Quantification of Health Commodities: Community Case Management Products Companion Guide

Supply Chains for Community Case Management (SC4CCM)

December 2012

Acknowledgments

This document is the output of significant work and collective expertise gathered from a large group of people in several countries. It relies heavily on the recent experience with quantification for community case management (CCM) to which the Supply Chains for Community Case Management (SC4CCM) Project contributed in Malawi, Rwanda, and Ethiopia, and represents our many observations and refinements in developing the process.

We would like to thank the ministries of health in all three countries for allowing our involvement in the process. Specifically, we would like to thank the Ministry of Health, Health Technical Support Services (HTSS), and Integrated Management of Childhood Illnesses (IMCI) program in Malawi; the Ministry of Health and Community Health Desk in Rwanda; and the Federal Ministry of Health and Pharmaceuticals Fund and Supply Agency (PFSA) in Ethiopia for their interest in and support of CCM quantification. We were able to learn from these recent activities and compile lessons learned and best practices in one place to be available to many more countries and programs. Many thanks also go to Atieno Ojoo of the United Nations International Children's Emergency Fund (UNICEF) Supply Division, Ahmet Afsar formerly of UNICEF Programme Division, and Joanna Sickler formerly of the Clinton Health Access Initiative (CHAI) for their careful review and thoughtful comments on an early version of the guide.

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Finally, but no less important, many thanks go to the SC4CCM staff, especially our team members in Malawi, Rwanda, and Ethiopia. They provided valuable contributions, including opinions and perspectives from their own experiences that helped shape this work. We thank them for their participation in data collection, data analysis, and the quantification workshops. We would also like to thank the many quantification experts and supply chain practitioners whose work this guide builds upon, particularly our colleagues with the USAID | DELIVER PROJECT.

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Acronyms

ACT	Artemisinin-based combination therapy
AL	Artemether/lumefantrine
ANC	Antenatal care
ARI	Acute respiratory infection
CCM	Community case management
CHW	Community health worker
HEW	Health extension worker (Ethiopia)
HIV/AIDS	Human immunodeficiency virus/ acquired immunodeficiency syndrome
HMIS	Health management information system
HSA	Health surveillance assistant (Malawi)
ICCM	Integrated Community Case Management
IMCI	Integrated Management of Childhood Illness
IRS	Indoor residual spraying
LLIN	Long lasting insecticide-treated net
LMIS	Logistics management information system
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
NGO	Nongovernmental organization
ORS	Oral rehydration salts
ORT	Oral rehydration therapy
PMI	President's Malaria Initiative
RUTF	Ready-to-use therapeutic food
RDT	Rapid diagnostic test
SC4CCM	Supply Chains for Community Case Management
SRA	Stringent regulatory authority
STGs	Standard treatment guidelines
UNICEF	United Nations International Children's Emergency Fund
USAID	United State Agency for International Development
WHO	World Health Organization

I. Introduction to Community Case Management

Globally, the leading causes of mortality and morbidity in children include pneumonia, diarrhea, malaria, and malnutrition. Community case management (CCM) is an approach designed to reach children under five and reduce childhood mortality by treating these common childhood illnesses at the community level through low-cost interventions. CCM employs community health workers (CHWs) to provide treatment at the community level and improve access to services; these workers serve as the last kilometer in health system distribution.

While program specifics vary by country, the typical package of CCM treatments includes antibiotics for pneumonia, artemesinin-based combination therapies (ACTs) for malaria (often including rapid diagnostic tests [RDTs] for diagnosis), zinc and oral rehydration salts (ORS) for diarrhea, and, in some programs, products for community-based treatment of severe acute malnutrition.

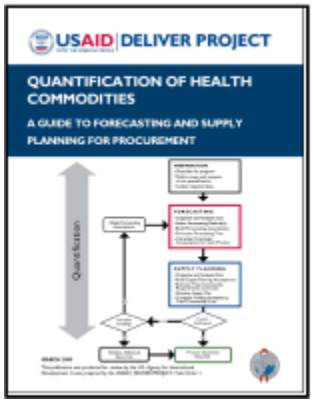
Increasing numbers of countries are launching CCM programs as a strategy to achieve the fourth Millennium Development Goal (MDG) of reducing the under-five mortality rate by two-thirds before 2015. In many countries, CHWs are providing health care to people in the most hard-to-reach areas with a wide variety of services and products for both prevention and treatment. This requires CHWs to obtain and maintain inventory for an array of products in remote settings. In Ethiopia, for example, more than 30,000 health extension workers (HEWs) are managing 25 to 55 products for a variety of programs at village health posts. In Malawi, more than 3,000 health surveillance assistants (HSAs) are managing up to 19 products from drug boxes generally stored at their houses. And in Rwanda, more than 35,000 CHWs are managing five to eight products that they keep with themselves or with someone else in the community.

As CCM programs scale up, product availability surveys in some countries, as well as anecdotal evidence in others, suggest that CCM delivery is hampered by ineffective supply chains and inconsistent availability of quality medicines and basic health supplies.[1] To address these challenges, a two-pronged approach is required: optimal age-appropriate formulations of CCM products must be widely available, of assured quality and at reasonable cost; and supply chains to the community level must be strengthened to ensure that these products reach the children who need them. Special formulations and/or packaging of medicines are required for both treatment of *children* (as opposed to adults) and for distribution to and use at *the community level* (as opposed to hospitals and health facilities).

Quantification is an important part of ongoing efforts to ensure that countries are able to efficiently procure key products from the local, regional, or global marketplace. This companion guide describes a forecasting methodology that can be used by countries and partners to develop credible demand forecasts for CCM products and to guide planning for procurement and funding.

[1] Supply Chains for Community Case Management (SC4CCM) Project website. 2010. Baseline survey results for Malawi, Ethiopia, and Rwanda (2010). Available at http://sc4ccm.jsi.com/about-sc4ccm/key-activities/.

How to Use This Companion Guide



This companion guide is intended to complement information on the preparation and supply planning steps in the USAID | DELIVER PROJECT's *Quantification of Health Commodities: A Guide to Forecasting and Supply Planning for Procurement*[2] (the main guide). The main guide describes how to conduct consumption-based forecasts for all commodity categories. This companion guide provides specific instructions for using this method and other methods to forecast requirements for age-appropriate CCM medicines and products. The instructions include guidance on input data and assumptions required for pediatric CCM program forecasts.

This document also provides information specific to CCM medicines. After completing the forecasting steps using this companion guide, users should refer to the main guide to compare the outputs from the different forecasting methods and complete the supply planning step of the quantification to obtain the final outputs.

[2] USAID | DELIVER PROJECT, Task Order 1. 2009. *Quantification of Health Commodities: A Guide to Forecasting and Supply Planning for Procurement*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

II. Product Selection: Optimal CCM Products

As part of the preparation for a quantification, it is important to clearly define the product specifications, select the products to be forecasted, and highlight the product characteristics that could influence the demand, provision, and use of the products. The general types of medicines to be used are typically selected by clinical and policy experts at the national level, based on a national essential medicines list, standard treatment guidelines (STGs), and which medicines are registered in the country. However, product specifications (strength, formulation, pack size, and packaging) should include input from program experts with consideration of program details and intended recipients.

When selecting CCM products, decision-makers should consider the unique context in which most community health workers perform their services. Medicines need to be in a formulation that is both age-appropriate for recipients and supply chain-friendly. Community-based treatment adds additional layers to the supply chain, and the community level requires different product packaging than hospitals and health facilities due to the lower volume of clients for CHWs and the general environment for distribution and storage. Therefore, in addition to the age appropriateness of available formulations, local conditions and amount of use by CHWs also need to be taken into consideration when determining product specifications and design. For example, packaging tablets in blisters instead of bottles can avoid crushing and exposure to moisture.

These specifications may require input from CHWs as well as discussions and decisions based on what is available in the marketplace that matches a country's procurement options. One way to gather feedback from CHWs on product use is through focus group discussions. The results of these focus group discussions could then be reviewed during a meeting with program managers and stakeholders as they decide which products to purchase. A sample of potential questions to ask during a focus group discussion on products with CHWs is provided in Appendix A.

This section provides a summary of optimal CCM products and discusses key considerations for product selection, including formulation, packaging, strength, and pack size, as well as product variation for products to be used for CCM.

Formulation

Adult formulations of medicines to treat pneumonia and other illnesses tend to be the most accessible products, while products formulated for children are not always available at the point of care. Due to the limited availability of age-appropriate formulations, health workers and caregivers often have to manipulate (break, crush, dissolve, etc.) adult medicines, which can lead to under- or over-dosing and ineffective or harmful treatment. On the other hand, some pediatric formulations (i.e., liquids) are heavy and bulky, making them difficult and expensive to distribute and manage. Therefore, making available the optimal dosage forms of high-priority medicines for children is vital to ensure that children receive the medicines they need.

Appropriate Formulation
Products should have the most pediatric- and supply chain-friendly formulation and packaging possible. In ***Rwanda****, for example, Coartem™, the Artemether/ lumefantrine product used for treatment of malaria throughout the country, is repackaged and rebranded as Primo for exclusive use at the community level. Red and yellow sleeves clearly indicate correct dosage to CHWs (who have no formal health training) and also distinguish it from the Coartem dispensed by health centers.*

Recognizing the precise dosing required for infant and young pediatric patients and the challenges of managing bottles of solution, suppliers are making more products available as flexible oral solid dose forms, primarily dispersible tablets. According to the United Nations International Children's Emergency Fund (UNICEF), dispersible tablets are defined as "uncoated or film-coated tablets that can be dispersed in liquid before administration giving a homogenous dispersion."[3] Dispersible tablets can be dissolved in water or a small amount of breast milk and usually disintegrate within several minutes. They can be used with very young children and are simple to dispense. The tablets are also smaller in volume and weight and tend to have a longer shelf life than solutions, which make them more suitable for distribution at the community level. However, due to their enhanced dissolvability, they are more sensitive to moisture and humidity than regular tablets, and therefore require enhanced packaging, typically aluminum/polyvinyl chloride (PVC) blisters or aluminum strips to ensure stability and efficacy.

Dispersible Tablets or Liquid?
Although children and caregivers tend to prefer liquids, syrups, and suspensions, these are bulky to transport, store, and manage. Furthermore, dispersible tablets are less expensive, less susceptible to contamination, and easier to measure for drug compliance. Therefore, it is preferable to procure dispersible products when available.

Products must be formulated in a way that is both age-appropriate and supply-chain-friendly so that they are:

- In age/weight-appropriate strengths to avoid manipulating adult formulations
- Formulated as dispersible tablets and/or other flexible oral solid dosage forms, if possible
- Taste-masked or flavored to improve palatability for children, facilitating adherence.

The World Health Organization (WHO), UNICEF, and partners have been developing model product profiles and recommendations for each high-priority medicine for maternal and child health. These can be found in the recent publication, *Priority Medicines for Mothers and Children 2012*, published by WHO.[4]

Packaging

Often, the environment where the CHW is working is not sanitary for product repackaging, which can pose a challenge for ensuring product quality with larger pack sizes. For instance, large bottles of tablets used in hospitals are more susceptible to contamination at the community level because the volumes of tablets may be sufficient for many months of treatment, allowing exposure to human handling and moisture and other elements to increase over time. Products should be packaged appropriately for CCM settings based on the WHO

Appropriate Packaging
Distribution from the resupply point to the CHW is usually via non-motorized means; CHWs often carry products in backpacks to patients or caregivers, and patients may bring medicines home in bits of newspaper or plastic bags. Therefore, packaging should minimize bulk and protect the product from crushing or breaking as well as from exposure to heat, sunlight, and moisture.

[3] United Nations International Children's Emergency Fund (UNICEF) website. Available at https://supply.unicef.org/unicef_b2c/mimes/catalog/images/DISPERSIBLE_TABLETS.pdf (accessed November 1, 2011).
[4] World Health Organization, *Priority Medicines for Mothers and Children 2012*. WHO/EMP/MAR/2012.1 Available at http://www.who.int/medicines/publications/emp_mar2012.1/en/index.html .
[5] USAID | DELIVER PROJECT, Task Order 1. 2011. The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs. Arlington, VAA: USAID | DELIVER PROJECT.

guidance for product stability in climatic zones. For hot and humid countries, products must meet requirements for Climate Zone IVa: 30°C and 65 percent relative humidity. For hot and very humid countries, products need to meet stability requirements for Zone IVb: 30°C and 75 percent relative humidity. Furthermore, to accommodate varying skill levels of CHWs, any instructions or pictorials on the packaging should be as simple as possible and easy to understand.

Products should be packaged:

- For easy dispensing and inventory management, with a full course of treatment per patient (e.g., blister strips)
- With easy-to-understand information, including pictorials to help caregivers remember instructions for administration
- With as little bulk as possible, so as to facilitate easy non-motorized transport and storage in small compartments, such as CHW drug boxes
- To be heat and moisture stable
- To be well protected from heat, sunlight, and moisture damage, even after distribution to caregivers, with in-use stability.

Product Variation

When determining which products to select, it is important to weigh the advantages of specialized products against proliferation of multiple strengths or formulations of the same medicines. Splitting tablets for younger children is not recommended because it compromises dosing accuracy and affects product characteristics, including stability. Consider the strength of the supply chain when deciding whether to introduce multiple products, or make do with one product to meet the needs of multiple age group. Address the following:

- Are multiple strengths of one product needed, or could the CHWs use lower dosage tablets and dispense more tablets to older children? Determine:
  - Can the supply chain manage additional products?
  - What volumes of products are dispensed at the CHW level?
  - What is the patient acceptability of different products, and what is the impact on patient pill burden?
- Consider the pros and cons of using unique products for the community level. For example:
  - In Ethiopia, cotrimoxazole 120mg tablets are used only at the community level
  - In Rwanda, artemether/lumefantrine (AL) (20+120mg dispersible tablets) is repackaged and rebranded as PRIMO for use only at the community level and is available as the brand name Coartem™ at other levels (see text box for additional details).

Appropriate Pack Sizes
Consider monthly volume need. If a CHW sees only 50 children per month, 15 of whom have pneumonia, bottles of 1,000 tablets for pneumonia treatment may lead to unnecessary wastage or contamination over time. Therefore, pack sizes should be reasonable for the number of clients seen and ideally, packaged as individual treatment courses to facilitate dispensing and storage by the caregiver.

The selection of unique products for use by CHWs helps ensure that products are dedicated to the CCM program, but reduces the flexibility of the program to transfer products used at other levels in the system in the event of a shortage or delay in shipments.

Maintaining Quality

During the product selection and procurement process, assuring quality standards for products is essential. While this document does not discuss quality assurance in detail, SC4CCM recommends that product quality be assured, ideally by a stringent regulatory authority (SRA) or WHO prequalification process. Quality requirements vary by national regulatory authority and funding sources, and should be carefully considered to ensure that programs and clients have access to products of assured quality, safety, and efficacy.

Summary

When preparing for a quantification exercise, review the product specifications for CCM products and determine if there are opportunities to introduce optimal pediatric-specific products or procure products in formulations and packaging more appropriate for use with children at the community level.

When considering a change in product from what is currently available—formulation, packaging, or a new product altogether—decision-makers should consider the steps required to make the change and be realistic about the time it will take. Depending on the change, CHWs may need to be trained on the new products, which may take time, thus requiring program managers and procurement units to coordinate training schedules with procurement plans to avoid delays in product roll-out and maintain availability of products. However, introducing a new product may present a useful opportunity for re-training by integrating the new products into refresher trainings for CHWs.

Table 1 summarizes information about the best case for age-appropriate medicines for children for CCM programs.

Table 1 - CCM Products: Optimal or Best Case

Disease	Product	Dose/Pack Size
Pneumonia	Amoxicillin	• Dispersible tablets or equivalent flexible oral solid dose form • Taste-masked and improved palatability (texture, feel, etc.) • Packed by course of treatment in bottles or blister strips • Age/weight-appropriate strengths to avoid tablet splitting
	Cotrimoxazole	Not included in recommended list but known to be used in many countries. If STGs do not include amoxicillin, then the best case is: • Dispersible tablets or

Disease	Product	Dose/Pack Size
		equivalent flexible oral solid dose in age-appropriate strength • Packed by course of treatment in bottles or blister strips
Diarrhea	ORS	• Low-osmolarity • Sachets • Taste-masked
	Zinc sulphate	• Dispersible tablets • Taste-masked
Malaria	Artemether/lumefantrine (ACTs)	• Dispersible tablets • Taste-masked • Appropriate pack size
	RDT	• Standard test
Malnutrition	Ready-to-use therapeutic food (RUTF)	• Sachets

III. Steps in Forecasting CCM Products

Forecasting Steps[5]
1. Prepare and plan for forecasting activity.
2. Organize, analyze, and adjust the data.
3. Build and obtain consensus on the forecasting assumptions.
4. Calculate the forecasted consumption for each product.
5. Compare and reconcile results of different forecasts.

The length of the quantification exercise may vary depending on how many products are quantified, the quantity and quality of available data, and level of technical capacity needed to conduct the quantification. The average time for the Intensive country-level quantification exercise is two to three weeks. However, additional time is required for preparation, follow-up report writing, and wrap-up activities; therefore, the entire process for conducting the quantification may take two months. Typically, preparation should begin at least a month before the in-country work begins. A sample timeline for the overall process can be found in Appendix B. Also see *Quick Reference: Quantification Planning*, published by the USAID | DELIVER PROJECT, for more details on planning.[6]

The format for following these steps can vary, but in many settings it is helpful to have a core team dedicated to participating in and managing all of the steps before convening a larger group of stakeholders for a quantification workshop to assess the data, discuss forecasting methodologies, develop assumptions, and validate the outputs. A forum where stakeholders and program experts can share opinions openly tends to be the easiest and most straightforward way to gain consensus on the decisions that must be made for a quantification. Decision-making and the quantification process are then transparent; the assumptions, methodologies, and outputs can be validated publicly, making everyone accountable for the results. The size, content, and length of the workshop will vary by country, context, and scope of the quantification. A sample workshop schedule for a national quantification, of which CCM was a component, is included in Appendix C.

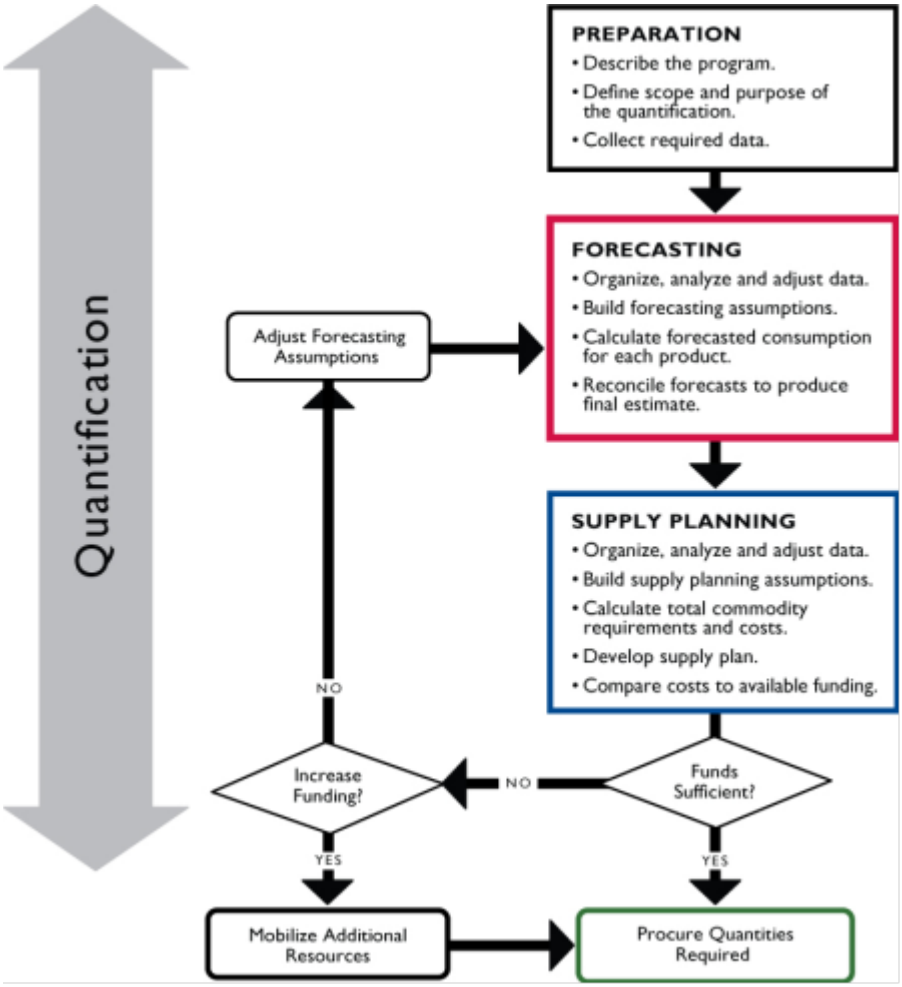
[5] USAID | DELIVER PROJECT, Task Order 1. 2011. The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs. Arlington, VAA: USAID | DELIVER PROJECT.
[6] USAID | DELIVER PROJECT, Task Order 1. 2010. *Quick Reference: Quantification Planning*. Arlington, VA.: USAID | DELIVER PROJECT. Available at http://deliver.jsi.com/dlvr_content/resources/allpubs/factsheets/QuiRefQuantPlann.pdf .

IV. Preparation

As illustrated in Figure 1 below, the first step in conducting a quantification exercise is preparation and planning. The level of preparation will vary depending on the objectives. If there is a capacity building component of the quantification, during which participants learn hands-on about the process and methodologies, appropriate curriculum development and time should be built in to focus on training and ensure skill transfer. In general, preparation activities include the following steps:

- Determine the scope and establish which products to include in the exercise (e.g., all products managed by CHWs or just those for CCM) and which programs (e.g., malaria, community health) are responsible for managing which product(s).
- Discuss product selection with program managers, the procurement unit, and others who will be involved with the quantification effort. This may also be a good time to solicit feedback on product characteristics from CHWs through focus group discussions.
- Assemble the quantification team and determine roles and responsibilities based on the scope of the quantification, familiarity with the supply chain, and CCM program. Participants will likely include representatives from the procurement unit, central medical store, logistics management unit (if one exists), CCM program stakeholders, and programmatic and technical partners.
- Prepare quantification materials, including training curriculum if capacity building is a goal.
- Plan the schedule of site visits, meetings, and workshop, if relevant.
- Collect, validate, and clean as much data as possible before the intensive workshop and validation phase.
- If consumption data are not available, conduct a validation assessment to gain more visibility into the number of patients seen, treatment guidelines followed, and quantities of products dispensed to clients or caregivers. If the program is new, collect program and country-specific morbidity data.

Figure 1 - Steps in Quantification[7]



Product selection was discussed in detail in the previous section because it is particularly critical for CCM programs, as the needs may differ from other programs, but product selection is also an important part of preparation for quantification. Establishing the types of products to include in the quantification will help determine methods to use when forecasting, as well as follow-up actions required for supply planning and pipeline monitoring.

The quantification also provides an opportunity to consult with program experts, clinicians, and procurement experts to evaluate the product specifications for the CCM programs. It may also prove a good time to solicit feedback from CHWs, as well as program staff and partners who work closely with CHWs in the community, to determine if there are product formulations or packaging options that are more age appropriate or suitable for storage and dispensing in community settings.

[7] USAID | DELIVER PROJECT, Task Order 1. 2010. *Quick Reference: Quantification Planning*. Arlington, Va.: USAID | DELIVER PROJECT. Available at: http://deliver.jsi.com/dlvr_content/resources/allpubs/factsheets/QuiRefQuantPlann.pdf

For programs that use products exclusively for CCM, forecasting and supply planning may be done separately from a national quantification and instead focus on the CHW level only. However, in many countries, the products used for CCM are used across multiple programs and purposes. In this case, since all of the CCM products are not dispensed exclusively at the community level, it will be necessary to collect data from and forecast demand for products at all levels and all conditions for which a product is used in the health system. However, while the forecast for the total demand for a product may be a sufficient output for the quantification, determining what subset of that need is for the CCM program may also be useful. This information can be used to advocate for program funding or for comparison to needs of other programs.

In this case of non-exclusive use of products for CCM, combining the CCM quantification with other national quantification exercises can ensure that the full need for each product is adequately estimated. CCM would then be quantified as a sub-set of the total need, using the methods discussed in this guide. In advance of the quantification, it will be important to determine with the relevant program managers how, when, and where the products are used to ensure that the scope of the quantification is broad enough to provide realistic forecasts of the total needs, while also ensuring that CCM demand is captured as part of larger forecasts.

For example, in Malawi, the scope of the 2011 quantification was to determine quantities of products required for the national essential medicine program for 2011–2013, as well as budget requirements and funding gaps. Since all of the CCM products were not dispensed exclusively at the community level, it was necessary to forecast consumption of CCM products at all levels in the health system and estimate the percentage that would be consumed at the community level. If only consumption at the community level had been used, the total need for products would have been significantly underestimated, leading to stockouts.

Figure 2 - Establishing Required Scope of Quantification

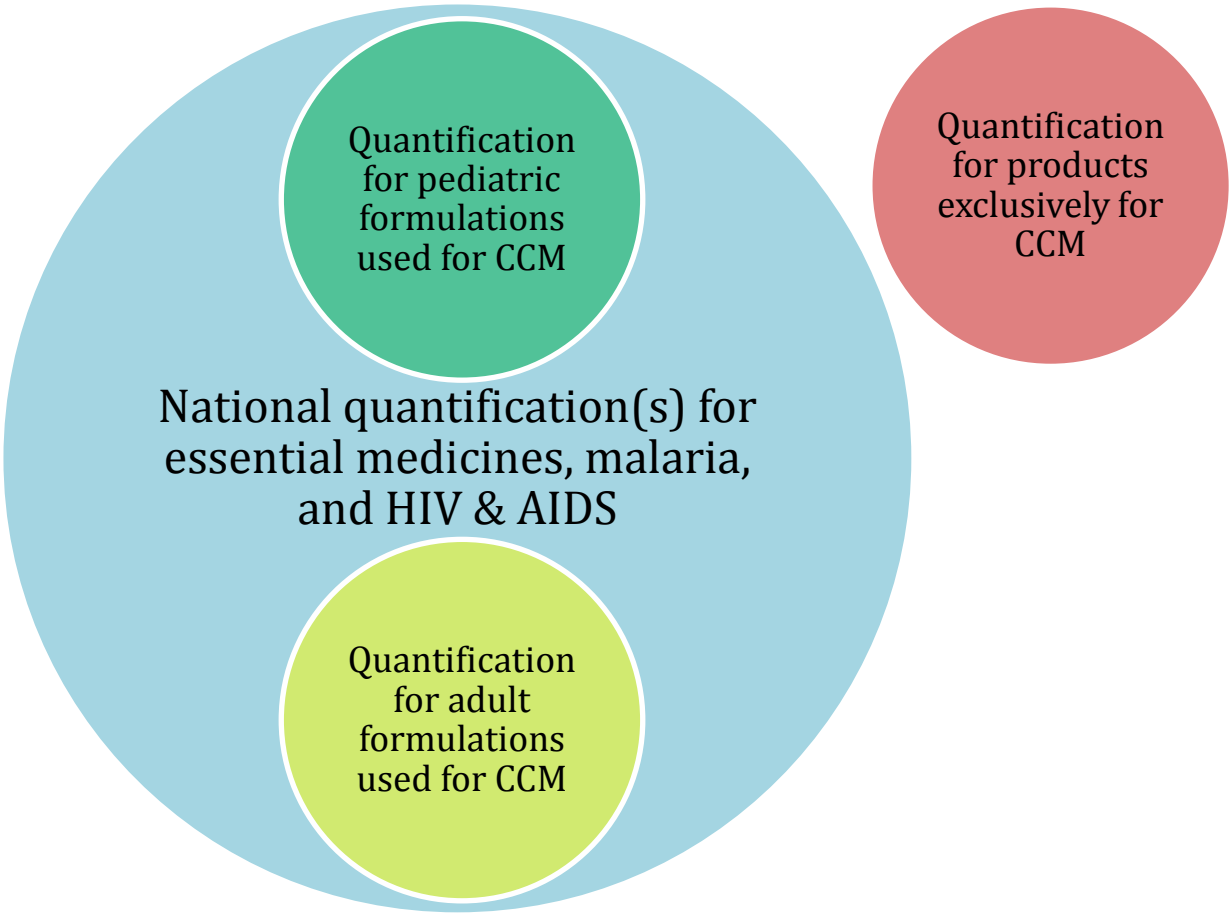


Figure 2 illustrates the overlap of quantifications when products are used for multiple programs, with CCM demand forecasts as a subset of total need. Only for products used exclusively at the community level for CCM could a forecast be done independently without input from other programs.

When establishing which programs, departments, or ministries are responsible for managing which products, it may be helpful to create a table clarifying roles and responsibilities, which can then be validated during an assumptions-building workshop or meetings with partners. Because CCM products tend to cross several programs, mapping out responsibilities for various functions related to quantification and clarifying what will and will not be included in the quantification are essential to ensuring that nothing is overlooked or repeated. Further, for products not included in the CCM forecast, it is critical to confirm that the community-level need is included in the quantification of the other program. For instance, in Rwanda, the National Malaria Program quantifies ACTs used for CCM, while the Community Health Desk quantifies many of the other CCM products. (See Table 2 as an example.)

Table 2 - Clarifying Scope of Actors: Rwanda Example

Product	Responsible Party	Functions Performed (e.g., data collection, quantification, pipeline monitoring)
Amoxicillin (125mg dispersible tablet)	Community Health Desk (CHD)	All
Zinc (10mg tablets)	Community Health Desk (CHD)	All
ORS (sachet for 1 liter)	Community Health Desk (CHD)	All
Vitamin A (100,000 and 200,000 IU)	Nutrition program	Data collection and quantification; pipeline monitoring not required, as products are issued through biannual campaign pushes
Mebendazole (500mg tablet)	Nutrition program	See above
AL (120/20mg), packaged for the community level as Primo	Malaria program	All (consumption and services data from same source as CHD – the Système Informa-tiquede Santé Communautaire - SISCom)

V. Organize, Analyze, and Adjust the Data

Different countries use different types of data to forecast various products, depending on the maturity of the CCM program and what types of data are available. In most cases, after using several methodologies, including demographics, morbidity, consumption, and services data, countries compare the outputs and selected the best method as the basis for the forecast. Policy decisions, such as program targets and growth rate, are also important considerations if the program is newer. Data should be gathered from as many different credible sources as possible; this will enable data to be compared and triangulated, lending greater credence to the forecast. See Table 3 for a description of which data were used to quantify CCM product requirements in three countries.

Table 3 - Types of Data Used in Previous Quantifications

Country	Product	Method(s)
Ethiopia (2011)	Cotrimoxazole 120mg tablets	Demographic/morbidity data
Ethiopia	ACTs (AL) 1x6 and (AL) 2x6	Demographic/morbidity data
Ethiopia	RDT – malaria	Demographic/morbidity data
Ethiopia	ORS	Demographic/morbidity data
Ethiopia	Zinc	Demographic/morbidity data
Ethiopia	RUTF	Demographic/morbidity data
Malawi (2011)	Cotrimoxazole 480mg tablets	Consumption data
Malawi	ACTs - AL 1x6 and AL 2x6	Morbidity data
Malawi	Zinc	Morbidity data

Country	Product	Method(s)
Malawi	ORS	Consumption data
Rwanda (2011)	Amoxicillin 125mg dispersible scored tablets	Morbidity data
Rwanda	Primo 1x6 and Primo 2x6 (repackaged Coartem)	Consumption data
Rwanda	ORS (sachets for 1 liter)	Morbidity data
Rwanda	Zinc (10mg)	Morbidity data

Collecting Data for Forecasting

Since many CCM programs are new, complete consumption and services data may not yet be available as reporting systems are being implemented. Furthermore, reporting may be a challenge for some CHWs, and may be inconsistent or lacking entirely. As CCM programs mature, however, data reporting and collection should become more robust. This guide, then, describes services and consumption data that should be collected if and when they become available, in addition to program, demographics, and target data, which may be more readily available. Appendix D provides a list of potential questions to ask when gathering data, deciding how to adjust data quality, and developing assumptions.

Specific data on product information, CCM program information and national policy, and demographics and morbidity should be collected for forecasting.

Product Information

As discussed previously, it is important to establish the specifications of the products to be forecasted based on the STGs and algorithms for CCM case classification and treatment. This also provides an opportunity to advocate for the use of optimal products to improve the quality of treatment delivered by CHWs. Specifications include:

- Formulation of product used (e.g., amoxicillin tablet, capsule, suspension, or both)
- Strength of product (mg)
- Primary package type (e.g., bottle, blister pack, sachet, or kit)
- Primary package size (number of tablets, number of milliliters per bottle, blister packs, grams).

Moving Toward an Ideal Product Profile Rwanda *has made progress in quantifying for an ideal product profile. In its February 2011 quantification exercise, and in response to program feedback on challenges with existing products, Rwanda forecast for amoxicillin dispersible tablets in blister packs (to avoid exposure of the tablet to the humid environment) and switched from 250mg dosage to the more pediatric-friendly 125mg dosage (to avoid tablet splitting). Rwanda also switched from 20 mg tablets of zinc to 10mg tablets (to avoid tablet splitting) and procured tablets with flavoring that masks the metallic taste of zinc. Rwanda mobilized leadership and commitment to quickly respond to challenges faced by CHWs. In doing so, the country was also able to change program guidelines, product specifications, and procurement plans to include pediatric- and supply chain-friendly products at the community level, leading to improved patient treatment and health outcomes.*

CCM Program Information and National Policy

- Date CCM started
- Date product was introduced for CHWs
- Date of program data collection (i.e., when the last count of CHWs was)
- Current number of CHWs
- Target number of CHWs, if still growing
- Date target number of CHWs will be implemented
- Population per CHW (total)
- Under-five population per CHW
- Total under-five population served by CCM
- Number of districts served by CCM
- Plans for geographic CCM expansion (national CCM strategy)
- STGS (or algorithms) for CCM
- Plans to revise or update national guidelines
- Partners supporting the CCM program, geographical areas of support, and any plans for product procurement.

VI. Demographic and Morbidity Data

Demographic or population data are data on the size of a specific population. Morbidity data are used to estimate what proportion of that population is affected by a specific disease or health condition that requires a specific treatment. In most cases, these population-based figures are further refined to estimate the size of a more segmented population that may actually have access to a health facility where the services are provided, such as children under five seeking care from CHWs.

Population and morbidity data may be obtained from surveys such as a national census, Demographic and Health Survey (DHS), or UNICEF Multiple Indicator Cluster Surveys (MICS), or from other UNICEF and WHO estimates. In addition to the resources above, morbidity data may be available from the national epidemiological surveillance or survey studies. The data may also be extrapolated to estimate incidence of diseases and malnutrition. Since demographic forecasts tend to inflate estimated demand, it is important to filter and pare down numbers of cases through careful assumptions about health care-seeking behavior, service provision, and service uptake before converting to quantities of product. Demographic and morbidity data relevant to quantifications of CCM are:

- Total population
- Total population under five
- Population growth rates
- Population covered by CHWs/CCM
- Population per CHW
- Under-five population per CHW
- Estimated episodes of diseases per child per year (annual incidence).

Disaggregating Data by Age
Some products should be dispensed according to a child's age and weight (see STGs in Appendix E). However, segmented data on age are usually not available because most reports aggregate data on children under five, which can pose a challenge for forecasting. Other sources of data may be needed to estimate the size of smaller age ranges. See additional information on Disaggregate Data by Using Multiple Sources on page 26.

Specific examples of data usually available from the DHS include:

- For each child under age five, number or percentage who experienced an episode of diarrhea, a cough accompanied by short, rapid breathing (symptoms of acute respiratory infection [ARI]), or fever in the two weeks preceding the survey
- Of children under five who had symptoms of ARI or fever in the two weeks preceding the survey, percentage for whom treatment was sought from a health facility or provider
- Of children under five who were sick with diarrhea in the two weeks preceding the survey, percentage for whom treatment was sought from a health facility or provider, percentage given a solution made from ORS packets or prepackaged ORS liquids, and percentage given any oral rehydration therapy (ORT)
- Of children with fever, the percentage who received antimalarial drugs
- Of children with fever, the percentage who received ACTs
- Of children aged 6 to 59 months, percentage whose laboratory test result for malaria was positive.

Incidence or Prevalence?

Incidence is a measure of the risk of developing some new condition within a specified period of time. The measurement conveys the number of *new* individuals who contract a disease during a particular period of time. Incidence is often expressed in episodes/child per year or episodes/1,000 population per year.

Prevalence of a health condition in a population is the total number of cases of the risk factor in the population at a given time or the total number of cases in the population, divided by the number of individuals in the population. Prevalence is a measurement of the total number of individuals affected by the disease within a particular period of time.

The relationship between the two measurements is: ***prevalence = incidence x duration.***

The selection of the type of data to use for a morbidity-based forecast depends on both which data are available and the specific condition. In general, prevalence estimates are more appropriate for estimating cases of chronic diseases, while incidence estimates are more appropriate for estimating acute conditions because one person may be affected by the same condition multiple times in a given period. If a condition is chronic but the affected population is increasing rapidly (an increasing incidence rate), then using both may be necessary.

See additional information on using DHS two-week prevalence data on page 27.

VII. Services Data

Services data are historical program-level or facility-level data on the number of patient visits, the number of services provided, the number of fever episodes, or the number of people who received a specific service or treatment within a given period, typically the past 12 months. For CCM programs, the data of interest would be number of patients seen by age group, case classifications, or services provided by CHWs.

Services data per month for a 12-month period would be ideal to capture seasonal variation in disease burden. Where this is not possible or where a program is new, a representative data sample can be used to extrapolate monthly averages. For example, in Ethiopia, where the CCM program is relatively new, services data were collected from a district where CCM was initially piloted and had over two years' worth of data. This showed what the monthly volume of services might look like per CHW, making it possible to observe any variation in average caseload from month to month for each condition. Data may include:

- Caseload per CHW each month
- Seasonal variation of caseload
- Number of cases classified as a particular disease per month per CHW
- Number of cases treated with a disease-specific product per month per CHW
- Number of cases treated with a product per month per CHW (children aged 2 to 12 months)
- Number of cases treated with product per month per CHW (children aged 1 to 5 years).

WHO Estimates of Worldwide Incidence
Pneumonia: 0.29 episodes per child-year (e/cy) (Rudan 2008)
Diarrhea: 3.2 (e/cy) (Kosek, Bern, and Guerrant 2003)

Rates of malaria and malnutrition are more country-specific. Resources can be found at: http://www.unicef.org/infobycountry/index.html.

Some countries collect these data through health management information systems (HMIS). Determining if these data break out services provided at the community level from services provided at other levels of the system will help forecast the CCM need as a portion of total need.

VIII. Consumption Data

Consumption data are historical data on the actual quantities of a product that have been dispensed to patients within a specified period, typically the past 12 months. When consumption data are used, the forecast is based on the quantities of products dispensed in the past. Consumption data are typically most useful in well-established, stable programs that have reliable supplies data that can help predict future demand. However, for new programs or programs in the process of expanding or adding products, consumption data may be extrapolated from what is available; see section on adjusting the data on page 25.

Consider the following when evaluating consumption data for collection:

- What is the consumption of product by formulation and dose (e.g., amoxicillin suspension, amoxicillin 125mg tablets, or amoxicillin 250mg tablets) per month per CHW? These data will prove useful if the CCM program is being phased in and it is necessary to estimate future consumption levels for additional CHWs who will begin providing services in the future.
- Consumption data that CHWs report tend to be aggregated with the data from the resupply point, especially when the same products are used at the health center. Therefore, CHW-specific data are not visible at the central level for forecasting, making it necessary to distinguish the CHWs' consumption data from other the data at other levels. This can be

done by comparing consumption data with services data, or comparing the proportion of total clients seen by CHWs with the proportion seen at the resupply point.

- If consumption data are not available from CHWs, determine if issues data from the resupply point to CHWs can be used. If issues data from a higher level are used as proxy consumption, be mindful of other sources of commodities that lower level facilities access, such as procurement from the local market or direct provision of products from local NGOs, to ensure that the full consumption is captured.
- When using consumption data, determine what percentage of sites or CHWs are reporting and whether stockouts are captured. The magnitude of any product stockouts will need to be estimated to determine true demand and not perpetuate short supplies.

IX. Analyzing Data Quality

Once all available data about CCM products have been collected, the quantification team should review the data to determine their validity and usefulness for forecasting. The main issues to look for are timeliness (e.g., date of report, survey, or policy), completeness (e.g., CHW reporting rate), and accuracy (e.g., comparing physical inventory with reported stock levels). Table 4 below provides examples for Rwanda, Malawi, and Ethiopia, as well as comparisons of available data from each country.

Table 4 - Analysis of Data Quality[8]

Type of Data	Data	Challenges with Data Quality	Notes
Demographic/ Morbidity	Total population (Rwanda National Institute of Statistics 2009, Rwanda; National Census 2002)	2–3 years old	Although demographic data were a few years old, they were deemed acceptable, given that alternative data were limited
	Two-week prevalence of fever and rapid breathing (DHS interim DHS 2007, Rwanda)	Need to convert two-week prevalence data to annual incidence (no data available to extrapolate seasonality)	Had to research appropriate methodology for conversion and make assumptions about seasonality
	Estimates on incidence of pneumonia, Ethiopia (WHO estimates, 2008)	3–4 years old; unsure how interventions in the interim have affected incidence	Decided to use and offset potential overestimate with realistic estimates of care-seeking behavior via HEWs

[8] USAID | DELIVER PROJECT, Task Order 1. 2011. The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs. Arlington, Va.: USAID | DELIVER PROJECT.

Type of Data	Data	Challenges with Data Quality	Notes
Services	Total number of cases of ARI and diarrhea seen per district per month from SIS Com (Système Informatique de Santé Communautaire SISCom database, Rwanda)	Do not know how many CHWs are active, how many are picking up product, and why or why not Data are captured at each level but are aggregated by cooperatives, so do not know individual binome (two CHWs working together) reporting rates	Did not use services data
	HMIS data used to collect number of cases of fever, rapid breathing, and diarrhea per year (for Integrated Management of Childhood Illness [IMCI] CCM, Malawi)	Data were aggregated for children under five	Since different treatment regimens are required for different ages, used DHS data to disaggregate data into the age range for treatments
Consumption	Products dispensed by CHWs to clients (Rwanda)	(2011) Paper records are aggregated at cooperative level and electronic records at district level; did not know reporting rates or information about stockouts, losses, and adjustments (2012) Improved logistics management information system (LMIS) provided consumption data from the CHW level; non-reporting rates allowed for adjustments	(2011) Extrapolated data from high-reporting districts to create a consumption-based forecast; however, did not use consumption data for final forecast because data were not considered generalizable to the whole country (2012) The substitution of new products mid-year created some anomalies in the data that made it hard to interpret or adjust but should be a good source for next year
	Physical inventory and *Supply Chain Manager* data (Malawi)	Missing data and stockouts	Used survey data from a sample of facilities to create a consumption-based forecast; used consumption data for ORS and cotrimoxazole

X. Adjusting the Data

After analyzing the quality of the data, the next step is to determine which data are most reliable, which should be factored into the forecast, and which should be discarded. As mentioned previously, there is often limited data for CCM programs, largely because in many countries programs are new and data systems are still in development. Other health programs also experience challenges with data availability and quality, especially in terms of logistics and services data. Adjusting data can be done at different points in the process, but is frequently done during a workshop setting where a large range of stakeholders and program experts can help analyze the data and provide their expertise and input to help determine when and how to adjust the data and provide input to any necessary assumptions. There are various ways to adjust for missing, incomplete, old, or erroneous data, such as:

Adjust for Missing Consumption Data through Extrapolation

In Rwanda in 2011, consumption data were incomplete and reporting rates were unknown, making existing logistics data unreliable. Therefore, the quantification team used existing consumption data from 6 districts (out of 30) with high reporting rates, calculated consumption averages by product per CHW for those districts, and applied the result across all districts. The quantification team also added a growth factor to account for anticipated scale-up in the program and uptake of services provided by CHWs. However, these adjustments were problematic: the six sites were more mature and received more support than other districts, thus their consumption rates might not have been similar to other districts. When the adjusted consumption data were compared to morbidity data, they appeared unrealistically high, given what was known about the program. Since the consumption data could not be reasonably adjusted, consumption data were discarded for this exercise.

In 2012, with a much more robust LMIS system in place, consumption data from Rwanda became available. The LMIS also captured non-reporting rates, so the consumption could be adjusted by calculating what the consumption would have been—had those non-reporting sites reported—based on the average consumption of the sites that reported.

Compensate for Stockouts through Proxy Data

In Malawi, consumption data were collected through physical inventories and *Supply Chain Manager*, a software tool that provides logistics management information to managers of distribution systems. However, the data were incomplete for some products, and some levels had stockouts of products, which, if used to predict future demand without being adjusted for, would lead to an underestimate of need. If the length of stockouts is known, that time can be corrected by estimating that period's consumption based on periods when the product was in stock, and adjusting consumption upward by adding the unmet but expected demand to known consumption. However, when stockouts are prolonged or affect many levels of the system, alternate methods are needed to estimate potential consumption in the absence of stockouts.

> ***Examples of Data***
> *In **Malawi**, physical inventory and* Supply Chain Manager *data were used for forecasting of essential medicines. The team also used issues data from the Regional Medical Stores to verify stockouts.*

In Malawi, where data were missing at the district level, proxy districts were used to estimate the consumption at comparable districts. If national product data were missing, Regional Medical Stores issues data were used instead.

Disaggregate Data by Using Multiple Sources

In Malawi, the IMCI program has a service data collection system that collected data that are disaggregated into 2 to 11 months and 12 to 59 months of age. However, since treatment for certain conditions required different regimens for different ages, the quantification team used techniques to disaggregate potential patients by age:

- Between 2 to 11 months and 12 to 59 months: The quantification team applied percentages by age category from base year across forecast years.
- Between 2 to 6 months and 6 to 59 months (for zinc tablets): The quantification team used MICS 2006 to disaggregate data for 2 to11 months of age.

In Ethiopia, when using population data for the forecast, the regional health bureaus provided up-to-date population data for each region, but the data were often in five-year age groups (or children under five and people over five). To disaggregate to smaller age groups matching the treatment protocols in the STGS, additional data were collected on one-year age groups from the 2007 national census. The percentages of one-year age groups were then applied to the more recent population data, documenting the assumption that these had remained constant. (In other words, the team acknowledged that changing fertility rates may have altered the percentages in the interim years, but these were the best data available).

Make Adjustments for Realities of CCM Programs

When consumption or services data are not available, it becomes more important to make careful assumptions about the morbidity trends of the under-five population, service provision, and care-seeking behavior via CHWs. The proportion of a population seeking care at the community level should increase over time as a program becomes established and community members become aware of services and treatment offered by CHWs. For example, during the quantification in Ethiopia, when using demographic/morbidity data, the experts group developed assumptions about the percentage of estimated cases that would seek health care from any source, and of those, what percentage would seek treatment from HEWs. The experts group also considered and estimated the percentage of those cases that would be referred to a higher-level facility, and therefore only receive an initial dose of a medicine or product (it is important to still quantify for the referral dose).

When making adjustments, consider that CHWs may provide treatment if a case is suspected but not confirmed. Therefore, medicine use may exceed actual disease prevalence. Furthermore, CHWs may treat patients in addition to children under five, so focusing only on children under five may underestimate demand.

Illnesses that CHWs treat as part of the CCM program are not chronic and may recur in the same child over the course of the year. Some, like malaria, tend to be seasonal and epidemic based. Therefore, programs need reliable estimates of annual incidence for morbidity-based forecasting.

Convert Prevalence Data to Annual Incidence If Necessary

DHS surveys collect data over a two-week period, and thus provide estimates for two-week prevalence of diarrhea and ARI (frequently used as a proxy for pneumonia). If the best data source for morbidity estimates comes from recent DHS surveys, then two-week prevalence data must be converted to annual incidence. WHO provides guidance on appropriate conversion methodology in Appendix R of the 1994 publication *Household survey manual: diarrhoea and acute respiratory infections.*[9] In short, it is necessary to convert the two-week prevalence, a measure of the number of cases starting or continuing into that time period, into two-week incidence, the number of cases starting during that period. Then the two-week incidence can be converted into an annual incidence estimate, that is, the number of new cases that can be expected in a one-year period.

While it may seem logical to multiply the two week-incidence by 26 to estimate the annual incidence, this would overlook any seasonality in morbidity trends and estimate only on the two-week period of the survey. The methodology presented by WHO[10] allows for adjustment for seasonality based on 12-month trends, if this information is available. Ideally, data would be available to use for seasonality adjustments. However, these data are frequently unavailable, in which case a straight multiplication of the two-week incidence by 26 gives the best estimate possible for annual incidence.

XI. Build and Obtain Consensus on the Forecasting Assumptions

In many countries, CCM programs are nascent, with logistics system design and strengthening only recently initiated. Data from HMIS are similarly limited. In these cases, forecasters must make assumptions about the program and product use to account for missing data and to estimate the effect of programmatic and environmental factors expected to influence demand for CCM products. This step in particular is frequently done in consultation with a large group of experts and stakeholders to ensure that a variety of perspectives are represented and considered.

The most critical component in building assumptions is to clearly document any assumptions used in a forecast, explaining on what basis they were made. When there are few or no data, the forecast will rely heavily on assumptions. These assumptions should be developed during a consultative process that includes government, programmatic, and community partners, and consensus must be reached so all stakeholders have confidence in the results of the forecast.

*In **Malawi** in 2011, the quantification team made the following assumptions in its forecast for ACTs:*

- *2.8% population growth rate*
- *10% decrease in the number of cases starting in 2012 due to bed nets and indoor residual spraying (IRS)*
- *25% increase in the number of treated fever cases at CCM level due to program expansion to additional villages*
- *HSAs will dispense AL 1x6 for 80% of fever cases in children under five, and AL 2x6 for 20% of fever cases in children under five.*

[9] World Health Organization (WHO). 1994. *Household Survey Manual: Diarrhoea and Acute Respiratory.* WHO/CDR/94.8. Geneva:WHO. Available at http://whqlibdoc.who.int/hq/1994/WHO_CDR_94_8.pdf.

[10] Appendix R from *Household Survey Manual: Diarrhoea and Acute Respiratory.*World Health Organization. Geneva, 1994. - http://whqlibdoc.who.int/hq/1994/who_CDR_94_8_annexes_r_v.pdf

The quantification should be revised if any of the forecasting assumptions change.

Some assumptions will be specific to the type of product being forecasted, while others can cut across the different products. The following are examples of programmatic and environmental factors that need to be taken into account:

Standard Treatment Guidelines

A forecasting assumption would be that CHWs have been trained in and are adhering to the STGs or dispensing protocols, and would have the appropriate stock on hand to follow the guidelines. Any changes to the STGS would not immediately be reflected in dispensing behavior, since changes would require training of providers and possible modification of procurement, which can take up to a year or more.

CHWs also use STGs to identify sick children with severe conditions and refer them to a higher-level facility for immediate care and treatment, generally after providing an initial dose of a treatment. If reliable data are not available on historical referral rates for each condition, it will be important to develop realistic assumptions for expected referral rates. Additionally, depending on the product to be given as the referral dose, it may be important to document in what quantity it will be administered. For instance, in Ethiopia, where severe acute malnutrition is treated as part of CCM, the referral dose for severe complicated malnutrition in infants is amoxicillin suspension. Given that it would be difficult to give less than a full bottle of the suspension (and the remaining amounts would likely be wasted if it was possible), the quantification team decided to quantify the referral dose as the full bottle of suspension.

See Appendix E for a summary of the STGs for CCM treatment in Ethiopia, Malawi, and Rwanda. Appendix E1 is a summary of STGs for ready-to-use therapeutic food (RUTF) for community-based treatment of severe acute malnutrition, included as a component of some CCM programs.

Emergence of New Products and Formulations on the Market

If new formulations and packaging of age-appropriate medicines come on the market and become available in-country as part of the CCM program, forecasts will need to be revised. When revising the forecast to plan for the introduction of a new product, factor in the time it will take to change the policy, adjust treatment protocols, train the CHWs on the new protocols, and incorporate new products and formulations into LMIS forms. In this case, working with the national drug regulatory administrations and key private sector partners will prove valuable during the initial forecast. They can provide better information about the possibility and timing of new drug introductions and the current situation of registration processes.

***Quantifying for Changing* Guidelines**

*In **Malawi**, CHWs are currently instructed to break adult-formulated tablets when dispensing to children. However, as pediatric formulations become available, guidelines need to be updated accordingly. Therefore, in the 2012 quantification, the team forecasted for 480mg cotrimoxazole tablets, but conducted a costing analysis of filling the pipeline and procuring in subsequent years, should the CCM program transition to pediatric-friendly 120mg dispersible tablets.*

Service Provider Capacity

The design of CCM varies from country to country, and CHWs are responsible for managing products for a variety of services and conditions. In many cases, CHWs are expected to manage an increasing number and quantity of products over time, as CCM programs expand. Whether providers are actually able to keep pace with targets and expectations remains to be seen, and in forecasting for product procurement it is important to encourage program managers to be realistic about targets or they will risk overestimating. Also, CHW retention remains an issue, and additional training may be required to replace lost CHWs.

Care-Seeking Behavior

A forecast based on demographic/morbidity data should include some estimate of the proportion of the estimated affected cases that will seek care from CHWs (or other types of facilities included in the quantification) versus other sources. Otherwise, forecasters risk significantly overestimating need for the product. These estimates should be realistic, based on what is known about where the populations under consideration currently do or do not seek care—via private sector providers, public sector facilities, CHWs, and drug outlets, or not at all. These estimates can be adjusted somewhat if there is reason to believe that a change in policy or service provision would change the current proportion, with the understanding that, typically, behavior is slow to change.

For example, if CCM is in the process of being scaled up in rural areas, and services and products will be free from CHWs (unlike services from facilities, which charge fees and are harder to access), it is likely that more people will seek care from CHWs than previously. However, given other options and the understanding that some people will not seek care at all, the portion of cases going to CHWs will still not be 100 percent.

Seasonality

Consumption of most CCM products is not uniform throughout the year; demand spikes and dips with the seasons. For example, rainy seasons bring an increase in the numbers of malaria and diarrhea cases, colder seasons mean more pneumonia, and the “hungry season” (just before the harvest) sees an increase in cases of moderate acute malnutrition. Depending on which data are being used, it is important to determine if seasonal changes in demand are captured or if they need to be estimated. If data are not sufficient to predict future changes in seasonal demand, one option is to estimate a percentage change and devise a trend line, which rises and falls over a calendar year to reflect the projected spikes and dips in consumption, based on known disease patterns.

The supply plan will further address trends in seasonality, as it will help plan when products are procured and distributed based on changes in the rate of consumption over time. However, this plan is only as good as the data used to predict seasonality in the forecast. It is important to forecast both the annual demand and month-to-month changes in order to distribute health commodities at the community level before the anticipated surge in demand. This is especially important for CCM because hard-to-reach communities may become inaccessible during the rainy season, so assumptions will be needed about peak quantities and when they will be required.

Exclusive versus Non-Exclusive Use of Essential Medicines

While some CCM products are exclusively used to treat particular conditions in children (e.g., ORS and zinc to treat diarrhea, and RDTs and ACTs to diagnose and treat malaria), other products have a wide variety of uses (e.g., cotrimoxazole and amoxicillin). HIV programs have a similar predicament when they try to forecast cotrimoxazole for the treatment of opportunistic infections (OIs), since cotrimoxazole is used to treat different diseases in various populations at health facilities. If program data are available, they can be used to determine projections of the number of children likely to experience pneumonia during the forecast period. This information, combined with demographic data and service uptake estimates, can yield estimates about the forecasted demand for cotrimoxazole for pneumonia (as opposed to other conditions). Also, it may be useful to engage local program staff in developing assumptions about the use of antibiotics to treat pneumonia, as opposed to other illnesses. Appendix F provides a sample forecasting tree as an example of this process.

Program Maturity

For new CCM programs, data may be lacking. Even where there are data, they may provide only a snapshot in time and not reflect the expansion of a maturing program. A number of factors affect the rate and magnitude of scale-up, including human resource capacity (as more CHWs are trained, they gain experience and become more efficient), community awareness (as more people learn more about services, they are more likely to access them), and product availability (when clients can trust that products will be available when they need them, they tend to access services at the community level more regularly). It is possible to incorporate expansion targets into assumptions, but be sure the targets are realistic in light of human resource and supply chain constraints.

For some CHWs, reporting may be inconsistent or lacking entirely. As CCM programs mature and systems are implemented, however, data reporting and collection should become institutionalized and more robust. This guide, therefore, describes services and consumption data that should be collected if and when they become available, as well as program, demographics, and target data, which may be more readily available.

Impact of Other Health Initiatives

Other interventions under way may affect current or projected future product demand. Examples of these include the introduction and increased coverage of rotavirus and pneumococcal vaccines, which would impact the incidence of diarrhea and pneumonia, respectively. Also, malaria RDTs that are new to a program would impact the use of ACTs. Eradication initiatives aiming to eliminate malaria from specific regions over a period of time are another example. Information about changes in incidence or detection of CCM illnesses due to treatment or prevention initiatives should be gathered during the quantification, and assumptions should be developed about how and when these initiatives will affect product demand.

XII. Calculate the Forecasted Consumption for Each Product

Depending on the data available and selected to use, different calculations will be necessary. In any case, the steps are the same:

1. Confirm the products to be included in the forecast.
2. Determine which methodology to use, as there may be several choices depending on the types of data available.

   Using **consumption data** means that previous consumption data will predict future consumption data. Therefore, no conversion is needed, unless a new formulation or product is being introduced or substituted or there is reason to believe consumption may change. In the last case, an adjustment factor is needed to estimate the increase or decrease in consumption over time.

   If using **demographic/morbidity** or **services data**, once the assumptions are finalized and the anticipated number of children is determined, these numbers must be converted into the total estimated quantity of each product needed for each year of the forecast. (See Appendix F for a sample forecasting tree and further explanation of the process.
3. Following the current STGS, break out the estimated number of patients by age or weight group. For each age/weight band, multiply the number of patients by the basic units of product (tablet, sachet, etc.) that should be dispensed per patient, per course of treatment. (See Table 5).
4. Multiply by the total estimated number of patients expected to be treated each month or year.
5. Adjust antibiotic quantities required to account for non-exclusive use, if relevant. This may mean forecasting for multiple conditions using multiple STGS and combining the outputs to determine the aggregate demand for the product.

Use Smallest Packaging Unit When Quantifying
For ACTs, the smallest packaging unit is a single blister pack (one treatment); however, it may come in a carton of 25 or 30 blister packs per carton, depending on the supplier. Therefore, quantify by the blister pack, not by tablet. Note that some providers may break or combine blisters if they run out of a particular presentation (e.g., 1x6).

If possible, a CCM-specific forecast is recommended to better understand actual use of antibiotics by CCM programs, even if this is done as part of a national quantification effort. This will then be a subset of the total demand, but will help quantify the need for the program and what proportion of the total demand the CCM program represents. Monitoring helps capture consumption data, which can be compared with the forecast to determine how much of need is being met.

Ideally, antibiotics should be in full supply for all of the country's programmatic needs. Antibiotics should be part of the national supply plan, with the CCM supply part of the calculation of the antibiotics required for all programs at all levels in the country. However, it may be necessary to participate in a national quantification for antibiotics (and other essential medicines) in order to obtain visibility into the total quantities of products to procure and the

quantities needed to reach the CCM level. For example, in Malawi, the quantification team had to quantify for all the essential medicines for the whole country in order to then estimate the proportion to be used for CCM.

Table 5 - Converting Data into Product Quantities[11]

Type of Data	Conversion Factor			Forecasted Consumption	
Consumption	Estimated quantity of product to be dispensed/used	X		=	Quantities of Product
Services	Estimated number of cases seen	X	Dispensing and referral protocols	=	
Demographic/ Morbidity	Estimated number of patients, number of episodes of illness or health condition	X	Dispensing and referral protocols	=	
Program Targets	Targeted number of CHWs trained, geographic coverage, anticipated number of children treated	X	Dispensing and referral protocols	=	

XIII. Compare and Reconcile Results of Different Forecasts

Ideally, multiple types of data should be used to calculate one or more forecasts. These results should then be compared to determine final forecast figures. Depending on the types of data available, the quantification team may want to use a combination of morbidity and services data, or consumption and demographic data. After weighing the quality of the data, the team can determine which forecasts to use and how to incorporate the results. The team may choose to average the results of the two forecasts, to weigh the figures from one of the forecasts more heavily if the quality of the data is better, or to disregard the figures from one of the forecasts if the results are unreliable or unrealistic in comparison to results from other types of forecasts. Depending on data quality and program experience, different methods may be selected to quantify different products.

For instance, in 2012, all three data types were available in Rwanda, and all three were used to develop forecasts. However, upon comparison and review of known data limitations with each one, the team chose the demographic/morbidity-based method as the basis for amoxicillin, ORS, and zinc.

[11] USAID | DELIVER PROJECT, Task Order 1. 2011. *The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs.* Arlington, Va.: USAID | DELIVER PROJECT.

XIV. Next Steps

The forecast provides the estimated demand for the program, but supply planning is what turns the forecast into an operational plan that considers the system design and determines the forecast demand. The operational plan also determines the quantities needed to fill the pipeline, estimates costs, and determines needed dates for procurement and shipments to ensure continuous product availability (and avoid overstock or understock).

XV. Supply Planning

Once the forecast is complete, it is possible to develop a supply plan using *PipeLine* or another type of software to plan procurement and shipments and to monitor stock levels. The time period covered in the supply plan may vary depending on the budget or funding cycles, but typically follows the same period as the forecast. While a supply plan will give the best estimate of the funding needed for budgeting and advocacy purposes, it should be updated quarterly or semi-annually to manage shipment schedules and advance or delay orders in line with actual consumption rates and the one-year supply plan used for contracting. This is discussed in more detail under pipeline monitoring below.

*In **Rwanda**, the USAID | DELIVER PROJECT conducted a physical inventory in 2010. The quantification team was able to put forecasted consumption (for CCM exclusively) into* PipeLine *and enter stock on hand, current prices, projected expiries, and shipment schedule. For inventory control (max/min levels and lead time estimates), the team decided to use the numbers from the previous year's forecast. The max/min levels generally do not change unless there is a change to the overall supply system or the max/min are reviewed and changed based on data.*

In general, supply planning entails:

- Organizing and analyzing data. In addition to the monthly forecasted consumption calculated during forecasting, the following is needed: stock-on-hand quantities with expiry dates, quantity on order, expected arrival dates, max/min levels, procurement lead times, and so on.
- Building supply planning assumptions, including timing for shipments, prices of products, stock levels (if data are not available), and more.
- Estimating total commodity requirements and costs, including the quantity needed to meet the forecasted consumption as well as to fill the in-country pipeline to maintain continuous supply.
- Developing a supply plan to plan orders and shipments.
- Comparing funding available to total commodity cost.

For programs in which products are exclusively used for CCM, it is possible to conduct forecasting and supply planning separately from the national quantification. However, in many countries, such as Malawi, the essential medicines in the CCM program are used nationally. This means that the CCM quantification team must participate in the national forecasting for these products, as well as in subsequent supply planning, reviewing, and updating, in order to monitor everything going into and through the pipeline.

*In **Malawi,** different CCM products have different funding sources. The President's Malaria Initiative (PMI) and the Global Fund purchase ACTs, the Global Fund is the main funder of cotrimoxazole, WHO purchases zinc, and the central government procures ORS. All these funding sources must be coordinated during supply planning.*

In Malawi, districts choose which products they want to buy. One possible way to enhance management is having the districts establish their own *PipeLine* databases to track what they are purchasing, what they are receiving from partners, and what their stock levels are.

For more details on supply planning, see *Quantification of Health Commodities: A Guide to Forecasting and Supply Planning for Procurement,* published by the USAID | DELIVER PROJECT[12].

XVI. Pipeline Monitoring and Quantification Updates

As part of the pipeline and procurement monitoring activity that takes place after the quantification, the national quantification team should routinely gather accurate consumption information to compare projected consumption to actual consumption. This will help determine if shipments should be delayed due to slower-than-anticipated program growth, or accelerated to meet increased demand. Because many CCM programs are new and preliminary forecasts may be heavily based on assumptions about program growth and service uptake, regular and frequent reviews of the quantification and pipeline monitoring will be critical until the program matures and stabilizes. Then, as a variety of partners contribute to the purchase of CCM products in many countries, quarterly reviews of the pipeline will allow the CCM program to keep track of partner contributions, identify shortfalls in funding, and provide information for advocacy to fill gaps if necessary.

Another reason that pipeline monitoring is a crucial activity for CCM supply chains is that the community level represents the last mile in the supply chain and is therefore last to receive products. When resources are limited and funding is insufficient for purchasing all estimated quantities required of any of the CCM products, it is likely that the community level will experience the most stockouts, since higher levels are more likely to take what they need before passing them down to CHWs. Therefore, the objective of pipeline monitoring for CCM is to understand stock levels over time and advocate for procuring (at the very least) quantities required to maintain the minimum stock level of the product for the community level.

In Rwanda, quarterly quantification reviews have been implemented. This, along with close monitoring of district-level stocks and central-level procurement plans, has allowed the program to shift quantities to avoid expiries and expedite shipments when stock levels are low.

While the national LMIS is a good source of information on national consumption, several challenges may impede obtaining national logistics data from the community level for CCM products. As stated previously, the key challenge is that, in most countries, CCM is a relatively new program, and systems for collecting data on inventory and consumption levels are not always sufficiently robust to routinely collect consumption data from these lower-tier health workers. Additionally, when CCM products are distributed by partners, they are sometimes distributed through parallel systems where commodities do not pass through a warehouse or a health facility, and therefore issues data may not be a reliable determinant of consumption and availability of commodities at the community level.

[12] USAID | DELIVER PROJECT, Task Order 1. 2009. *Quantification of Health Commodities: A Guide to Forecasting and Supply Planning for Procurement*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

A number of approaches could be used to ensure timely and reliable information for monitoring the supply plan for CCM, depending on the supply chain design, LMIS, and exclusive or non-exclusive use of individual products for CCM.

Where CCM products are non-exclusive to the CCM program, and the national LMIS does not collect data from the community level, the national quantification team can monitor the national availability of the medicines—keeping in mind that CCM is the last tier of the supply chain and that any national shortages are likely to be felt by the CHWs first.

If procurement is done locally at lower levels or if partners distribute products directly to CHWs, it will be necessary to work with these lower levels and partners to obtain data on CHW consumption and stockouts. This may mean working with partners to obtain quantities of products issued to and dispensed by CHWs. If CCM products are distributed by the health facility to the CHWs (CCM program), and recorded as being issued to CHWs by the health facility, then issues data from health facilities can represent CCM consumption if recorded separately (distinct from issues made to the dispensary, antenatal care [ANC] ward, laboratory, etc.). If products are exclusive to the CCM program and distributed to CHWs from health facilities, issues data from the health center can be used as a proxy for CCM consumption.

In instances where reporting rates are low, consumption data will have to be adjusted for non-reporting and stockouts. The adjusted consumption can then be compared to the national stocks (including the central, district, and facility levels) and pipeline to determine if the existing procurement and supply plan is sufficient, or if orders or schedules need to be adjusted to bridge any supply gaps.

A *PipeLine* database can be useful in performing the necessary calculations of months of stock available, based on current consumption rates and stock-on-hand data (and planned orders). It will also help plan orders and necessary arrival dates to maintain needed stock levels and monitor the country supply chain. When using the *PipeLine* database:

- Make appropriate calculations to the consumption data and update the forecast consumption with the actual consumption.
- Update any incoming shipments as collected from partners and the central medical stores.
- Use more realistic estimates of the lead time required for ordering and receiving shipments of products from likely suppliers.

Quantification is an ongoing process of monitoring, reviewing, and updating the forecasting data and assumptions. For mature programs, reviewing and updating the quantification every six months is sufficient. For new or expanding programs, more frequent updates are suggested; since CCM programs are relatively immature, quarterly reviews are recommended so updates can be made as new data become available (or every six months).

Quarterly Updates and Pipeline Monitoring

What to do?

Obtain current consumption data for commodities from all levels of the health system.

- Update stock on hand for each product.
- Assess national stock status.
- Review assumptions and revise them if better information is available.
- Review and update shipment delivery schedules.
- Update amounts and timing of funding commitments.
- Recalculate product requirements and costs over time.
- Estimate and update funding needs and gaps.

Who should do it?

Ideally, the same people who participated in the initial quantification should conduct routine updates.

Where should data come from?

Ideally, updated data representing consumption of products used for CCM at all relevant levels would be available. Where this comes from will depend on the supply chain design for CCM, the quality and completeness of reporting from CHWs, and resources available for data collection, such as:

- LMIS from the CHW level (stock or bin cards)
- Reports submitted by CHWs to higher levels
- Data from partners on products provided to CHWs and procurement plans
- Issues data for products used for CCM from higher levels
- National, regional, and facility stock-on-hand data for products used for CCM
- Procurement plans, including orders placed and expected arrival dates of planned shipments of CCM products.

XVII. Challenges and Lessons Learned

Through experience with the quantification of CCM products, several common challenges and lessons have emerged. Many are unique to the challenge of CCM and getting products to the very last mile of the supply chain, but some are common to all levels of the system.

Challenges

- The lack of quality-assured, age-appropriate products not only impacts the quality of services provided to patients but poses challenges for forecasting (in terms of adjusting for tablet splitting or blister breaking, and for non-exclusive use of antibiotics).
- In general, data on CCM services and product supply are still of limited quality and availability, and tend to be unreliable or insufficient for forecasting quantity requirements. Consequently, many forecasts still rely heavily on assumptions.
- Consumption and services data are often aggregated at the health center or district level, impairing visibility of data at the community level. Furthermore, it is difficult to determine reporting rates, stockouts, losses, and adjustments.
- Using morbidity data is possible, but figures need to be tempered by realistic rates of care-seeking as well as services and treatments provided by CHWs. It will be helpful to validate morbidity data with the input of national epidemiologists, and then develop realistic treatment assumptions about how estimated episodes per year per child translate into the number seeking care from CHWs.
- While it is important to quantify the demand for products at the community level specifically, if the same products are used at other levels of the system, it will also be critical to know the total demand for the health system, so that required stocks at all levels are known and ideally, maintained so that the community level does not experience shortages.
- If monthly data are not available, it will be necessary to make assumptions about seasonality of disease patterns to make sure that adequate stocks are available to account for dips and peaks in demand.
- Although the mandate for CCM targets children under five, in practice, health workers may also provide medicines to other members of the community. Therefore, actual consumption may be over and beyond the number of children under five, even though it may not get reported and product consumption may exceed the number of cases.
- There are multiple reasons why product may not be available at the community level, including the following:
  - The resupply point does not have product to give to the CHW.
  - The resupply point has product, but holds on to it rather than distributing it to CHW.
  - The CHW does not go to the resupply point to pick up product.
  - Product is damaged, expired, or pilfered during transport or storage.

  Thus it can be difficult to determine the cause, duration, and frequency of stockouts, information important for forecasting.
- CCM programs are relatively new in many countries; it is unclear whether the introduction of services provided by CHWs will increase the overall number of patients seeking care and treatment, or if it will shift where patients seek care: from health facilities to CHWs. This uncertainty makes it difficult to estimate the additional number of patients who will be treated for an illness after the introduction of CCM.

Lessons Learned

- In the absence of reliable data, developing assumptions that are strongly informed by service providers and program managers familiar with CCM is likely to enhance the reliability of forecast results. It is critical that these assumptions be documented and easily recalled so they can be reconsidered and updated should new information become available.
- CCM program managers and quantification team should consider product specifications early in the process and assess opportunities to introduce optimal (age-appropriate and supply chain-friendly) products for CCM to increase the efficacy of treatment for children and the quality of services provided by CHWs.
- All product specifications used during the quantification should be shared with the procurement unit and used during the bidding process.
- Quantification requires a consultative process with multiple stakeholders and implementers to reach consensus on decisions about the selection, quantification, and procurement of CCM products.
- CCM program managers and logistics staff should monitor the pipeline quarterly using updated consumption data, if possible, and plan reviews of the quantification once (or twice for new programs) per year. This will build in the flexibility and agility necessary to ensure that if assumptions do not hold true, shipment quantities or timing can be adjusted to accommodate changing needs and help avoid stockouts or overstocks.
- Pipeline monitoring and reviewing data and assumptions will help determine if the forecast should be updated more frequently than once per year.
- DHS data for prevalence and incidence estimates are generally collected over a short period of time, so ensure that seasonality is properly considered when extrapolating these figures.
- Planning for upcoming changes in STGS or product selection will help avoid product expiries. For instance, in Rwanda, the CCM program decided to shift from 250mg dispersible tablets of amoxicillin to 125mg dispersible tablets in blister packs; planning for this shift in the training, introduction, forecasting, and procurement helped ensure that only limited quantities were wasted or expired.
- CCM program managers and quantification teams should consult with epidemiologists to consider disease shifts (and therefore changes in treatment demand) that may occur after the introduction of new vaccines or RDTs.

XVIII. Summary

The process for quantifying the product requirements for CCM does not vary significantly from the process used for many other programs and products. However, there are important nuances throughout the entire process that need to be properly considered, from product selection to data requirements to shipment planning. In many countries, supply chains to the community level are particularly fragile, frequently relying on informal means of distribution to CHWs; CHWs often travel by foot or bike with a backpack to pick up products from a health center. Products therefore need to be packaged in a way that minimizes weight and bulk, but is sufficiently protective to ensure stability at high temperatures or in humid and rainy environments.

The products themselves are critical to achieving Millennium Development Goal 4 and reducing child mortality caused by diarrhea, pneumonia, and malaria. If products are available but not of acceptable quality or are in doses/formulations that children refuse, the goals for CCM will not be met. CCM products must be selected to maximize use and efficacy for the children who receive them. This means that tablet manipulation should be avoided whenever possible, and products should be packaged in courses of treatment easy to dispense and count (for inventory), be sufficiently taste-masked to make them acceptable to children, and have pictorials that are clear for CHWs to explain and caregivers to follow. Dispersible tablets in blister packs are optimal for use at the community level.

If CCM products are used for multiple programs at multiple levels in the system, it is critical to ensure that the demand for products required for CCM via CHWs is estimated and shared with other programs and stakeholders. Products frequently pass through several levels in the system before arriving at the CHW level, and if demand for these products cannot be met at the higher levels, it is unlikely that products will be available in sufficient quantities for CHWs. This means that quantification for CCM products needs to be coordinated with other programs and levels where the same products are used in order to ensure that the products are quantified for all uses and will be available for use in the community.

Using historical consumption data as the basis for at least one method of quantification is recommended; however, in countries where CCM is a new program or in the process of expanding, this may not be possible or advisable. It is recommended to collect and use all available data and compare the relative strengths and weaknesses of a few methodologies to determine the most realistic output. A young program will likely include many assumptions about service uptake and client demand. Therefore, it is important to obtain input from program experts with the most informed perspective on community-based services. In many ways, quantification is more an art than a science, but it is important to understand the consequences of the assumptions used and try to arrive at the best estimate possible with the information available to avoid significant understocks or overstocks of CCM products.

That said, no forecast is ever 100 percent accurate. Even with perfect historical data, a forecast can vary significantly from actual demand, so every forecast should be reviewed regularly and updated as more current data become available. This is particularly important for new programs without robust data to predict future trends; forecasts and assumptions should be reviewed and updated with new information frequently. Quarterly updates are recommended until programs stabilize. Updating the supply plan regularly and planning procurements around smaller, more frequent orders and shipments of products are also recommended. This will provide greater flexibility to adjust the timing and quantities of procurements, should demand vary significantly from the forecast. Both overstocking and understocking have significant risks and costs, and should be avoided by carefully reviewing and adjusting the supply plan as needed.

The purpose of quantification is to ensure that adequate quantities of quality products are procured, distributed, and continuously available for health care workers to provide high-quality services to their clients. For CCM, there is generally a virtuous cycle: product availability increases client confidence in CHWs, which in turn, increases the number of clients, which increases the demand for services and products from CHWs. The end goal is to increase access to care and reduce mortality by equipping CHWs with the products they need to provide services closer to their clients' homes.

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Appendix A. Sample Focus Group Questions for CHWs to Facilitate Discussion and Feedback on Products

The following are examples of questions to ask CHWs about their opinions on and preferences for the types of products they dispense and manage. The questions should be tailored to individual settings based on the services provided and products in use. This example does not include instructions for conducting a focus group. There are many good resources available on how to facilitate focus group discussions. Please consult these resources to ensure that the questions are administered in a way that will most likely yield candid opinions and responses from participants and provide guidance on how to interpret results.

Objective: These questions are designed to help us understand community health worker (CHW, HEW, HSA, etc.) preferences for medicines given to children in the community for the treatment of pneumonia, malaria, diarrhea, and malnutrition. These preferences may be based on user acceptability, ease of dispensing, ease of management, or potential for improving treatment in communities. The information gathered is meant to be the personal opinions and ideas of individuals. You can ask each question and then use the probes to gain additional insight to their answers.

1. To begin our discussion, please tell us about CCM drugs that you (CHWs) use to treat children under 5.

2. In general, can you tell us what factors influence CHWs' preferences for particular medicines given to children?
   Probes: tablets, liquids, or powders?
   - What are your thoughts on liquids (suspensions)? Why?
   - Do you have or use scored tablets? Why?
   - How do you prefer to give dosages for children?
     - ☐ Split tablets. Why?
     - ☐ Giving multiple tablets to older children? Why?

3. What about the packaging of the medicines that you dispense to children.
   Probes:
   - What types of packaging works best?
   - What aspects do you like about the packaging? Can you explain more?
   - Do you prefer packaging that comes as individual dosing? (e.g., blister strips) or large bottles of tablets. Why?
   - How do you see the importance of information (such as color and pictures) and instructions on dosing given on the packaging for caregivers, children. Why?
   - What challenges do particular types of packaging present? How?
   - Given the existing packaging for CCM drugs, how do you think it does in maintaining product integrity during distribution (e.g. transporting from HC to CHW). Explain (ask detailed stories of experiences)
     - ☐ What about suitability for giving to caregivers to take home? Why?

4. Thinking about CCM products given to all children (infants of 2 months to 5 years) -

- What difficulties are there with ensuring children take a full course of treatment? Why?
- What feedback do you get on strengths or the doses of the products CHWs have?

Do any products need to be split for younger children? If so, what effect does splitting tablets for younger children have on the completion of a course of treatment? Explain.

5. Thinking about the formulation/ strength of CCM drugs, which formulations do you prefer- dispersible tablets, regular tablets, or liquids? Explain. Why?

    - What about caregivers' preferences for dispersible tablets, regular tablets, or liquids? What are the reasons for their preferences?

6. Thinking about the medicines that you manage, let's discuss about what you like best about these medicines and why -
    - Which medicines do you think are easier for children to take? Why?
    - Which medicines do you find easier for you to store? Why?
    - Which medicines do you find easier to transport from the facility? Why?
    - Which ones do you find easier to explain to caregivers how to use them? Why?

7. Now, let's discuss what information/feedback caregivers give you about CCM medicines. Probes:
    - Which medicines do caregivers like as easier for children to take? Why?
    - Which medicines do caregivers like in terms of explaining dosage?
    - Which medicines do caregivers not like? Why?
    - Have there been any complaints of side effects on CCM medicines? Which ones? (Ask about complaints in detail)

8. If you are given the chance to improve any of the CCM products to be better suited to children, what features/aspects would you improve? Why? (Probe for packaging, formulation/strength, flavor, etc.).

9. From your experience of working in the community, where do caregivers prefer to go to have their children treated? Why? Probe:
    a. Are there caregivers who prefer to go to the local drug sellers instead of coming to you to treat their children? Why?

That is the last of our questions; however, if there is anything else you think we should know about your preferences for or experience with medicines for children that we have not asked, we would appreciate any additional thoughts at this time.

Appendix B. Example Timeline for Quantification Process

Quantification Timeline: Ethiopia		Week of															
Activity		**18-Jul**	**25-Jul**	**1-Aug**	**8-Aug**	**15-Aug**	**22-Aug**	**29-Aug**	**5-Sep**	**12-Sep**	**19-Sep**	**26-Sep**	**3-Oct**	**10-Oct**	**17-Oct**	**24-Oct**	**31-Oct**
Data Collection																	
1	Confirm product list for quantification																
3	Consult with partners to obtain reports with CCM data and service statistics																
4	Collect partner data																
5	Collect HMIS data																
6	Collect DHS data																
7	Collect Census data																
8	Collect program data for CCM																
9	Collect logistics data for CHWs																
10	Collect SOH data from PFSA central and PFSA hubs																
11	Collect epidemiological data																
Quantification																	
1	Compile/organize data																
2	Conduct preliminary data cleaning for use at workshop																
3	Document assumptions																
4	Conduct workshop																
5	Determine methodology and crunch numbers																
6	Create quantification outputs																
7	Hold experts group meeting to validate methodology and outputs																
Report Writing																	
1	Compile outputs of tables																
2	Draft report																
3	Hold meeting to review report contents																
4	Receive comments on report																
5	Finalize report																

Pre- and pos- trip work

SC4CCM In-Country STTA

Appendix C. Sample Quantification Workshop Schedule

7th February	8th February	9th February	10th February	11th February
CHAIR: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**
8:00 – 9:00 Registration XXX **9:00 – 9:10** Introductions XXX **9:10 – 9:20** Opening by the XXX **9:20 – 9:30** Objectives & Group Norms XXX **9:30 – 9:50** Tea Break **9:50 – 10:20** Introduction to Quantification XXX **10:20 – 12:30** Quantification Methods & Data Requirements XXX **12:30 – 1:30** Lunch Break **1:30 – 3:00** Intro to Small Group Work (Data Organization) XXX **3:00 – 3:15** Tea Break **3:15 – 4:30** Data Organization (Small Groups) **4:30 – 5:00** Wrap-Up XXX	**8:30 – 8:45** Intro to the day XXX **8:45 – 9:30** Data Organization (Small Groups) **9:30 – 9:50** Tea Break **9:50 – 11:00** Data Organization (Small Groups) **11:00 – 12:30** In-depth review of Forecasting Methodologies XXX **12:30 -1:30** Lunch Break **1:30 – 3:30** Data organization/forecasting (Small Groups) **3:30 – 3:45** Tea Break **3:45 – 5:00**: Continuation of forecasting (Small Groups)	**8:30 – 8:45** Intro to the day XXXX **8:45 – 9:30** Preparation of "Status" presentations (Small Groups) **9:30 – 9:50** Tea Break **9:50 – 11:30** "Status" presentations **11:30 – 12:30** Continuation of forecasting (Small Groups) **12:30 -1:30** Lunch Break **1:30 – 3:30** Continuation of forecasting (Small Groups) **3:30 – 3:45** Tea Break **3:45 – 5:00**: Report Organization Review & HW	**8:30 – 8:45** Intro to the day XXX **8:45 – 9:30** Preparation of "Status" presentations (Small Groups) **9:30 – 9:50** Tea Break **9:50 – 11:30** "Status" presentations **11:30 – 12:30** Continuation of forecasting (Small Groups) **12:30 -1:30** Lunch Break **1:30 –3:30** Continuation of forecasting (Small Groups) **3:30 – 3:15** Tea Break **3:15 – 5:00** Continuation of forecasting & presentation preparation (Small Groups)	**8:30 – 8:45**: Intro to the day XXXX **8:45 – 9:30** Continuation of forecasting & presentation preparation (Small Groups) **9:30 – 10:00** Tea Break **10:00 – 12:30** Continuation of forecasting & presentation preparation (Small Groups) **12:30 -1:30** Lunch Break **1:30 – 3:30:** Presentation of forecasts (Flipchart Gallery Walk) **3:30 – 3:45** Tea Break **3:45 – 4:30**: Report Writing & Intro to Week 2 XXX
Day 1 Output: Organized Data & Program Goals	**Day 2 Output : Review of forecast methodologies; Forecast data organization**	**Day 3 Output : Forecast data organization; « Status » presentations**	**Day 4 Output : Forecast data organization; « Status » presentations**	**Day 5 Output : Final forecast presentations; report intro sections narrative**
5:00 – 5:30 Chair/Rapp/Group Lead Debrief	**5:00 – 5:30 Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30 Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30 Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30 Chair/Rapp/Group Lead Debrief**

Notes:

This schedule was for a national quantification for all medicines, including CCM products; depending on the scope of the quantification, the schedule may be shorter or longer.

XXX on the schedule would indicate person responsible for facilitating the session.

Sample Quantification Workshop Schedule—continued

14th February	15th February	16th February	17th February	18th February
CHAIR: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**	**CHAIR**: **RAPPORTEUR:**
8:30 – 8:45 Intro to the Day XXX **8:45 – 9:30** Importance of (& how to) Forecast Validation XXX **9:30 – 10:00** Tea Break **10:00 – 12:30** Group Work Comparison and Validation (Small Groups) **12:30 -1:30** Lunch Break **1:30 – 3:30:** Group Work Comparison and Validation (Small Groups) **3:30 – 3:45** Tea Break **3:45 – 4:30**: Group Work Comparison and Validation (Small Groups) **4:30 – 5:00** Report Write-up	**8:30 – 8:45** Intro to the Day XXX **8:45 - 9:30** Group Presentation Prep: Final Forecasts XXX **9:30 – 10:00** Tea Break **10:00 – 12:30** Presentations of Final Forecasts **12:30 -1:30** Lunch Break **1:30 – 2:30** Intro to Supply Planning and Pipeline Management XXX **2:30 – 3:30** Group Work: Quantities to Procure (Small Groups) **3:30 – 3:45** Tea Break **3:45 – 5:00** Group Work: Quantities to Procure (Small Groups)	**8:30 – 8:45**: Intro to the Day XXX **8:45 – 9:30** Developing a Supply Plan XXX **9:30 – 10:00** Tea Break **10:00 – 12:30** Group Work: Supply Planning **12:30 -1:30** Lunch Break **1:30 – 3:30:** Group Work: Supply Planning & Report writing XXX **3:30 – 3:45** Tea Break **3:45 – 5:00** : Final Presentation Instructions & Small Group Work (Small Groups) XXX	**8:30 – 8:45**: Intro to the Day XXX **8:45 – 9:30** Group Work on Final presentations (Small Groups) **9:30 – 10:00** Tea Break **10:00 – 12:30 Presentation of Commodity Requirements** XXX **12:30 -1:30** Lunch Break **1:30 – 3:30: Presentation of Commodity Requirements** XXX **3:30 – 3:45** Tea Break **3:45 – 4:30**: Discussion about supply/funding gaps XXX **4:30 – 5:00** Report Write-up XXX	**8:30 – 8:45**: Intro to the Day XXX **8:45 – 9:30**: Recap of the week and final outputs XXX **9:30 – 10:00** Tea Break **10:00 – 11:00** Discussion about supply/funding gaps XXX **11:00 – 12:00** Next steps XXX **12:00 - 12:30** Closing by HTSS Pharmaceuticals XXX **12:30 -1:30** Lunch Break Departure
Day 6 Output & HW: Final Forecast; Report write-up	**Day 7 Output & HW: Supply Plan; Report write-up**	**Day 8 Output & HW: Supply Plan; Report write-up/Final Presentation**	**Day 9 Output & HW: Final presentations; Report write-up**	**Day 10 Output: Next steps and responsibilities assigned**
5:00 – 5:30 **Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30** **Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30** **Chair/Rapp/Group Lead Debrief**	**5:00 – 5:30** **Chair/Rapp/Group Lead Debrief**	**2:00 – 2:30** **Chair/Rapp/Group Lead Debrief**

Appendix D. Sample Data Collection Questions

The questions below can be useful when gathering data, considering how to adjust data quality, and developing assumptions.

Consumption	*Services*	*Demographic/Morbidity*
• What is the formulation of product? If not pediatric-specific, are CHWs cutting or combining blister packs or tablets? • Is the CHW reporting relatively complete consumption data to the resupply point? • Does the resupply point aggregate community-level data when it reports to the next level of the system? • If reporting rate is unknown, what are ways to extrapolate the data? • At each facility/level of the logistics system, what was the beginning inventory for each CCM product at the start of the year? • At each facility/level of the logistics system, what were the total quantities received of each CCM product during the year? • At each facility/level of the logistics system, what were the expiries, losses, and adjustments for each CCM product during the year? • At each facility/level of the logistics system, what was the ending inventory for each CCM product at the end of the year? • What is the expected rate of change in consumption of CCM products for each year of the quantification? What percentage/quantity of products can be anticipated being dispensed to the over-five portion of the population? • Are there incentives to dispense product that might skew data? • Are there policies that may influence availability of products for CCM (for example, in Rwanda, Primo Rouge and Primo Jaune are not distributed by health centers unless RDTs are also available)?	• What is the average caseload of CHWs per month? • What is the average number of cases treated with disease-specific product per month per CHW? • Is there variation by month in cases treated that would indicate seasonality? • How many children were tested for malaria through CCM services during the past year? • Of those tested, how many children tested positive for malaria through CCM services during the past year? • Of those tested positive, how many received an ACT? • How many were given ACT without testing (on basis of fever)? • When RDTs are not available, how does CHW determine whether to treat fever with cotrimoxazole or amoxicillin, as opposed to paracetamol or ACT? • What is the expected decrease in malaria cases due to antimalaria interventions (e.g., IRS, LLIN)? • Are CCM data captured in the national HMIS? • According to the country's HMIS, what is the reported number of cases of each illness/condition?	• What is the total population in the CCM catchment area? • What percent are children? How many children under five live in the catchment area of CCM sites (rural vs. urban population)? • What is the percent of children in each weight band? • What is the population growth rate? What is the growth rate for children under five? • How many children presented with symptoms? --Had fever and cough in a given period? --Had diarrhea in a given period? --Were (clinically) malnourished in a given period? • How many children sought care? • What are the common sources of care for each symptom (i.e., private, public, informal)? • How many accessed CCM services? • What conditions are being treated through CCM (as opposed to private or facility care)? • What products are used to treat these conditions? • Are there national or regional estimates of annual disease incidence? • Are there plans to introduce or scale up rotavirus or pneumococcal vaccines?

Appendix E. Standard Treatment Guidelines for CCM Treatment for Ethiopia, Malawi, and Rwanda

Country	Disease	Age/weight group	Medicine	Strength in use	Treatment course	Units per treatment course
Ethiopia	Diarrhea	< 6 months	Zinc	20 mg scored tablets	1/2 tablet 1x per day for 10 days	5 tablets
Ethiopia	Diarrhea	6 months–5 years	Zinc	20 mg scored tablets	1 tablet 1x per day for 10 days	10 tablets
Ethiopia	Diarrhea	< 2 years	Oral rehydration salts (ORS)	ORS, low osmolarity, 1L sachet	50–100 ml after each loose stool	2 sachets
Ethiopia	Diarrhea	2–5 years	ORS	ORS, low osmolarity, 1L sachet	100–200 ml after each loose stool	2 sachets
Ethiopia	Malaria	3 months–2 years (5–14 kgs)	Artemether/ lumefantrine (AL)	AL 20/120 mg 6x1 blister pack	1 6x1 packet (1 tablet 2x per day for 3 days)	6 tablets (1 pack)
Ethiopia	Malaria	3–7 years (15–24kgs)	AL	AL 20/120 mg 6x2 blister pack	1 6x2 packet (2 tablets 2x per day for 3 days)	12 tablets (1 pack)
Ethiopia	Malaria	All persons with suspected fever	Rapid diagnostic test (RDT)	Multi-species RDT	1 test	1 test
Ethiopia	Pneumonia	2 months–12 months	Cotrimoxazole	120 mg tablets	2 tablets 2x per day for 5 days	20 tablets
Ethiopia	Pneumonia	1 year –5 years	Cotrimoxazole	120 mg tablets	3 tablets 2x per day for 5 days	30 tablets
Malawi	Diarrhea	2 months–5 years	ORS	ORS, low osmolarity, 1L sachet	10–20 ml/kg/hour until hydration normal	2 sachets
Malawi	Diarrhea	2 months–5 years	Zinc	Zinc sulphate 20mg tablets, dispersible	1 tablet 1x per day for 10 days	10 tablets
Malawi	Malaria	6 months–3 years	AL	AL 20/120mg 6x1 blister pack	1 6x1 packet (1 tablet 2x per day for 3 days)	6 tablets (1 pack)
Malawi	Malaria	3–5 years	AL	AL 20/120mg 6x2 blister pack	1 6x2 packet (2 tablets 2x per day for 3 days)	12 tablets (1 pack)
Malawi	Pneumonia	2 months–12 months	Cotrimoxazole	480mg tablets	1/2 tablet 2x per day for 5 days	5 tablets
Malawi	Pneumonia	1 year–5 years	Cotrimoxazole	480mg tablets	1 tablet 2x per day for 5 days	10 tablets
Rwanda	Diarrhea	<2 months	ORS	ORS, low osmolarity, 1L sachet	1/2 cup of ORS at each seating	1 sachet

Country	Disease	Age/weight group	Medicine	Strength in use	Treatment course	Units per treatment course
Rwanda	Diarrhea	2 months–5 years	ORS	ORS, low osmolarity, 1L sachet	1 cup of ORS at each seating	1 sachet
Rwanda	Diarrhea	1–6 months:	Zinc	10mg scored tablets	1 tablet 1x per day for 10 days	10 tablets
Rwanda	Diarrhea	6 months–5 years	Zinc	10mg scored tablets	2 tablets 1x per day for 10 days	20 tablets
Rwanda	Malaria	6 months–3 years (5-14 kgs)	AL	Coartem 20/120mg 6x1 blister pack	1 6x1 packet (1 tablet 2x per day for 3 days)	6 tablets (1 pack)
Rwanda	Malaria	4 years–5 years (15–24 kgs)	AL	Coartem 20/120mg 6x2 blister pack	1 6x2 packet (2 tablets 2x per day for 3 days)	12 tablets (1 pack)
Rwanda	Malaria	All children with suspected fever	Rapid diagnostic test (RDT)	RDT	1 test	1 test
Rwanda	Pneumonia	2–4 months (< 6kg)	Amoxicillin	125mg dispersible tablets	1 tablet 2x per day for 5 days	10 tablets
Rwanda	Pneumonia	5–12 months (6-9kgs)	Amoxicillin	125mg dispersible tablets	2 tablets 2x per day for 5 days	20 tablets
Rwanda	Pneumonia	13–30 months (9–13 kgs)	Amoxicillin	125mg dispersible tablets	3 tablets 2x per day for 5 days	30 tablets
Rwanda	Pneumonia	31 months - 5 years (13–18 kgs)	Amoxicillin	125mg dispersible tablets	4 tablets 2x per day for 5 days	40 tablets

Appendix E1. STGs: Outpatient Care for the Management of Severe Acute Malnutrition Without Medical Complications[13]

In some countries, CCM includes the treatment for severe acute malnutrition (SAM) with ready-to-use therapeutic food (RUTF). Country-specific guidelines will be necessary to estimate the quantity of RUTF required to treat an episode of SAM, but the table below shows the general guidelines.

The number of packets of RUTF the child should eat in a day is determined by the child's weight:

RUTF Rations* in Outpatient Care: Plumpy'Nut® (92g packets containing 500kcal)

Weight of Child (kg)	Packets per Day	Packets per Week
3.5–3.9	1.5	11
4.0–5.4	2	14
5.5–6.9	2.5	18
7.0–8.4	3	21
8.5–9.4	3.5	25
9.5–10.4	4	28
10.5–11.9	4.5	32
≥ 12	5	35

*Based on average nutrition rehabilitation ration of 200 kcals/kg/day

Source: Valid International. *Community-based Therapeutic Care (CTC): A Field Manual, 2006. Available at: http://www.fantaproject.org/downloads/pdfs/CTC_Manual_v1_Oct06.pdf*

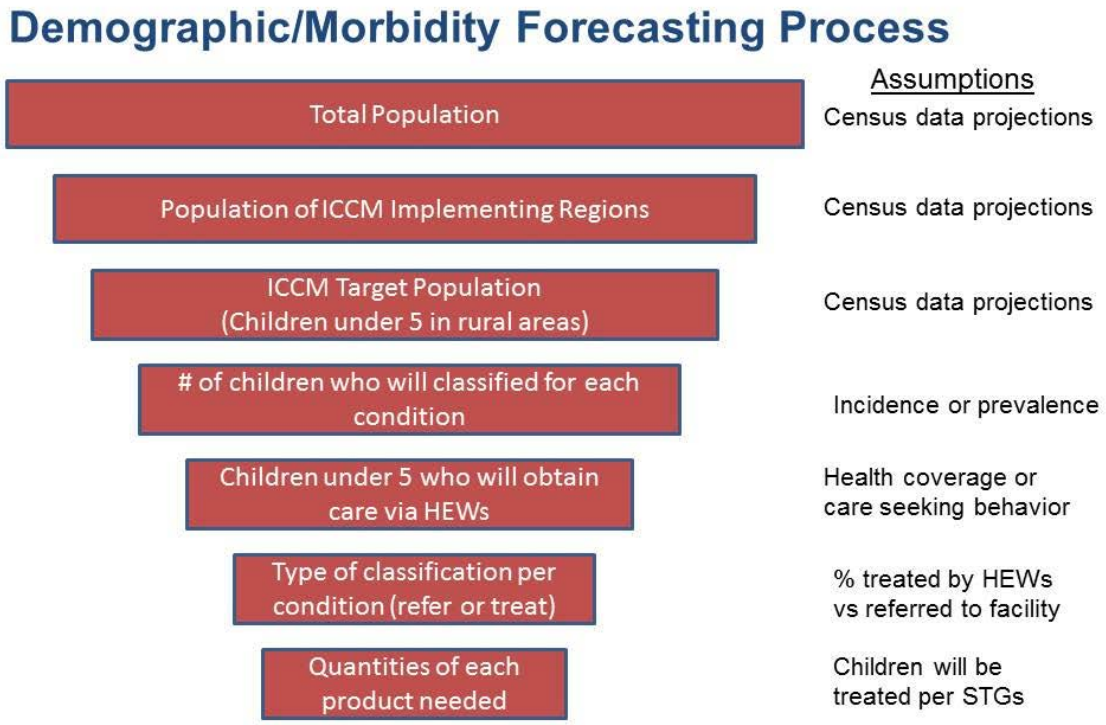
[13] Available at http://www.fantaproject.org/downloads/pdfs/CMAM_Training_Mod4_ENGLISH_Nov2008.pdf.

Appendix F. Sample Forecasting Tree for Demographic/Morbidity Method

When consumption data are not available or do not accurately reflect expected trends in use due to program changes or scale-up, it becomes necessary to use demographic and morbidity data to estimate need. The objective is to estimate the number of patients per age group or weight band according to the STGs to calculate the anticipated demand per product. This process will have to be conducted separately for each condition.

This usually means trying to "drill down" from a larger starting population to estimate the target populations that will be treated with each product, and then convert numbers of people to quantities of product. The concept of a funnel, as shown in Figure 3, helps depict the methodology of the drill-down process. Figure 3 shows one way that this can be done, along with the types of data or assumptions needed to calculate patients and then products.

Figure 3 - Example of Demographic/Morbidity Forecast used in Ethiopia Integrated Community Case Management (ICCM) Quantification



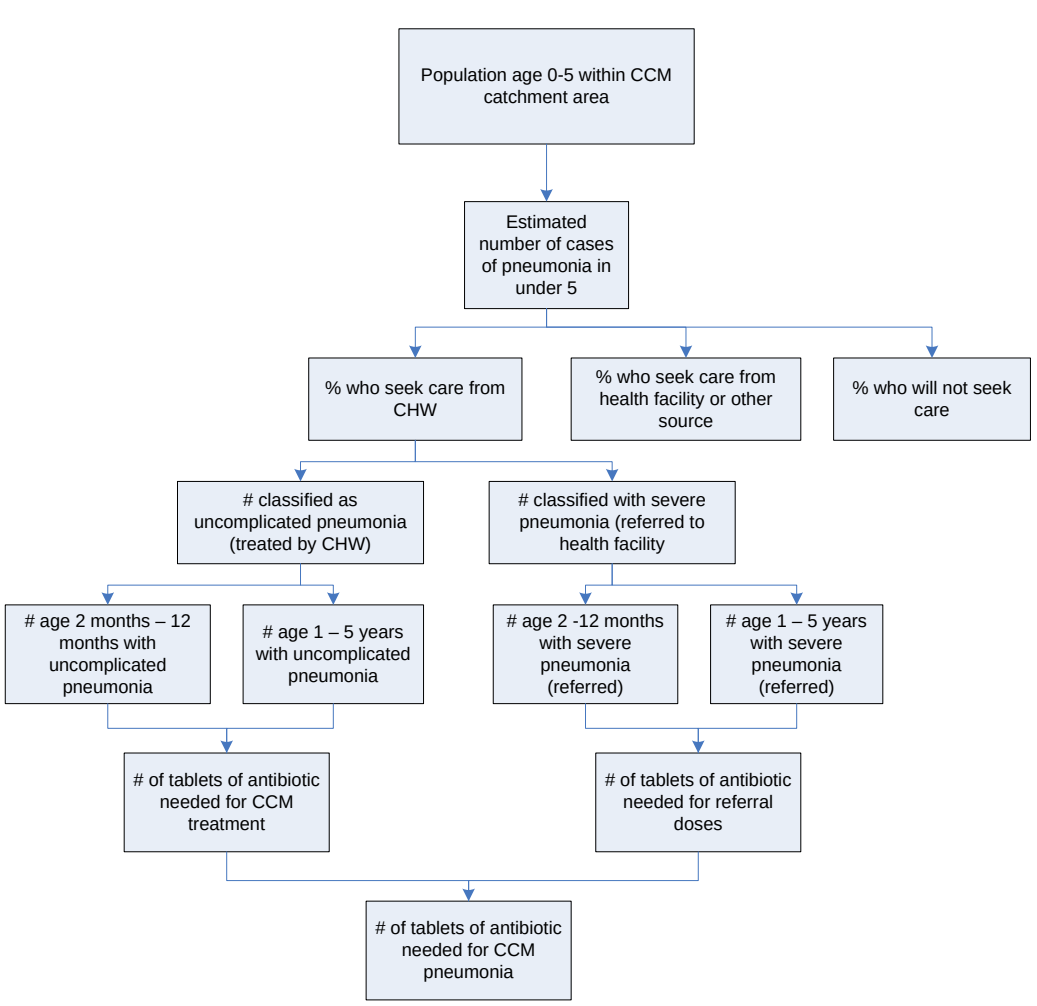
Types of data that might be needed as a starting point:

- Total population
- Annual population growth (if census data are older, it may be necessary to project to estimate current population size)
- Percent of population under five

- Percent of population under five in rural areas
- Number of cases of illness per child per year (incidence)
- Estimates of care-seeking behavior or CCM coverage
- Estimates of CCM referral rates: these are needed to estimate the numbers of children with severe conditions to whom the CHW will give only the first dose, then refer to a higher-level facility for the rest of the treatment. The referral rate estimate will determine the quantities needed for the referral dose only, not the quantities that the higher-level facility will need for those children who are referred and then treated.

These data can then be used to create a forecasting tree for each condition. The forecasting tree for each condition will vary depending on the program and precise data available in a given setting. As an example, a forecasting tree for pneumonia using demographic/morbidity data could look like Figure 4.

Figure 4 - Sample Forecasting Tree for Pneumonia and Antibiotics for CCM



Data Needed and Calculation

Incidence
Multiply population at risk by esimated episodes/child/year

Care seeking data
Multiply estimated cases by % that will seek care via CHW (vs other sources or not at all)

Estimates of severity
Multiply estimated cases seen by CHWs by % that will be severe (and also non-severe)

Estimates of age groups*
Multiply estimated cases treated and referred by CHWs by % that will be in each age group (per STGs); this will tell you how many courses of treatment or referral doses you need per age group

STGs
Multiply estimated cases treated or referred by age group by the number of tablets per course of treatment and then add together

Products required
Add the estimated need for treated cases to estimated need for referred cases; this represents your total forecast demand for tablets of antibiotic X for community case management of pneumonia

* Depending on what data are available, it will be important to arrive at reasonable estimates per age group; this may require additional data from the census (one-year age breakdowns) and rough estimates to determine age groups in less than one-year increments (i.e., six months to one year).