Forecasting Exercise for the 13 Reproductive, Maternal, Newborn, and Child Health Commodities Prioritized by the UN Commission on Life-Saving Commodities for Women and Children

August 2014

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Forecasting Exercise of the Reproductive, Maternal, Newborn, and Child Health Commodities Prioritized by the UN Commission on Life-Saving Commodities for Women and Children

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Key Words

reproductive, maternal, newborn and child health; forecasting; quantification; supply chain

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ACRONYMS

ANCS	Antenatal corticosteroids
ARI	Acute respiratory infection
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BMMS	Bangladesh Maternal Mortality Survey
CHX	Chlorhexidine
DGFP	Directorate General of Family Planning
DGHS	Directorate General of Health Services
DHS	Demographic and health survey
ECP	Emergency contraceptive pill
EMLc	Model List of Essential Medicines for Children
EMS	Essential medicines and supplies
EPI	Expanded programme on immunization
FIGO	Federation of Gynecology and Obstetrics
FWC	Family welfare center
FWG	Forecasting Working Group
GDP	Gross domestic product
GOB	Government of Bangladesh
HDI	Human Development Index
HPNSDP	Health Population and Nutrition Sector Development Program
ICM	International Confederation of Midwives
IM	Intramuscular
IMCI	Integrated management of childhood illness
IV	Intravenous
MMR	Maternal mortality rate
MNCH	Maternal, newborn, and child health
MOHFW	Ministry of Health and Family Welfare
MWRA	Married women of reproductive age
NGO	Non-governmental organization
ORS	Oral rehydration salts
PE/E	Preeclampsia and eclampsia
PHC	Primary health care center
PPH	Postpartum hemorrhage
RH	Reproductive health
RMNCH	Reproductive, Maternal, Newborn, and Child Health
SIAPS	Systems for Improved Access to Pharmaceuticals and Services Program
SNL	Saving Newborn Lives
SVRS	Sample vital registration system
UHC	Upazila Health Complex
UN	United Nations
UNCoLSC	United Nations Commission on Life-Saving Commodities
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organization
WRA	Women of reproductive age

INTRODUCTION

In September 2012, the United Nations Commission on Life-Saving Commodities for Women and Children released its recommendations for improving access to 13 priority commodities across the reproductive, maternal, newborn, and child health (RMNCH) continuum. These recommendations focused on developing markets, both local and global, for these commodities; strengthening national supply chains; and improving demand. One of the supply chain areas for these commodities that was identified as particularly weak was forecasting and supply planning. For several of these commodities, the data required to estimate need accurately are unavailable in many countries and national forecasts are based on unsubstantiated assumptions and often on data from past procurements. This is the case for many commodities procured by the Ministry of Health and Family Welfare (MOHFW) in Bangladesh.

The U.S. Agency for International Development (USAID)/Bangladesh requested assistance from the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program, implemented by Management Sciences for Health (MSH), to address supply chain management issues related to essential medicines, especially tracer drugs (determined by Forecasting Working Group of the MOHFW) with maternal, newborn, and child health (MNCH) products, helping the Government of Bangladesh (GOB) and other key national stakeholders to improve the security of essential health medicines in the country, strengthen the distribution and management information systems in place, and build local capacity to strengthen health systems. As part of this effort, SIAPS has been working with relevant GOB departments to improve forecasting and supply planning of RMNCH commodities.

BACKGROUND

Bangladesh is one of the most densely populated countries in the world with a land mass of 147,570 km^2 and a population of 149.77 million, 77% of whom live in rural areas. The population growth rate is1.37% per annum and it ranks 146th (http://hdrstats.undp.org/en/countries/profiles/BGD.html) out of 173 countries in the United Nations Development Programme's (UNDP's) Human Development Index (HDI) with an estimated per capita gross domestic product (GDP) of US$ 848.

Taking into account the current annual population growth rate, the projections suggest that if the country achieves replacement level fertility by 2015, the population will reach 219 million by 2050. As expected, the total fertility rate for rural women is higher than for urban women (2.5 compared with 2.0 births per woman).

Bangladesh also has a high burden of maternal, newborn, and child morbidity and mortality. The Bangladesh Demographic and Health Survey (BDHS) 2011 revealed that while under 5 mortality has declined from 65 deaths per 1,000 in 2007 to 53 deaths per 1,000 live births in 2011, one in 23 infants born in Bangladesh still dies before reaching his/her fifth birthday. During infancy, the risk of dying in the first month of life (32 deaths per 1,000 live births) is three times greater than in the subsequent 11 months (10 deaths per 1,000 live births). Deaths in the neonatal period account for 60% of all under-5 deaths.

Deaths of newborns are mainly due to prematurity, asphyxia, and infections. Most of these deaths could have been prevented if newborns had adequate access to resuscitation devices, appropriate umbilical cord care, and timely treatment for sepsis. Substantial presence of acute respiratory infections and diarrhea also contribute to the elevated mortality rates for children.

The current estimated maternal mortality ratio (MMR) is 194 per 100,000 live births (Bangladesh Maternal Mortality Survey-BMMS 2010), one of the highest rates in the world. One of the factors that contribute to maternal mortality is use of health services. Fifty-five percent of pregnant women received antenatal care from skilled providers, and skilled attendance at birth remains low at 31%. The Bangladesh Demographic and Health Survey –BDHS 2011) estimated that 29% of pregnant women delivered in health facilities, whereas an estimated 71% delivered at home. It is also estimated that for every 100 maternal deaths, at least 31 women die as a result of postpartum hemorrhage and 20 from eclampsia, with indirect obstetric causes (anemia, cardiovascular, respiratory diseases, etc.) accounting for another 35deaths.

Bangladesh's high adolescent fertility rate (133/1,000 women ages 15-19) undoubtedly contributes to the nation's high premature birth rate. This underscores the need to provide the Ministry of Health and Family Welfare (MOHFW) with assistance in accelerating the introduction of antenatal corticosteroids (ANCSs).

As the challenges cited above have demonstrated, strengthening the planning, procurement, and information management of maternal, newborn, and child health (MNCH) life-saving commodities is critical to the survival and quality of care for millions of women and children in

Bangladesh. The country has made commendable progress in the prevention and control of pneumonia and diarrhea-related complications despite many challenges, and now must strive to build on that progress and reinvigorate efforts to address other causes of maternal and child mortality. To this end, it is essential that life-saving commodities be available when and where they are needed.

RATIONALE FOR UNDERTAKING THIS EXERCISE

Through its work in Bangladesh, the SIAPS program has documented the limited capacity within the MOHFW to conduct the forecast for essential RMNCH commodities. This lack of capacity has compelled the national and sub-national programs to rely on the use of past distribution data and estimates of patient flows at facilities to calculate the need for MNCH commodities. The respective Line Directors develop medicine requirements that are not scientifically appropriate to meet the current needs, thus making it difficult to maintain appropriate inventory to meet the needs of clients in the country. This current practice sometimes yields stock imbalances, stock-outs of some important medicines, and a preponderance of emergency orders, which in the end have been threatening the integrity of the MNCH programs. However, the Directorate General of Family Planning (DGFP) has established mechanisms to undertake the forecasting exercise of reproductive health (RH) commodities through a Forecasting Working Group (FWG) comprised of technical experts. This approach helps to improve the forecasting and supply planning functions.

The need for a comprehensive harmonized and coordinated forecasting exercise in the MOHFW (e.g., Directorate General of Health Services [DGHS]) is heightened by a number of factors including:

- The lack of a formalized national coordinated system mechanism between DGFP and DGHS for forecasting and supply planning of commodities managed by both Directorates

- The need to identify the current funding gap for the needed commodities to ensure efficient allocation of financial resources by the MOHFW

- The introduction of new commodities for MNCH for which no distribution or consumption data are available

This activity is aimed at developing a long term (five-year) national forecasting collaboration with the DGFP and DGHS and their technical partners, including United Nations (UN) bodies that will better inform procurement decisions for the 13 life-saving commodities. The exercise will also help MOHFW to populate a framework for computing the requirements for RMNCH products during the plan period and to take future procurement actions. Basically, the goal of this forecasting exercise is to optimize a data-driven procurement system and minimize losses through expiry by over stocking. The report will essentially guide the decision makers in setting up a national system for regular updates of the forecasts and introduce supply planning process for MNCH commodities.

GOALS AND OBJECTIVES

Goal

Determine the national (combined DGFP and DGHS) needs of RMNCH commodities

Objectives

1) Prepare the national forecasting for 13 RMNCH commodities during the period 2014-2018

2) Discuss data sources and data gaps to support regular forecasting and supply planning, and ways to address gaps

3) Develop recommendations for institutionalization of a formal RMNCH forecasting and pipeline monitoring system within DGHS and DGFP capable of conducting annual and quarterly updates on the forecast and supply plan, respectively

METHODOLOGY

SIAPS Bangladesh team worked in close coordination with the DGFP, DGHS/ Integrated Management of Childhood Illness (IMCI) program, SIAPS HQ team and other RMNCH implementing partners (MaMoni Health Systems Strengthening and Saving Newborn Lives Program of Save the Children International, Population Council, Mayer Hashi program of EngenderHealth, and Pathfinder/NGO Health Service Delivery Program) to develop the forecast. Initially, the group defined the scope, purpose and period of the forecast. Then, SIAPS collected and reviewed existing documents to define assumptions and make adjustments based on recent demographic data. SIAPS then developed the algorithms of the forecasting process for each commodity. These were then reviewed by key stakeholders. The steps of the process are detailed below.

Scope

The forecast was meant to cover the 13 life-saving RMNCH commodities (Table 1) prioritized by the United Nations Commission on Life-Saving Commodities (UNCoLSC) and the estimated requirements of these commodities for health services provided at government facilities in the country. The estimates included requirements for all levels of health care from tertiary hospitals to primary health care facilities of DGFP and DGHS. The agreed upon timeframe is 2014-2018. However, through discussions with stakeholders and upon review of existing data, forecasting was done for 11out of the 13 commodities. Female condoms were not included because the government does not plan to procure either commodity in the next five years. Implants were also excluded since a forecast for these was previously done (Omer, Giash, Kibria, 2013).

Table 1. Thirteen UN Commission Priority RMNCH Commodities

Continuum of Care	Commodity	Use	Comments
Reproductive health	Female condoms	Family planning/ contraception	No procurement planned
	Implants		Previously completed
	Emergency contraception		Considered in forecast
Maternal Health	Oxytocin	Post-partum hemorrhage	Considered in forecast
	Misoprostol		
	Magnesium sulfate	Eclampsia and severe pre-eclampsia/toxemia of pregnancy	
Newborn Health	Injectable antibiotics	Newborn sepsis	
	ANCS	Fetal lung maturation for preterm babies	
	Chlorhexidine	Newborn cord care	
	Resuscitation equipment	Newborn asphyxia	
Child Health	Amoxicillin	Pneumonia	
	Oral rehydration salts (ORS)	Diarrhea	
	Zinc		

Forecasting Options

Estimates of commodity needs for multi-year planning are based on population data and linked to defined national RMNCH strategies and plans. Three methods of estimating commodity needs are commonly used:

- Estimates based on anticipated need in a target population based on morbidity data (more appropriate at the national and intermediate levels);
- Estimates based on previous consumption of a commodity (more appropriate at the national level);
- Estimates based on the service delivery statistics (more appropriate at the service delivery level).

Whichever method is used, the accuracy of the estimate depends on the availability and quality of data used, as well as the forecasting team's knowledge of the specific conditions of the program. Due to the absence of reliable consumption and service data for the commodities mentioned in Table 1 above, the morbidity method is used for this forecasting.

Four basic sets of data are required for the morbidity method of forecasting commodity requirements:

1) Medicine lists with packaging and price data
2) Budgets in operational plans/procurement plans
3) Standard treatment guidelines in which the recommended treatment regimen is defined
4) A complete morbidity profile of the conditions for which the commodities are used

The basic formula used in the morbidity method is:

Total quantity of a commodity required for a given health problem	=	Quantity of the commodity specified for a standard course of treatment	×	Number of expected treatment episodes of the health problem

The first element in the formula requires agreement on an average standard treatment regimen for each health problem. Since this average treatment will be multiplied by the total number of treatment episodes for that particular health problem, it is necessary to define an **average** quantity per course of treatment. Average drug treatment schedules also need to accommodate a system for specifying selection and dosage of drugs for patients of different age and disease severity.

Data and Review of Documents

As part of the forecasting exercise, we considered factors such as the estimated current need, national program strategies. This forecast is based on various assumptions regarding RMNCH commodity needs. This process included a review of national policy and technical documents; we familiarized ourselves with the recommended treatment guidelines and previous activities that could impact the forecasting. In addition, we reviewed policy documents to assess information provided on other major policy decisions that may affect the RMNCH program. Several of these documents are listed in bibliography.

Data Analysis

We used different tools (Spectrum and basic Excel) to forecast the requirements for the MNCH commodities. Spectrum is used to determine the target population for respective commodities and also helps to analyze, plan, and advocate for improved programming. Excel facilitates the process of determining the quantities of medicines and related supplies that are required for any health program. For each condition, we used incidence rates obtained from recent literature to determine the total number of patients who required treatment for one year. We then entered information on all medicines and related supplies and added the total requirement and costs by the maternal, newborn, and child categories. The specific forecasting methodologies, key assumptions, and forecasting results for each commodity category are included in the corresponding subsections presented in the quantification results.

We developed annual essential commodity requirements for 2014-2018 in Bangladesh based on the understanding that Bangladesh will achieve replacement fertility by 2016 as specified in the Health Population and Nutrition Sector Development Program (HPNSDP), and based on medium variant projections. We first questioned what the requirements of different essential commodities for MNCH would be if replacement fertility was achieved between 2014 and 2016. In order to meet these objectives, we used the baseline input data and the method attributes.

Steps Used in Forecasting

The following steps were used to forecast the need for each commodity:

1) Calculate the target population (i.e., pregnant women or children) who will require essential medicines and supplies (EMS)

2) Calculate the amount of EMS needed in each case to manage the condition (i.e., prevention or treatment/establish standard or average treatment regimen)

3) Calculate the quantity of EMS needed for the forecast period

4) Adjust for programmatic changes

5) Adjust for losses (i.e., expiry and wastage)

Target Population

We estimated the target population based on recent population census (Census 2011) results. We obtained other information required to estimate this population from the Bangladesh Demographic Health Surveys, Maternal Mortality Survey, and Sample Vital Registration System. For population projection for 2014–2018, we used the cohort component method. From this, we determined that our estimated total population would be 156 million, 42.8 million women of childbearing age (15–49 years), 3.0 million births, and just under 15 million children under 5 in 2014 (Table 2).

Table 2.Estimated Target Population (Population, Births, Pregnant Women, Women of Reproductive Age (WRA), Married Women of Reproductive Age (MWRA) and Under-Five (U5) Children)

Year	Population	Births	Pregnancy	Total WRA	MWRA	Children U5
2011	149,772,352	3,211,543	3,822,586	39,937,244	31,949,796	15,658,020
2014	156,088,421	3,064,560	3,663,078	42,811,188	34,248,952	14,984,527
2015	158,117,525	3,024,558	3,620,580	43,871,380	35,097,104	14,691,935
2016	160,178,045	3,062,208	3,667,330	44,929,096	35,943,276	14,438,474
2017	162,272,771	3,106,464	3,721,609	45,967,660	36,774,128	14,414,969
2018	164,403,996	3,156,135	3,782,029	46,980,436	37,584,348	14,480,128

Treatment Protocols

To obtain an accurate estimate of national needs for MNCH commodities, it is important to have specific treatment protocols for the dosage, frequency of administration, and duration of treatment. To estimate a standard list of medicines and supplies in the entire country, we assumed that treatment in primary health care centers (PHCs) and hospitals follows the standard treatment guidelines for Bangladesh. If no such guideline exists, treatment followed the international best practice guidelines. If we found a discrepancy in treatment protocols, we followed WHO recommendations.

Calculation of MNCH Commodities

The calculation of MNCH commodities depends on the national MNCH guidelines. This is calculated by multiplying the number of cases requiring the medicines by the amount needed per case. After computing the total (national) estimates, these commodities should be divided into public and private sectors proportionately, in accordance with care-seeking data from the BDHS.

Consultative Meeting with Different Agencies

After completing the draft forecast, we conducted consultative technical sessions with MNCH program implementing agencies (EngenderHealth and Save the Children USA) and government officials (IMCI/DGHS and DGFP). The objectives of the consultative meeting were to:

- Review and validate the available data, assumptions, and methodologies presented by the consultants
- Build additional assumptions based on future programmatic goals when there are no adequate data
- Reach consensus and agree upon assumptions, data, methodologies, and current forecasting findings

Later sections of this report contain the findings and recommendations the MNCH experts made during the technical sessions.

RESULTS

Forecasted Need for Oxytocin for Augmentation and Management of PPH

Globally every year around 6% of women suffer from excessive bleeding after child birth (Carroli et al. 2008). This condition—medically referred to as postpartum hemorrhage (PPH)—causes one of every four maternal deaths and accounts for more maternal deaths than any other cause. Oxytocin is the medicine that is most effective in preventing and treating postpartum hemorrhage. Oxytocin is most often available in 1ml glass vials, containing 10 IU, and is administered by injection into a woman's vein or muscle. Doses range between 10 IU for prevention of postpartum hemorrhage and up to 40 IU for treatment of PPH. The following input data are used to estimate the required oxytocin for the forecasting period 2014-2018 in the public sector.

Summary of Data Needed for Forecasting Oxytocin

- Target population (total pregnancies)
- Number of facility deliveries (total deliveries segregated into public and private facilities)
- Number of public facility deliveries requiring oxytocin for prevention of PPH
- Number of public facility deliveries requiring oxytocin for treatment of PPH
- Number of home deliveries requiring oxytocin for treatment of PPH following misoprostol administration
- Standard or average treatment regimen (i.e., 10 IU of oxytocin needed for each case to prevent risks of PPH and an average 40 IU required for PPH treatment)
- Expected projected changes in consumption (potential losses or scale-up in use)

The formulas used for this calculation of oxytocin are:

Total oxytocin need (dose, 10 IU)	=	Oxytocin need for prevention (dose)	+	Oxytocin need for treatment (dose)				
Oxytocin need for prevention	=	Total pregnancies	×	Proportion of facility births	×	Dose per case for prevention		
Oxytocin need for treatment	=	Total pregnancies	×	Proportion of facility births	×	Proportion of women who require treatment for PPH	×	Dose per case for treatment

The associated summary outputs for oxytocin are shown in Table 3. By applying the different attributes and assumptions the forecasted number of pregnancies for the year 2014 and 2018 are estimated at 3.66 million and 3.78 million, respectively. We have estimated (by trend analysis) that 42.9% of women will receive facility delivery service in 2018. Thus, the total number of estimated facility deliveries in the public sector based on this assumption will be 512,831 and 529,484 in 2014 and 2018, respectively. We can assume that 1.06% of women with PPH complications (Bangladesh Maternal Mortality Survey, 2010) sought treatment of PPH following oxytocin or misoprostol administration at public facilities. Applying these parameters, we estimate the number of doses (10 IU) of oxytocin that needs to be procured for public facilities is **701,553** for 2014 and **724,334** for 2018.

Table 3. Forecasted Oxytocin Requirements

Parameter	2014	2015	2016	2017	2018
Total population (projected, based on 2011 census)	156,088,421	158,117,525	160,178,045	162,272,771	164,403,996
A. Total pregnancies (projected, based on 2011 census)	3,663,078	3,620,580	3,667,330	3,721,609	3,782,029
B. % of facility birth (29%; public and nongovernmental organization (NGO) facility 14% and private facility 15%) (source: BDHS-2011)	32.2	35.1	38.1	40.6	42.9
C. # of facility births (C=A x B)	1,181,223	1,269,392	1,398,303	1,510,472	1,620,856
D. % of facility birth (public and NGO facility)	15.6	16.9	18.4	19.6	20.7
E. # of facility births (public sector) (14% of all birth) (E=A x C)	512,831	506,881	513,426	521,025	529,484
F. Number of women requiring prevention of PPH (100% of all facility deliveries) (F=E)	512,831	506,881	513,426	521,025	529,484
G. Oxytocin requirement for PPH prevention (10 IU for each) (G=F X 10 IU)	512,831	506,881	513,426	521,025	529,484
H. Number of women requiring treatment of PPH (1.06% of those who received oxy or miso for PPH prevention) (H=A x 1.06%) (source: BMMS 2010)	38,829	38,378	38,874	39,449	40,090
I. Oxytocin requirement for PPH treatment (average 40 IU for each; 4 times of 10 IU) (I=H x 4 X 10 IU)	155,315	153,513	155,495	157,796	160,358
Total need for prevention or treatment (10 IU) (G+I)	668,145	660,394	668,921	678,821	689,842
Oxytocin (10 IU) requirement to procure (with 5% wastage)	701,553	693,413	702,367	712,763	724,334

Forecasted Need for Misoprostol for Prevention of PPH

While oxytocin is the recommended choice for prevention and treatment of postpartum hemorrhage, use of oxytocin may not be feasible in low-income settings, where most births occur at home with untrained birth attendants.

Misoprostol has been suggested as an alternative to oxytocin since it has been proven to act as an effective uterotonic is inexpensive, can be taken orally, does not need refrigeration, and has a long shelf-life. The International Federation of Gynecology and Obstetrics (FIGO) and the International Confederation of Midwives (ICM) jointly recommended that where home births occur without a skilled birth attendant, misoprostol may be the only available technology to control PPH. Misoprostol is new in Bangladesh. A pilot project is now taking place in six northern districts. The purpose of this research is to assess the feasibility of scaling up PPH prevention intervention (Mayer Hashi 2010). Recognizing a need for strategies to prevent PPH among women who give birth at home without a skilled provider, the program provides two 200 mcg tablets of misoprostol to women immediately after delivery under the direct supervision of a community health worker. It should be noted that although the current recommendation of the World Health Organization is for three 200 mcg tablets, technical experts in Bangladesh opted for the 400 mcg dose based on local data. Women were also counseled on the use of misoprostol during antenatal visits. Table 4 shows the amount of misoprostol required during the forecast period.

The trend analysis shows that the number of home births is declining (series of BDHS reports). Consequently, the requirement for misoprostol is also trending downward. The estimated number of home births in 2014 is 2.48 million and in 2018 is 2.16 million, respectively (Table 4). The total amount of misoprostol required is 24.1 million tablets during the forecast period (2014-2018). We assume that all pregnant women in the community will receive two 200mcg misoprostol tablets from the community health worker or volunteers.

Summary of Data Needed for Forecasting Misoprostol

- Target population (total number of pregnancies)
- Number of home births
- Proportion of women who will receive misoprostol
- Standard or average treatment regimen (i.e., amount of misoprostol needed for each case to prevent risks of PPH (two per woman)
- Expected projected changes in consumption (potential losses or scale-up in use)

The formula used for this calculation of misoprostol is:

Total misoprostol needed for prevention (tab)	=	Total pregnancies	×	Proportion of home births	×	Dose per case for prevention

Table 4. Forecasted Number of Misoprostol Tablets Required for Prevention of PPH

Parameter	Births				
	2014	**2015**	**2016**	**2017**	**2018**
(A) # of pregnancies (projected, based on 2011 census)	3,663,078	3,620,580	3,667,330	3,721,609	3,782,029
(B) % of home births (trend) (source: BDHS 2011)	67.8	64.9	61.9	59.4	57.1
# of home births (C = A × B)	2,481,855	2,351,188	2,269,027	2,211,137	2,161,173
For prevention of PPH, 100% of all home deliveries (two tablets per woman; D = C × 2)	4,963,710	4,702,375	4,538,054	4,422,275	4,322,346
Wastage factor plus 5%	5.0%	5.0%	5.0%	5.0%	5.0%
Misoprostol requirement (tabs)	**5,211,896**	**4,937,494**	**4,764,957**	**4,643,388**	**4,538,463**

Forecasted Need for Magnesium Sulfate for Prevention of Pre-Eclampsia/Eclampsia

The second leading cause of maternal death is pre-eclampsia/eclampsia (PE/E), most often detected through the elevation of blood pressure during pregnancy. It can lead to seizures, kidney and liver damage, and both maternal and infant deaths, if untreated. These conditions claim the lives of an estimated 63,000 women per year, as well as the lives of many of their babies. Magnesium sulfate (injection 500 mg/ml in 10-ml ampoule) is needed at every level of the health care system where deliveries occur, from urban hospitals to rural clinics [WHO 2012].

Summary of Data Needed for Forecasting Magnesium Sulfate

- Target population (total births)
- Proportion of facility births
- Number of pregnancies in facility complicated by PE/E
- Standard or average treatment regimen (i.e., amount of magnesium sulfate needed for each case to prevent PE/E (magnesium sulfate: injection 500 mg/ml in 10-ml ampoule)
- Expected projected changes in consumption (potential losses or scale-up in use)

The formula used for this calculation of magnesium sulfate is:

Total magnesium sulfate needed for prevention (g/2 ml)	=	Total pregnancies	×	Proportion of facility births (public)	×	Dose per case for prevention (ampoule)

By applying the information on pregnancy complication (2% pregnancies are complicated), we estimated the number of women who require magnesium sulfate during pregnancy. A total of 215,795 pregnant women are estimated to require magnesium sulfate for treatment of PE/E during the forecasting period (2014 to 2018). A total of 855,932 g magnesium sulfate is required for 2014, of which 171,615 g (IV) is for loading doses and 643,558 g (IM) is for maintenance every 4 hours for 24 hours.

Table 5.Forecasted Number of Doses of Magnesium Sulfate Required for Prevention of Pre-Eclampsia/Eclampsia

Parameters	2014	2015	2016	2017	2018
Total births (A) (projected, based on 2011 census)	3,064,560	3,024,558	3,062,208	3,106,464	3,156,135
% of facility birth (public and NGO facility 14) (B) (source: BDHS 2011)	15.6	16.9	18.4	19.6	20.7
# of facility births (C = A × B%)	429,038	423,438	428,709	434,905	441,859
10% of pregnancies complicated by PE/E at facility (D) (source: Kishwara et al 2011)	10	10	10	10	10
Number of women treated with PE/E (E=C × D)	42,904	42,344	42,871	43,490	44,186
Loading dose 4 g (IV)(loading dose employed in 4 g intravenous (IV), while the maintenance was 2.5 g IM every four hours for 24 hours) (F) 4 g (IV) (source: http://apps.who.int/rhl/pregnancy_childbirth/medical/hypertension/cd007388_sonibl_com/en/)	171,615	169,375	171,484	173,962	176,744
Maintenance2.5 g IM every four hours for 24 hours (G) 2.5 g (IM) × 6	643,558	635,157	643,064	652,357	662,788
Total need (H = F + G)	815,173	804,532	814,547	826,319	839,532
Wastage factor 5%	40,759	40,227	40,727	41,316	41,977
Magnesium sulfate requirement to procure (g/2 ml)	855,932	844,759	855,275	867,635	881,509

Forecasted Need for Injectable Antibiotics for Management of Neonatal Sepsis

Sepsis is the most common cause of neonatal mortality; it is responsible for about 30-50% of total neonatal deaths (Bang et al 1999; Hafsa et al 2011). The majority of these deaths occur in low-income countries and almost 1 million of these deaths are attributable to infectious causes, including neonatal sepsis, meningitis, and pneumonia. These deaths occur because of lack of preventive care (clean birth care, breastfeeding) and appropriate case management. Delays in treating neonatal infections of even a few hours may be fatal. Delays in illness recognition and care seeking, a dearth of primary health care providers, and limited access to facility care also contribute to these deaths. Therapy with appropriate antibiotics and supportive management in neonatal nurseries is the cornerstone of management of neonatal sepsis. According to the national guidelines, gentamicin (5 mg/kg IV/day for 7 days) is required to prevent neonatal sepsis in each case (MOHFW 2009).

Summary of Data Needed for Forecasting Injectable Antibiotics

- Target population (total births)
- Number of newborns at risk of neonatal sepsis
- Number of newborns who will be given gentamicin
- Standard or average treatment regimen (i.e., amount of gentamicin needed for each case to prevent risks of neonatal sepsis (gentamicin - 5 mg/kg IV/per day for seven days]
- Expected projected changes in consumption (potential losses or scale-up in use)
- Adjusted (plus 5%)

The formula for calculation of gentamicin is:

Total need (gentamicin, amp of 2 ml each)	=	Total live births	×	Proportion of birth at risk of neonatal sepsis	×	Proportion of neonate at risk will be administered	×	Dose per cases

By applying the related information provided above, we estimated that newborns require 398,265 packs of gentamicin to prevent neonatal sepsis (10 ampoules of 2 ml each) during the forecast period, of which 68,475 are for 2014 and 102,069 for 2018. We also estimate the required number of gentamicin that should be procured to meet the national programmatic goal by using benchmark data provided in table 6.

Table 6. Forecasted Number of Injectable Antibiotic (Gentamicin)

	2014	2015	2016	2017	2018
Total live births (A) (projected based on Census 2011	3,064,560	3,024,558	3,062,208	3,106,464	3,156,135
Proportion of birth at risk of neonatal sepsis (8%) (B) (source: Hafsa et al 2011)	8	8	8	8	8
Number of new born at risk of neonatal sepsis (C = A × B)	245,165	241,965	244,977	248,517	252,491
Percentage of neonate at risk administered gentamicin (38%) (D) (recommendations from consultative meeting with Saving Newborn Lives (SNL)	38	40	45	50	55
Number of newborns who will be given gentamicin (E = D × C)	93,163	96,786	110,239	124,259	138,870
Dose (Full course -7 gentamicin) (F)	7	7	7	7	7
Total need	652,138	677,501	771,676	869,810	972,090
# packs of gentamicin needed (10 amp of 2 ml each)	65,214	67,750	77,168	86,981	97,209
Adjusted amount needed (plus 5%)	68,475	71,138	81,026	91,330	102,069

Forecasted Need for Antenatal Corticosteroids for Management of Preterm Birth

Preterm birth is a leading cause of perinatal death and disability, and is an important global public health problem. Preterm birth accounts for approximately 6–7% of all births (WHO 2012). Preterm birth is also the leading cause of neonatal mortality both in developed and developing countries, accounting for an estimated 24% of neonatal deaths. Preterm birth occurs most often in economically disadvantaged communities and those with high rates of urinary and genital tract infection. The administration of certain corticosteroids to women at risk of preterm birth yields a considerable reduction in risk of complications of prematurity, such as respiratory distress syndrome, intraventricular hemorrhage, and perinatal death. Dexamethasone is a fluorinated glucocorticoid steroid that is administered through intramuscular injections to prevent these complications—with the greatest effect seen when there is a 24-48 hour time span between the first dose and birth. According to the WHO, 7% of pregnant women are assumed to be at risk of preterm delivery (WHO 2012). An injection of 4 mg dexamethasone phosphate (as disodium salt) in a 1ml ampoule is needed to promote fetal lung maturation before preterm delivery.

Summary of Data Needed for Forecasting Antenatal Corticosteroid (ANCS)

- Number of pregnant women at risk of preterm birth
- Proportion of women who will be given dexamethasone
- Standard or average treatment regimen (i.e., amount of dexamethasone needed for each case to prevent risks of preterm birth)
- Expected projected changes in consumption (potential losses or scale-up in use)

The formula for calculation of dexamethasone is:

Total need (dexamethasone, ampule of 1 ml each)	=	Total pregnancies	×	Proportion of pregnant women at risk of preterm delivery	×	Proportion of pregnant women at risk administered dexamethasone (all public hospital delivery)	×	Dose per cases

A total of 1,291,824 pregnant women are at risk of preterm birth during the forecast period, including 256,415 women in 2014 and 264,742 in 2018. To meet the program goal, 17,083 packs of dexamethasone (50 ampoule of 1 ml each) should be procured during the forecast period (2,585 packs for 2014 and 4,003 for 2018) (Table 7).

Table 7. Forecasted Amount of Dexamethasone

Parameter	2014	2015	2016	2017	2018
Number of pregnancies (A) (projected based on 2011 census)	3,663,078	3,620,580	3,667,330	3,721,609	3,782,029
Percentage of pregnant women at risk of preterm delivery (7%) (B) (source: WHO 2012)	7	7	7	7	7
Number of pregnant women at risk of preterm delivery (C = A × B)	256,415	253,441	256,713	260,513	264,742
Percentage of pregnant women at risk administered dexamethasone (all public hospital delivery) (D) public facility delivery (source: BDHS 2011)	16	18	20	22	24
Number of pregnant women at risk administered dexamethasone (E = D × C)	41,026	45,619	51,343	57,313	63,538
Amount of dexamethasone required (4 mg in 1-ml ampoule) (F = E × 3 doses) (source: WHO 2012*)	123,079	136,858	154,028	171,938	190,614
Number of packs of dexamethasone needed (50 ampoule of 1 ml each) (F/50)	2,462	2,737	3,081	3,439	3,812
Adjusted amount of dexamethasone needed (plus wastage 5%)	2,585	2,874	3,235	3,611	4,003

*The required doses suggested by WHO are four but considering the country context, we used three doses for the forecast as recommended in the consultative meeting.

Forecasted Need of Chlorhexidine

Severe infection is one of the top three causes of newborn deaths worldwide. In resource-poor, high-mortality settings, infections can account for more than half of the neonatal deaths. A baby's newly cut umbilical cord can be an entry point for bacteria, which can lead to cord infection and potentially life-threatening sepsis. The 1998 WHO recommendations for care of the umbilical cord express a preference for clean and dry cord care practices. However, in settings where the risk of bacterial infection is high, use of an antiseptic such as chlorhexidine (CHX) is acceptable (WHO 1999). As of July 2013, the WHO Model List of Essential Medicines for Children (EMLc) includes 7.1% chlorhexidine digluconate for umbilical cord care (WHO 2013). In September 2012, a WHO expert consultation resulted in the following recommendation: daily application of 7.1% chlorhexidine digluconate to the umbilical cord stump immediately and during the first week of life (Segre et al. 2012).

Summary of Data Needed for CHX Forecasting

- Target population (total births)
- Standard or average treatment regimen (i.e., of CHX needed per treatment) (single dose 5 ml)
- Expected projected changes in consumption (potential losses or scale-up in use)

The formula for calculation of chlorhexidine is:

Total need (chlorhexidine)	=	Total birth	×	single dose (5 ml) per birth

According to the current national plans, chlorhexidine will be used for all births. Table 2.6 shows the forecasted amount of chlorhexidine by year. A total of 15,413,925 liquid bottles of 5 ml (7.1% CHX digluconate) will be procured to implement the national program during the project period (2014-2018) (Table 8).

Table 8. Forecasted Number of CHX

Forecasted number of CHX	2014	2015	2016	2017	2018
Number of births (projected based on 2011 census)	3,064,560	3,024,558	3,062,208	3,106,464	3,156,135
Total CHX needed (single dose 5 ml)-distribution of four channels	3,064,560	3,024,558	3,062,208	3,106,464	3,156,135
Adjusted amount (plus wastage 5%)	3,217,788	3,175,786	3,215,318	3,261,787	3,313,942
• Home	2,284,629	2,254,808	2,282,876	2,315,869	2,352,899
• Public facility	450,490	444,610	450,145	456,650	463,952
• Private facility	482,668	476,368	482,298	489,268	497,091

Forecasted Need for Resuscitation Commodities

About one quarter of global neonatal deaths are caused by birth asphyxia (WHO 2012). Effective resuscitation at birth can prevent a large percentage of these deaths. The need for clinical guidelines on basic newborn resuscitation, suitable for settings with limited resources, is universally recognized. Assumptions regarding resuscitation commodity requirements are below. Table 9 and the table in Annex A offer forecasts for resuscitation devices for 2014-2018.

The formulas for calculation of resuscitation devices are:

Total need (resuscitation device) in tertiary facility (A)	=	Each item*	×	Number of beds in • Delivery room • Operation theater • Special care unit	×	1 2 1
Total need (resuscitation device) in secondary facility (B)	=	Each item	×	Number of beds in • Delivery room • Operation theatre	×	1 1
Total need (resuscitation device) in primary facility (C)	=	Each item	×	Number of beds in delivery room	×	1
Community skilled birth attendant (D)	=	Each item **			×	1

* Bag, mask 0, mask 1 size, suction device, and manikin; ** except manikin

Total need	=	**A + B + C + D**

Table 9. Forecasted Number of Resuscitation Devices

Type of unit/room	Number of facilities	Total number of beds in country	Bag	Mask size 0	Mask size 1	Suction device (re-cleanable)	Manikin
Tertiary facilities	**17**	119	170	170	170	170	17
Secondary facilities (district)	**52**	104	104	104	104	104	52
Primary facilities UHC and FWC	**2000**	2000	2000	2000	2000	2000	2000
Sub TOTAL		2223	2274	2274	2274	2274	2069
Community skilled birth attendant (2014-2018)			28000	28000	28000	28000	
Sub total			28000	28000	28000	28000	
Grand total		**2,223**	**30,274**	**30,274**	**30,274**	**30,274**	2,069

FWC, family welfare center; UHC, upazila health complex

Forecasted Need for Amoxicillin

Amoxicillin is required for treatment of various conditions in both adults and children. When estimating the national need for this product for treatment of children with pneumonia, we account for the morbidity patterns (pneumonia) of children at every age. The children are stratified by age due to the different treatment regimens. The forecast below includes only the amoxicillin required for treatment of pneumonia in children under five.

Summary of Data Needed for Forecasting of Amoxicillin for Pneumonia in Children

- Number of children under five (excluding city corporations)
- Episode of pneumonia per child per year
- Standard or average treatment regimen (i.e., percentage who received antibiotic)
- Dose of amoxicillin for each age group
- Expected projected changes in consumption (potential losses or scale-up in use)

The formula for calculation of amoxicillin is:

Total need (amoxicillin tab)	=	Total under five children	×	Incidence rate in children U5 years (case/child/year)	×	Percent who received antibiotic	×	% of patients seeking amoxicillin in public facility	×	Dose per episode

Table 10 shows the forecasted number of patients requiring amoxicillin. A total of 24.1 million dispersible tablets and 95,532 doses of syrup (125 mg; 75 ml) of amoxicillin are required to treat pneumonia during the period (2014-2018), including 5.2 million tablets for 2014 and 4.6 million tablets for 2018. EPI/IMCI and DHS data were used to estimate this drug.

Table 10.Forecasted Number of Amoxicillin for Management of Pneumonia

Parameter	2014	2015	2016	2017	2018
Total under-5 children (excluding city corporation) (projected, based on 2011 census)	14,059,862	13,677,444	13,270,397	12,843,510	12,448,777
Estimate children 0-11months	2,097,101	1,880,917	1,704,244	1,502,946	1,306,517
Estimate children 12-59 months	11,962,761	11,796,527	11,566,153	11,340,564	11,142,260
Incidence rate in children U5 years (case/child/year=3) (source: Newsletter: Performance Report, 2010, DGHS/MIS)	3	3	3	3	3
Total number of ARI episodes	**42,179,586**	**41,032,333**	**39,811,191**	**38,530,530**	**37,346,332**
Number of ARI episodes 0-11 months children	6,291,303	5,642,751	5,112,731	4,508,837	3,919,551
Number of ARI episodes 12-59 months children	35,888,284	35,389,581	34,698,460	34,021,693	33,426,781

Parameter	2014	2015	2016	2017	2018
Percentage receiving antibiotic (10%) (source: EPI/IMCI)	10	10	10	10	10
Number of pneumonia patients treated with amoxicillin	**4,217,959**	**4,103,233**	**3,981,119**	**3,853,053**	**3,734,633**
Number of 0-11 months children treated with amoxicillin	629,130	564,275	511,273	450,884	391,955
Number of 12-59 months children treated with amoxicillin	3,588,828	3,538,958	3,469,846	3,402,169	3,342,678
% of patients seeking amoxicillin in public facility (25%) (source: BDHS 2011)	25	25	25	25	25
# of patient seeking amoxicillin from public facility	**1,054,490**	**1,025,808**	**995,280**	**963,263**	**933,658**
# of patients (0-11 months children) seeking amoxicillin from public facility	157,283	141,069	127,818	112,721	97,989
# of patients (12-59 months children) seeking amoxicillin from public facility	897,207	884,740	867,462	850,542	835,670
Required amoxicillin (2-11 months children) [dose 1/2 tablet three times (tab-250 mg)] for five days [85% are 2-11 months children under 1] (source: EPI/IMCI)	334,225	299,771	271,614	239,532	208,226
Required amoxicillin (12-59 months children) [dose 1 tablet 3 times for (Tab-250 mg) for five days] (source: EPI/IMCI)	4,486,035	4,423,698	4,337,308	4,252,712	4,178,348
Total amoxicillin required (DT-250 mg)	**4,820,261**	**4,723,469**	**4,608,921**	**4,492,244**	**4,386,574**
Total amoxicillin (syrup-125 mg) required [75 ml, dose for five days (5 ml 3 times per day)]	**23,592**	**21,160**	**19,173**	**16,908**	**14,698**
Adjusted total amoxicillin required (DT-250 mg) (plus 5%)	5,061,274	4,959,642	4,839,367	4,716,856	4,605,902
Total amoxicillin (syrup-125 mg) required [75 ml, dose for five days (5 ml 3 times per day)] (plus 5%)	24,772	22,218	20,131	17,754	15,433

Forecasted Need for Oral Rehydration Salts

Oral rehydration salts (ORS) when properly mixed with safe water can help rehydrate the body when a significant amount of fluid has been lost due to diarrhea. A child with diarrhea should never be given any tablets, antibiotics or other medicines unless they have been prescribed by a medical professional or a trained health worker. The best treatment for diarrhea is to drink lots of liquids and ORS properly mixed with water.

An ORS estimate is provided for children under 5. Assuming two packs per case, the total number of ORS is estimated at 30.1 million for the forecast period, including 5.9 million for 2014 (Table 11).

Summary of Data Needed for Forecasting of ORS

- Number of children under 5 (excluding city corporations)
- Episodes of diarrhea per child per year
- Standard or average treatment regimen (i.e., percentage who received ORS
- Dose of two packs per episode
- Expected projected changes in consumption (potential losses or scale-up in use)

Total need (ORS)	=	Total under-5 children	×	Incidence rate in under-5 children (case/child/year)	×	Percent who received ORS	×	% of patient seeking ORS in public facility	×	Dose per episode

Table 11.Forecasted Number of ORS Needed During the Period (2013-2017)

Parameter	2014	2015	2016	2017
Under-5 population, excluding city corporations (projection based on 2011 census)	14,059,862	13,677,444	13,270,397	12,843,510
Diarrhea prevalence and incidence				
Incidence rate in under-5 children (case/child/year) (ICDDRB)	3.5	3.5	3.5	3.5
Number of diarrhea				
Total number of diarrhea episodes	50,761,921	50,629,825	50,570,933	50,568,997
Percentage who received ORS (80%) (source: BDHS 2011)	80	80	80	80
Number of diarrhea patients treated with ORS	40,609,537	40,503,860	40,456,746	40,455,198
% of patients seeking ORS from public facility (source: BDHS 2011)	7	7	7	7
# of patient seeking ORS from public facility	2,842,668	2,835,270	2,831,972	2,831,864
Required ORS packet (two/episode)	**5,685,335**	**5,670,540**	**5,663,944**	**5,663,728**
Wastage factors (plus 5%)	56,853	56,705	56,639	56,637
Total	5,969,602	5,954,067	5,947,142	5,946,914

Forecasted Need for Zinc

Diarrhea is second only to pneumonia as the leading cause of death globally among children under 5. WHO and UNICEF recommend the routine use of zinc supplementation to help reduce the duration and severity of diarrhea, and to prevent subsequent episodes. Zinc is essential for the normal growth and development of children and is naturally found in the diet, mainly in foods of animal origin. Dietary deficiency of zinc can lead to an increased risk of gastrointestinal infections and impaired gastrointestinal and immune function. The mechanisms by which zinc exerts its anti-diarrheal effect are not fully understood.

Summary of Data Needed for Forecasting of Zinc

- Number of children 6-59 months (excluding city corporations)
- Episodes of diarrhea per child per year
- Standard or average treatment regimen (i.e., percentage who received zinc)
- Dose of 10 tablets per episode
- Expected projected changes in consumption (potential losses or scale-up in use)

Total need (zinc)	=	Total under-5 children	×	Incidence rate in under-5 children (case/child/year)	×	Percent who received zinc	×	% of patients seeking zinc in public facility	×	Dose per episode

Considering that the episodes of diarrhea per child per year are 3.5 with other fixed parameters, we estimate the zinc requirement for 2014 is 29.8 million. We also estimate that the total zinc required for next five years is 150.8 million (Table 12).

Table 12.Forecasted Number of Zinc Required for Period 2014-2018

Parameter	2014	2015	2016	2017	2018	Total
Children 6-59 months excluding city corporation (projected based on 2011 census)	14,059,862	13,677,444	13,270,397	12,843,510	12,448,777	66,299,991
Incidence rate in under 5 children (case/child/year) (ICDDR,B)	3.5	3.5	3.5	3.5	3.5	
Total number of diarrhea episodes	50,761,921	50,629,825	50,570,933	50,568,997	53,974,379	256,506,055
Percentage who received ORS/Zinc (80%) (BDHS 2011)	80	80	80	80	80	
Number of diarrhea patients treated with ORS/zinc	40,609,537	40,503,860	40,456,746	40,455,198	43,179,503	205,204,844
% of patients seeking ORS/zinc in public facility (BDHS 2011)	7	7	7	7	7	
# of patients seeking ORS/zinc from public facility	2,842,668	2,835,270	2,831,972	2,831,864	3,022,565	14,364,339
Required zinc tablet (10 tablet/episode)	**28,426,676**	**28,352,702**	**28,319,722**	**28,318,638**	**30,225,652**	143,643,391
Adjustment for wastage (5%)						
Total required zinc tablets	29,848,010	29,770,337	29,735,708	29,734,570	31,736,935	150,825,560

Forecasted Need for Emergency Contraceptive Pill

The emergency contraceptive pill (ECP), provided in either a one-pill or two-pill pack, contains a high dosage of the same hormones used in non-emergency oral contraceptives (the number of pills depends on the brand). ECP can be either combination or progestin-only pills. We consider two types of ECP users to estimate the number of ECP. The first type of client consists of women who are currently using traditional methods (withdrawal, rhythm) and short-acting modern methods (pill and condom). The second type includes women who are not using any family planning methods.

The formulas for calculating ECP are:

Total need (ECP)	=	Total need (ECP) for women using contraception	+	Total need (ECP) for women not using contraception

Total need (ECP) for women using contraception	=	Total married women of reproductive age	×	Proportion of using traditional method, condom and pill	×	Percent failure	×	Percent in public sector	×	Dose per cases
Total need (ECP) for women not using contraception	=	Total married women of reproductive age	×	Proportion of women not using any contraception who prefer to avoid pregnancy (%)	×	Probability of conception	×	Percent in public sector	×	Dose per case

Table 13.Forecasted Number of ECP Required for Period 2014-2017

Scenario A: Women Using Contraception	2014	2015	2016	2017	2018
Parameters					
(a) Total population	156,088,421	158,117,525	160,178,045	162,272,771	164,403,996
(b) Percentage of women of reproductive age	21.9	22.2	22.4	22.7	22.9
(c) Total number of married women of reproductive age = (a) × (b)	34,248,952	35097104	35943276	36774128	37584,348
(d) Contraceptive prevalence rate—traditional methods (withdrawal, rhythm) (%)	9.2	9.2	9.2	9.2	9.2
(e) Contraceptive prevalence rate—male condoms (%)	5.5	5.5	5.5	5.5	5.5
(f) Contraceptive prevalence rate—oral contraceptive pills (%)	27.2	27.2	27.2	27.2	27.2
(g) Total contraceptive prevalence rate of traditional methods, condoms, and pills (%) = (d) + (e) + (f)	41.9	41.9	41.9	41.9	41.9
(h) Total number of women of reproductive age using poor contraceptive (traditional methods, condoms, or pills) = (c) x (g)	14,350,311	14705687	15060233	15408360	15747842
(i) Percentage failure (Failure rate of pill + condom + traditional method)	10%	10%	10%	10%	10%
(J) Number of poor contraceptive users who are exposed to conception due to method failure	1,435,031	1,470,569	1,506,023	1,540,836	1,574,784
(k) Percentage of poor contraceptive user expected to conception (method failure) in public sector	40%	40%	40%	40%	40%
(l) Number of users who exposed to method failure in public sector	574,012	588,227	602,409	616,334	629,914
Scenario B: Women NOT Using Current Contraception					
(m) Total number of sexually active women of reproductive age	34,248,952	35,097,104	35,943,276	36,774,128	37,584,348
(n) Rate of non-contraceptive use (%)	38.8	38.8	38.8	38.8	38.8
(o) Total number of sexually active women of reproductive age not using contraception = (m) x (n)	13,288,593	13,617,676	13,945,991	14,268,362	14,582,727
(p) Proportion of married women who are not using method who want a child soon	16.4	16.4	16.4	16.4	16.4
(q)Proportion of married women who are not using method - pregnant	16.6	16.6	16.6	16.6	16.6
(r) Proportion of married women who are not using method - postpartum amenorrheic	13.0	13.0	13.0	13.0	13.0
(s)Proportion of married women who are not using method - infecund or menopausal	27.7	27.7	27.7	27.7	27.7
(t) Proportion of women not using any contraception who prefer to avoid pregnancy (%)	26.0	26.0	26.0	26.0	26.0
(u) Number of women not using any contraception who prefer to avoid pregnancy (o x t)	3,455,034	3,540,596	3,625,958	3,709,774	3,791,509
(w) Probability of having a conception	0.5	0.5	0.5	0.5	0.5
(y) Number of women not using any contraception who have conception (u x w)	1,727,517	1,770,298	1,812,979	1,854,887	1,895,755
(z) ECP method used in public sector	40%	40%	40%	40%	40%
(aa) Number of non-users who are potential ECP users in public sector (y x z)	691,007	708,119	725,192	741,955	758,302
Total demand of ECP [l + aa]	**1,265,019**	**1,296,347**	**1,327,601**	**1,358,289**	**1,388,215**

Adjust for Losses and Programmatic Changes

The proportion of patients likely to be treated with the product depends on programmatic factors. This adjustment is made either before or after converting the number of episodes to products. For example, if the number of episodes of diarrhea is expected to change, these adjustments are made when estimating the number of episodes. For forecasting and budgetary purposes, we are adding a percentage for uncertainties in demand to avoid stock-outs. It is also important to stress, that in these forecasts, the whole target population was considered, without taking into account the existing programmatic status (rate of scale up). When actual procurement of these commodities is being planned, DGFP and DGHS will need to assess the status of implementation, particularly of new commodities such as misoprostol and chlorhexidine, and adjust the target population as relevant.

Forecast Limitations

Producing accurate forecasts of these MNCH commodities remains a challenge in Bangladesh because of unavailable consumption and stock-on-hand data. Some of the other challenges or limitations faced in producing this forecast include the following:

- To conduct the forecasting exercise, 2011 census data were used for projections of the target population (MWRA, birth and pregnancies), which leaves some chance of error regarding the actual number of the target population. Obtaining information on the different treatment regimens of each program was a challenge in carrying out the exercise since standardized national treatment protocols do not currently exist for some of the conditions.

- The lack of a coordinated/unified national procurement and supply system between DGHS and DGFP for a specific commodity still remains a challenge. For example, both entities are procuring misoprostol to distribute at the community level using their own field network, which opens a window of targeting same women.

- Information on the number of days of stock-outs of products at the facility level is not available.

- The accuracy of this exercise fully depends on the implementation of a successful MNCH program (as per target set on HPNSDP).

- In some cases, the recommended product is not yet available in the market or is produced by a very small number of manufacturers.

RECOMMENDATIONS

- Since there is no information on the actual consumption of essential medicines, DGHS should develop a mechanism for collecting logistics data on a routine basis from the health facilities to enable expeditious determination of national requirements of essential medicines and supplies.

- DGFP should include these life-saving commodities in their logistics reporting forms and take necessary steps to make the logistics data available in their existing eLMIS.

- The technical capacity of the MOHFW staff for conceptualizing the forecasting methodology, assumptions, and data validation process, and for undertaking the overall forecasting and supply planning exercise, must be strengthened. Quantification can be institutionalized in DGHS by establishing a unit of relevant technical personnel across the entities that can sensitize and transfer skills to the lower levels.

- Coordination among DGFP, DGHS and Ministry of Local Government, Rural development, and cooperatives/UPHCSDP (which covers the city corporation area) is essential before MH commodities are procured.

- DGFP and DGHS can consider disseminating the forecasting report to the drug manufacturers to inform them of the quantity of commodities needed for the whole country so they too can plan accordingly.

- This forecasting exercise should be reviewed annually by the entities and adjusted to account for changes in the assumptions or data in accordance with strategic plans and new data.

- District Managers can use the forecasting algorithms for each commodity presented in this document for their local procurement planning using their own routine health information systems and population data.

- DGFP and DGHS should maintain an effective coordination mechanism during procurement planning, particularly for items procured by both Directorates, such as misoprostol and magnesium sulfate as these commodities target the same women at the community and facility levels. This effort will eliminate the double counting of women during the forecasting exercise and thus will minimize the over stocking and potential wastage of commodities.

BIBLIOGRAPHY

Bang AT, Bang RA, Bactule SB, Reddy HM, Deshmukh MD. 1999. Effect of Home-Based Neonatal Care and Management of Sepsis on Neonatal Mortality: Field Trial in Rural India. *Lancet* 1999; 354:1955-61

Bangladesh Bureau of Statistics. 2003. Bangladesh Population and Housing Census, 2001. Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning. www.bbs.gov.bd

Bangladesh Bureau of Statistics. 2009. Sample Vital Registration System; Planning Division, Ministry of Planning. www.bbs.gov.bd

Bangladesh Bureau of Statistics. 2012. Bangladesh Population and Housing Census, 2011. Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning. www.bbs.gov.bd

Bangladesh Demographic and Health Survey (BDHS) 2011. NIPORT, Mitra and Associates and ICF International. Bangladesh Demographic and Health Survey 2011 Preliminary Report. Dhaka, Bangladesh, and Calverton, Maryland, USA.

Carroli G, Cuesta C, Abalos E, Gulmezoglu AM. 2008. Epidemiology of Postpartum Haemorrhage: A Systematic Review. *Best Practice & Research Clinical Obstetrics and Gynaecology*. 22:999–1012.

DemProj Spectrum System of Policy Models. 2008. A Computer Program for Making Population Projections. USAID | Health Policy Initiative.

DGFP Monthly Logistics and Family Planning, Maternal and Child Health and RH Services Reports, 2011, MIS Unit, Dhaka: DGFP, Ministry of Health and Family Welfare. www.dgfp.gov.bd

DGFP Procurement Procedure Manual, Dhaka: DGFP, MOHFW and USAID/SPS/SIAPS Program, January 2012

DGFP Supply Chain Information Portal, www.dgfplmis.org

DGHS Annual Report 2012, www.dghs.gov.bd

Ending Preventable Child Death by 2035: Bangladesh Call for Child Survival, BENCHMARK, MOHFW, GoB.
http://www.healthynewbornnetwork.org/topic/chlorhexidine-umbilical-cord-care. Accessed on 26-05-2013

Hafsa A, Fakruddin M, Hakim MA, Sharma JD. Neonatal Bacteremia in a Neonatal Intensive Care Unit: Analysis of Causative Organisms and Antimicrobial Susceptibility. *Bangladesh Journal of Medical Science* Vol.10 (3) 2011.

IMCI Newsletter: Performance Report for January to December 2010, Issue 3, 2012; Management Information System (MIS), Directorate General of Health Services (DGHS) Mohakhali, Dhaka: Web: www.dghs.gov.bd; Email: info@dghs.gov.bd

Jai Das and Zulfiqar. A. Bhutta: *Scale-Up Plan for Essential Medicines for Child Health-Diarrhea, Pneumonia and Malaria Pakistan*; Aga Khan University Karachi

Kishwara1 S, S Tanira, E Omar, F Wazed, S Ara. 2011. Effects of Pre-eclampsia on Perinatal Outcome-A Study Done in the Specialized Urban Hospital Set Up in Bangladesh. *Bangladesh Medical Journal* 2011 Vol. 40 No. 1

Mayer Hashi Project. 2010. *Community-Based Distribution of Misoprostol for the Prevention of Postpartum Hemorrhage: Evaluation of a Pilot Intervention in Tangail District, Bangladesh*. Dhaka: EngenderHealth/Mayer Hashi Project.

Ministry of Health and Family Welfare. 2009. National Neonatal Health Strategy & Guidelines. Government of the People's Republic of Bangladesh, Dhaka

Ministry of Health and Family Welfare. 2009, Strategic Plan for Health, Population and Nutrition Sector Development Program (HPNSDP). Available at: http://www.bma.org.bd/pdf/strategic_Plan_HPNSDP_2011-16.pdf

Mitra, S. N., M. N. Ali, S. Islam, A. R. Cross, and T. Saha. 1994. Bangladesh Demographic and Health Survey, 1993-1994. Dhaka, Bangladesh, and Calverton, Maryland: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International Inc.

Mitra, S. N., M. N. Ali, S. Islam, A. R. Cross, and T. Saha. 1997. Bangladesh Demographic and Health Survey, 1996-1997. Dhaka, Bangladesh, and Calverton, Maryland: National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International Inc.

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ORC Macro. 2001. Bangladesh Demographic and Health Survey 1999-2000. Dhaka, Bangladesh, and Calverton, Maryland: NIPORT, Mitra and Associates, and ORC Macro.

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ORC Macro. 2005. Bangladesh Demographic and Health Survey 2004. Dhaka, Bangladesh, and Calverton, Maryland: NIPORT, Mitra and Associates, and ORC Macro.

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International. 2009. Bangladesh Demographic and Health Survey 2007. Dhaka, Bangladesh, and Calverton, Maryland, USA: NIPORT, Mitra and Associates, and Macro International

National Institute of Population Research and Training (NIPORT), MEASURE Evaluation, and icddr,b. 2012. Bangladesh Maternal Mortality and Health Care Survey 2010. Dhaka, Bangladesh: NIPORT, MEASURE Evaluation, and icddr,b.

Omer, AM, Giashuddin, MS, Kibria, MG. 2013. *National Reproductive Health Commodities Quantification Bangladesh 2012-2016*). Available at: http://siapsprogram.org/wp-content/uploads/2013/03/Bangladesh-SIAPS-RH-Commodities-Quantification-Report.pdf

Segre, Coffey, Metzler, et al. *Chlorhexidine for Umbilical Cord Care. A Case Study Prepared for the UN Commission on Life-Saving Commodities for Women and Children*. February 2012.

Sultana N, Khatun M. 2007. Misoprostol versus Oxytocin in the Active Management of the Third Stage of Labour. *Journal of Bangladesh College of Physicians and Surgeons* Vol. 25, No. 2, May 2007

Takang, E, B Serumaga, C Okoh, and E Obaje. 2012. *Nigeria: Nationwide Forecast and Funding Gap Analysis; Maternal, Newborn, and Child Health Commodities*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 4

UN Population Database, available at: http://www.unfpa.org/public/datafordevelopment/statistics

United Nations. 2010. *Returning to Bangladesh: A Guide for Returnees*; available at: http://www.unescap.org/esid/psis/meetings/AgingMipaa2007/Bangladesh.pdf.

United Nations. 2012. UN Commission on Life-Saving Commodities for Women and Children Commissioners' Report, UN plaza, NY

USAID | DELIVER PROJECT, Task Order 1. 2011. *The Logistics Handbook: A Practical Guide for the Supply Chain Management of Health Commodities*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

World Health Organization, 1995, *Estimating Drug Requirements - A Practical Manual*; Available at: http://apps.who.int/medicinedocs/en/d/Jh2931e/

World Health Organization. 1999. *Care of the Umbilical Cord: A Review of the Evidence*. World Health Organization, Reproductive Health, Maternal and Newborn Health/Safe Motherhood; Geneva, Switzerland, 1999. Available at: https://apps.who.int/rht/documents/MSM98-4/MSM-98-4.htm.

World Health Organization. 2007, *Standards for Maternal and Neonatal Care*, available at: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/a91272/en/

World Health Organization, 2011, *Alternative Magnesium Sulfate Regimens for Women with Pre-Eclampsia and Eclampsia*. Available at: http://apps.who.int/rhl/pregnancy_childbirth/medical/hypertension/cd007388_sonibl_com/en/

World Health Organization. 2012. *Guidelines on Basic Newborn Resuscitation*. Department of Maternal, Newborn, Child and Adolescent Health (MCA), 20 Avenue Appia, 1211 Geneva 27, Switzerland

World Health Organization, 2013. 4th WHO Model List of Essential Medicines for Children. Geneva, Switzerland, April 2013. Available at: http://www.who.int/medicines/publications/essentialmedicines/4th_EMLc_FINAL_web_8Jul13.pdf

ANNEX A. PROJECTED NUMBER OF RESUSCITATION DEVICES FOR NEWBORNS

Type of unit/room	Number of facilities	Est. number of rooms in a hospital	Total number of beds in country	Bag	Mask size 0	Mask size 1	Suction device (re-cleanable)	Manikin
Tertiary level facilities	17	2						17
Number of beds in delivery room (2)		2	68	68	68	68	68	
Operation theater		2	34	68	68	68	68	
Special care unit		1	17	34	34	34	34	
SUB TOTAL			**119**	**170**	**170**	**170**	**170**	**17**
Secondary level facilities (district)	52	1						52
Number of beds in delivery room (1)		1	52	52	52	52	52	
Operation theatre		1	52	52	52	52	52	
Special care unit		0	0	0	0	0	0	
SUB TOTAL			**104**	**104**	**104**	**104**	**104**	**52**
Primary level facilities (UHC & FWC)	2000							2000
Delivery room		1	2000	2000	2000	2000	2000	
Operation theatre		0	0	0	0	0	0	
SUB TOTAL			**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
TOTAL			**2223**	**2274**	**2274**	**2274**	**2274**	**2069**
Skilled Birth Attendant								
2014				16000	16000	16000	16000	
2015				3000	3000	3000	3000	
2016				3000	3000	3000	3000	
2017				3000	3000	3000	3000	
2018				3000	3000	3000	3000	
SUB TOTAL				28000	28000	28000	28000	
GRAND TOTAL			2,223	30,274	30,274	30,274	30,274	2,069