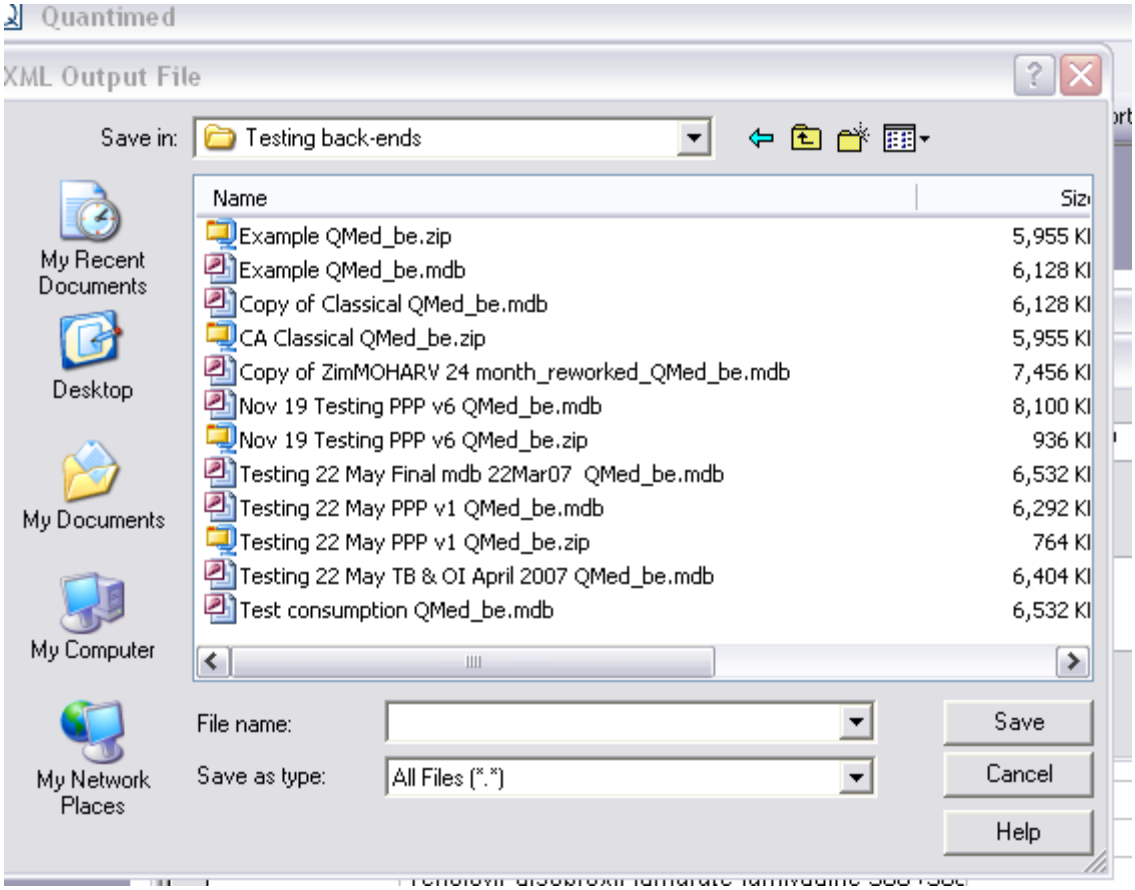
Figure 6: Export to xml File



Note: The field *Recipient* should be displayed with the name of the active dataset.

Click the button *Select XML file for Export*; the box in figure 7 appears.

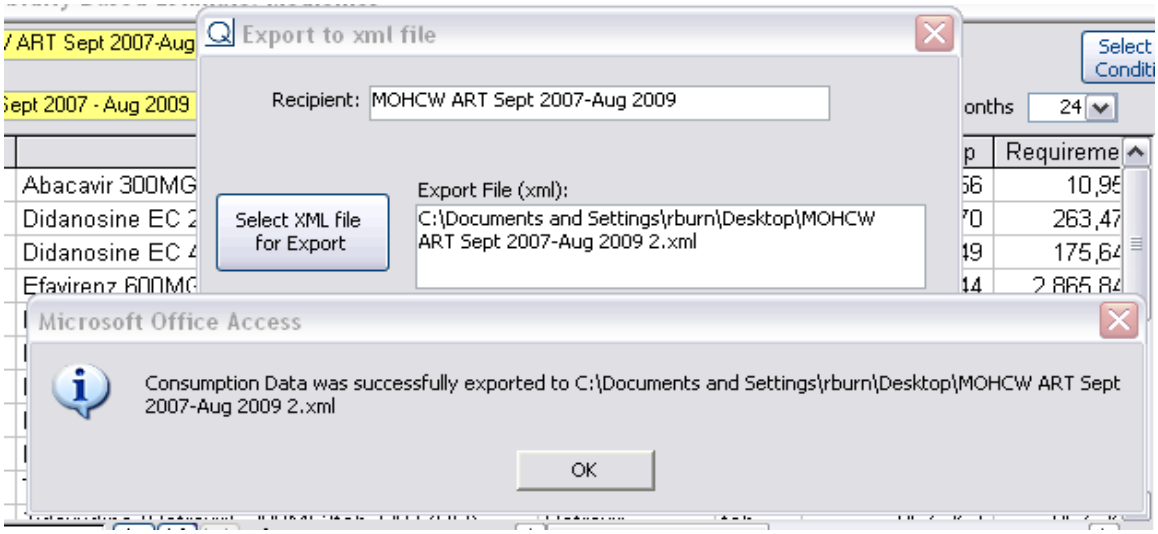
Figure 7: Select XML File for Export



Select the folder to save the xml file in (it could be the relevant folder under PipeLine) in the *Save in:* field; type a filename in the *File name* field; click *Save*. The default filename is the name of the dataset. Remember where this is saved so it can be found easily when importing into PipeLine.

The full path and name for the xml file will appear in the previous screen (figure 6) and the button *Create XML* is now active. Click on this button. A confirmation screen (figure 8) will appear.

Figure 8: Confirmation Screen



Click *OK*; you will return to the *Analysis and Reports>Scaling-up Morbidity-Based Estimate: Medicines* screen and the xml file should be saved in the chosen location.

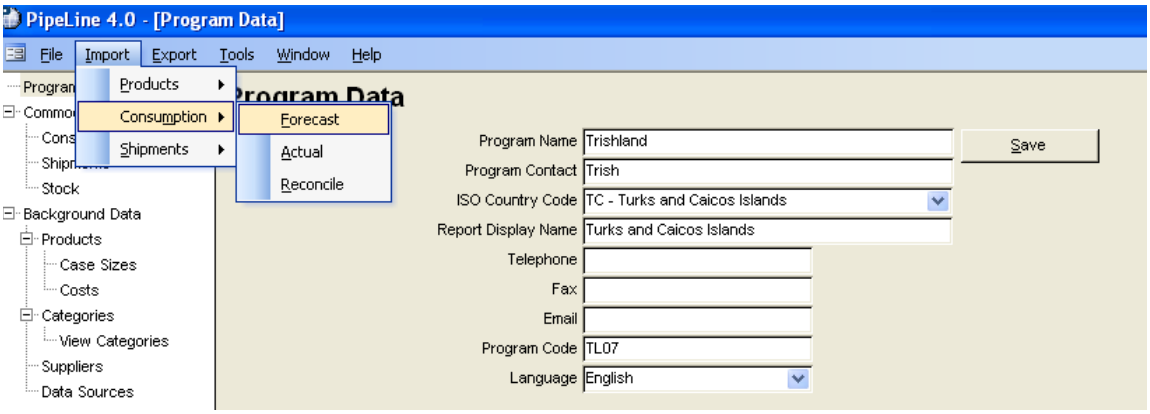
Import Forecast Consumption Data from Quantimed into PipeLine 5.1

Generic instructions for importing forecast data can be found on pages A-6 through A-10 of the PipeLine 4.0 user's manual.

To import consumption data from Quantimed, you need two types of files for export. One will be the forecast consumption data generated from Quantimed; the other will be a list of products (see the Supply Chain Management System project for a copy). Both files should be generated in XML format; they will have an.xml extension.

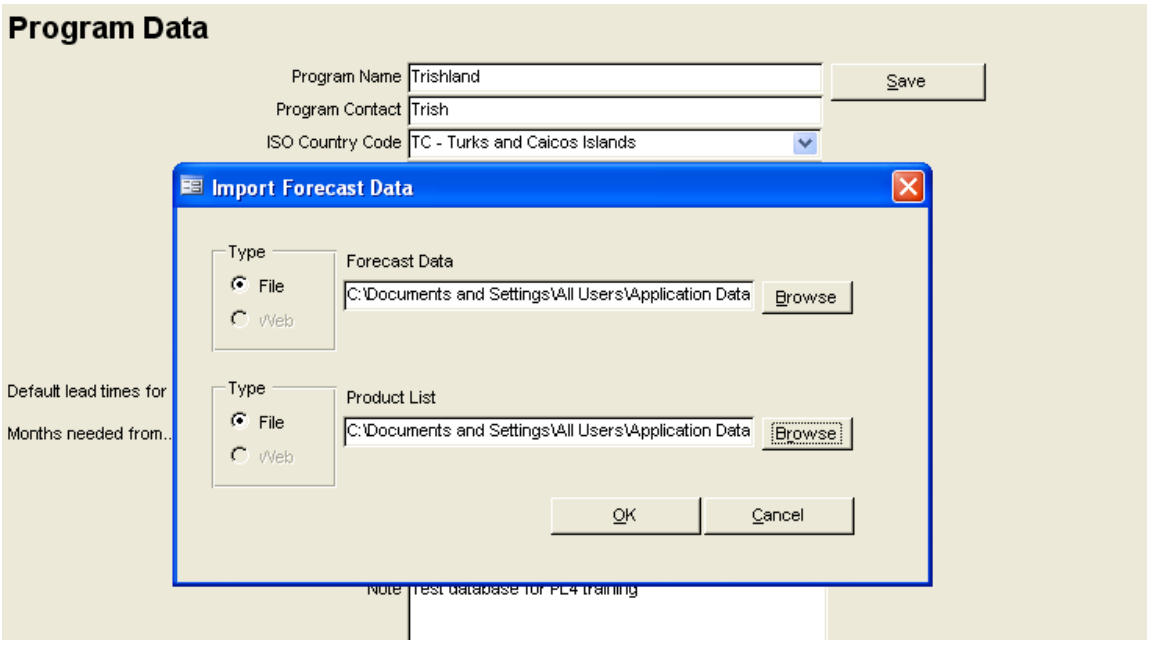
1. From the *Import* drop-down menu, select *Consumption* > *Forecast* as displayed in Figure 9.

Figure 9: Consumption > Forecast Screen



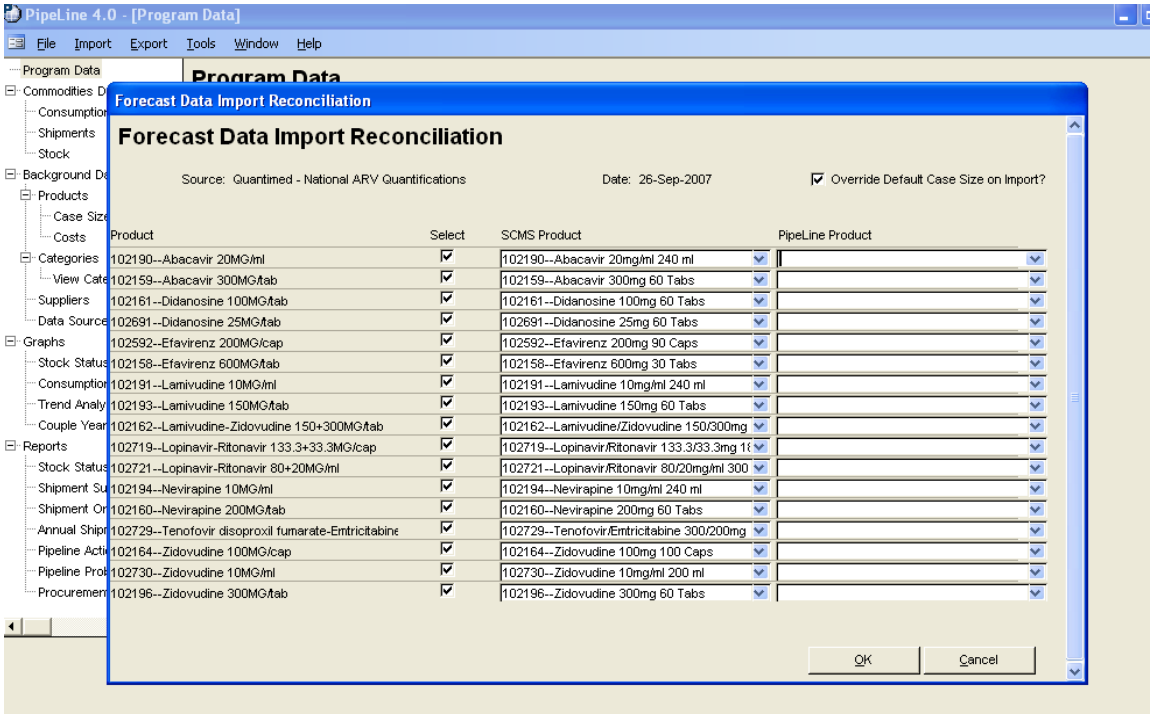
2. Select the locations of your consumption data and product list .xml files, which were generated by Quantimed, in the *Import Forecast Data* dialogue box. See figure 10.

Figure 10: Import Forecast Data



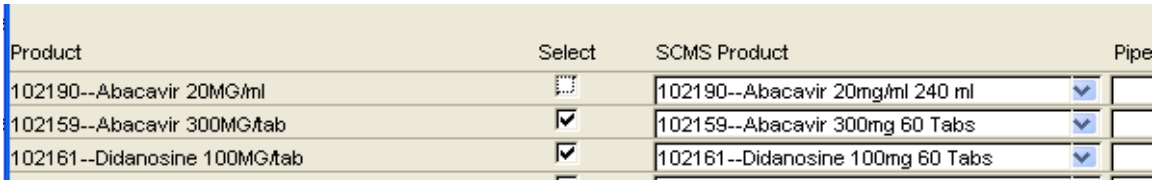
3. When you select *OK*, the *Forecast Import Reconciliation* screen appears (see figure 11). If a product is already in PipeLine, it will appear in the *PipeLine Product* column on the right.

Figure 11: Forecast Import Reconciliation



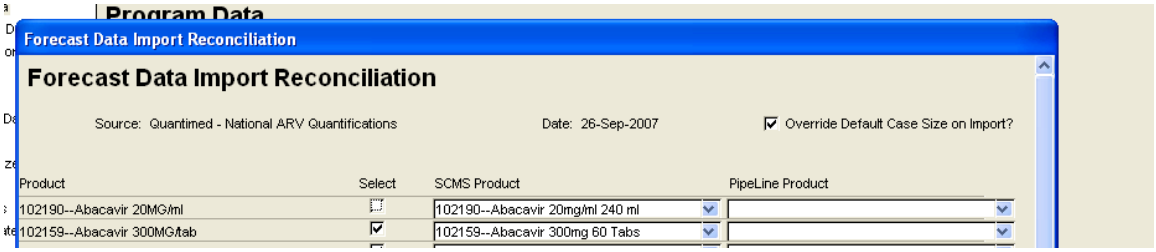
4. In the *Forecast Data Import Reconciliation* screen, clicking on the checkmark in the select column to deselect any products whose forecast data you **do not want to import**. The checkmark will be removed after you click on it. See figure 12.

Figure 12: Selecting a Product Not to Import in the Forecast Reconciliation Screen



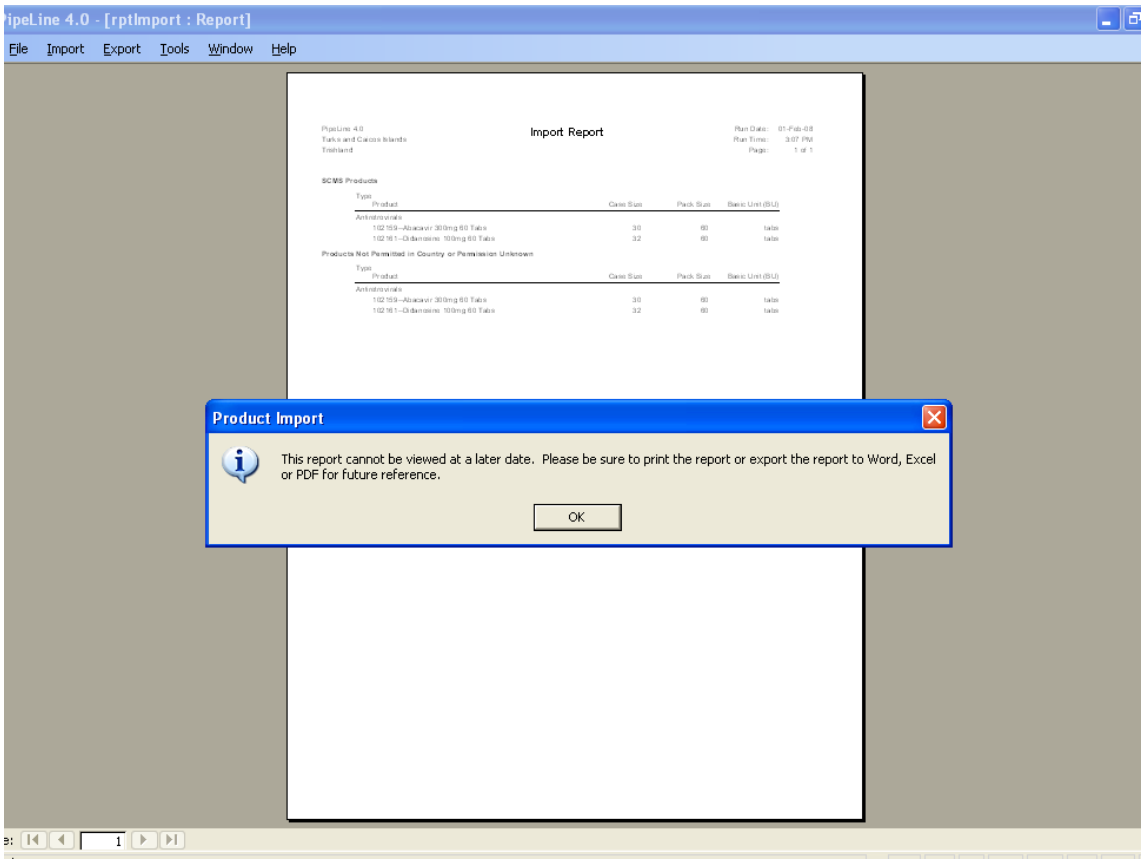
5. Be sure the *Override Default Case Size on Import?* box is selected if you want to override the default case sizes with the case sizes in the import file already in your PipeLine database.

Figure 13: Overriding the Default Case Size in the Forecast ReconciliationScreen



6. After you successfully import data, a report will be displayed confirming the data imported. This report is not saved; print it if you want a copy for your records (see figure 14).

Figure 14: Product Import



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