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Quantification of selected medicines and health supplies for the MCH Program for 2016

Ministry of Health of Belize

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Glossary

CMS Central Medical Store

MCH Maternal and Child Health

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I. Introduction

The Salud Mesoamerica 2015 (SM2015) Initiative is an innovative public-private partnership between the Bill & Melinda Gates Foundation (BMGF), the Carlos Slim Health Institute (ICSS), the Spanish Agency of International Cooperation for Development (AECI), the Inter-American Development Bank (IDB) and the countries of the Mesoamerican region. The SM2015 Initiative seeks to improve the health of women and children under five in the 20 percent of the poorest households in the Mesoamerican region, through the implementation of evidence-based practices in the areas of reproductive health, family planning, maternal, newborn and child health, including immunization and nutrition services; strengthening information systems and capacities for the provision of health services.

In February 2015, the Bank signed a contract with the government of Belize to finance operations under BL-G1002 aimed at improving reproductive health, maternal and child health through better access, use and quality of health services. The implementing agency (EO) of the operation is the Ministry of Health of Belize (MoH-BLZ).

With the aim to support the Ministry of Health of Belize in the implementation of the operation, IDB hired John Snow, Inc. to provide technical assistance (TA) to the MoH-BLZ to improve the management of the supply chain for reproductive health, maternal and child health medicines and supplies.

This document contains the quantification for reproductive health, maternal and child health medicines and supplies for those regions where the assessment of the supply chain was conducted in November 2015. In the case of contraceptives, the quantification was prepared for the national level, as contraceptive prevalence rate data is not disaggregated by region.

II. Quantification of medicines and health supplies for the MCH Program in Belize

In order to understand the forecasting and quantification processes to determine demand and procurement needs for a specific medicine, product or health supply, it's important to define the terminology¹ used throughout this document.

Term	Definition
Forecasting	Forecasting answers the question: "How much is needed, in quantities and cost, to meet the health demand of the population?" It is the process of estimating the expected consumption of commodities based on historical consumption, service statistics, morbidity and/or demographic data or assumptions when data are unavailable, to calculate the quantities of commodities needed to meet demand during a particular time frame.
Quantification	Quantification answers the question: "How much will be procured and when will it be delivered?" It includes both forecasting and supply planning. It is the process of estimating the quantities and costs of the products required for a specific health program (or service), and determining when the products should be delivered to ensure an uninterrupted supply for the program. It takes into account the expected demand for commodities, unit costs, existing stocks, stock already on order, expiries, freight, logistics and other costs, lead times, and buffer stocks. Using this information, the total commodity requirements and costs are calculated and compared with the available financial resources to determine the final quantities to procure.
Supply Planning	This is the final output of quantification. Supply planning details the quantities required to fill the supply pipeline, costs, lead times, and arrival dates of shipments to ensure optimal procurement and delivery schedules.

In addition, to perform the quantification exercise for medicines and health supplies, it is necessary to define the concepts of:

¹ Source: Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program. 2014. Promising Practices: Quantification: Forecasting and Supply Planning. Arlington, VA: Management Sciences for Health.

Consumption: The medicines, contraceptives and health supplies dispensed directly to users during a specific period of time.

Distribution: the quantities of medicines, contraceptives and health supplies that are issued between levels and are usually stored for a certain period of time. For example, the quantities that the MCH program issues to regional hospitals and are stored at the MCH ward.

Stock on hand: The quantities of usable stock available at each facility, including storerooms and warehouses.

III. Limitations to conduct the quantification of medicines and health supplies for the MCH Program in Belize

During this visit, we faced some limitations when trying to forecast and quantify medicines and health supplies for the MCH Program:

1. Consumption data was not available at any level (central, regional, local). Only distribution/issues data to regions was available at the central level.
2. The central warehouses (MCH, CMS) only have issues data to regions and hospitals and do not know the issues/distribution data for each individual health unit.
3. The stock on hand at central level (MCH warehouse and CMS) is not known.
4. Hospitals have consumption data for their different wards, but not for the MCH wards and for the health units they resupply.
5. Hospitals have to calculate consumption manually, as hospitals don't use the BHIS system to generate this information automatically.
6. The pharmacies at hospitals do not handle data for the MCH wards. However, they could do it if the MCH program staff entered the data using the BHIS at the hospitals.

Given these limitations, the quantification for medicines and health supplies for the MCH Program is based on issues/distribution data using the 2014-2015 period and the stock hand reported by the MCH Program and the HIV/AIDS Program (i.e. male condoms) as of October 30 2015. Based on these data, we calculated the average monthly distribution to be used for 2016, even though the ideal data to use for forecasting and quantification is consumption data.

In the case of contraceptives, JSI used the data from the document called "Cluster Survey. Final Report Belize 2011, UNICEF" and we used demographic data from the Statistical Institute of Belize "Demographic projection 2015" to do the contraceptive forecasting. For

the quantification, JSI used stock on hand data at the MCH Program warehouse in Belmopan.

3.1 Family Planning

Population and Demographic Profile

Belize is located in Central America; it shares a border with Mexico to the north, Guatemala to the west and south, and with the Caribbean Sea to the east. The total land area of Belize is 22,700 km². The country has a culturally diverse population estimated at 368,310 (184,157 males and 184,015 females) according to the Statistical Institute of Belize population estimates for 2015.

Belize is comprised of six administrative districts: Belize, Cayo, Corozal, Orange Walk, Stann Creek, and Toledo.

The male-female distribution remains practically unchanged as reported in the mid-year estimates for 2012 (50 % males, 50 % females). The urban-rural distribution shifted from 48.6% urban and 51.4% rural in 2000, to 45.1 % urban and 54.9 % rural in 2012.

The Belize District continues to have the largest portion of the population (29.7%) (101,430), followed by the Cayo District with a population of 23.6% (82,677) while; Toledo District maintained the lowest proportion (9.5%), according to the post Census Estimates from 2012.

Belize has a young population. In 2012, 46 % of the population was under 15 years of age, while 53.7% was 20 years of age or older.

The elderly (60 years of age or older) accounted for 6.1 % of the total population. The life expectancy at birth is estimated at 72 years for males and 74 years for females. Women of reproductive age (15-49 years) accounted for 52.67 % of the total female population.

Family planning and contraception

Appropriate family planning is important to the health of women and children by: 1) preventing pregnancies that are too early or too late; 2) extending the period between births; and 3) limiting the number of children. Access by all couples to information and services to prevent pregnancies that are too early, too closely spaced, too late or too many is critical.

The most popular method is female sterilization which is used by 20.7 percent of married women in final report Belize. The next most popular method is the pill, which accounts for 12.5 percent of married women and this is followed closely by injectables at 11.4 percent.

Male condom use (5.2 percent) and use of IUD (1.6 percent) play a small role. Less than 2.1 percent use periodic abstinence, withdrawal, male sterilization, vaginal methods, or the lactational amenorrhea method (LAM).

- a. Use of contraception was reported by 55.2 percent of women currently married or in a union.
- b. The most popular method is female sterilization which is used by 20.7 percent of married women in Belize. The next most popular method is the pill (12.5 percent).
- c. Contraceptive use in urban and rural married women age 15-49 years was 57.7 percent (urban) and 53.3 percent (rural).
- d. Contraceptive prevalence is highest in Corozal District at 61.8 percent.
- e. In the Cayo District, contraceptive use is relatively rare; only 28.3 percent of married women reported using any method.

For the quantification of contraceptive supplies, data from the Belize Multiple Indicator Cluster Survey 2011 Final Report from UNICEF was used, as no consumption data was available when JSI conducted an assessment of the supply chain system in November-December 2015.

Population Data for contraceptive forecasting

To determine estimated consumption of contraceptives, we explained the process of the calculations in the document *"BELZ-3: Forecasting medicines using morbidity data Belize.docx"* December 2015. Based on demographic data, a forecast was prepared based on the estimated number of women of reproductive age:

Total Population (estimated 2015)	368,310
Estimated women in 2015	184,838 (51% of total population)
Women of reproductive age	100,921 (54.6% of female population)
Contraceptive Prevalence Rate 2011*:	55.2 %
Total women using any method	55,709 (55.2% of 100,921 women)

Table 1: Quantification of Contraceptives (in units) for 2016, for all Regions, based on women of reproductive age and contraceptive prevalence rate (2011*)

Contraceptives A	Stock on hand as of October 30 2015 (MCH)** B	Total women using this method based on method mix and prevalence rate C	Quantity to dispense to each couple per month, based on couple-years-of-protection factor/MCH Program dispensing norm D	To procure for 12 months E	To procure for 18 months F
Microlut (cycles)	12,870	1,170	1.08	2,293	9,875
Microynon (cycles)	68,100	6,964	1.08	22,153	67,280
Emergency contraceptive (cycles = 2 pills)	7,200	1,170	0.16	0	0
Medroxyprogesterone Sol. Injection 150 mg / 1 ML	0	6,350	0.33	25,146	37,719
Noristerat (1 dose vials)	534,200	6,350	0.5	0	0
Norigynon (1 dose vials)	59,800	6,350	1	16,400	54,500
Copper T IUD (units)	2,400	891	0.083	0	0
Male condom	763,200	2,897	30	279,720	801,180
Implanon	0	1,170	0.083	1,165	1,748

*Source: Belize Multiple Indicator Cluster Survey 2011 Final Report. UNICEF. The conversion factors are based on USAID's standards and in other cases, MCH Program dispensing norm. In the case of condoms, we used 30 units/month to ensure 100% protection from unwanted pregnancy/HIV infections.

**stock on hand data provided by the MCH Program, based on inventory control card data at central MCH storeroom.

In this case, we quantified the needs for each of the contraceptive products using 12 months and 18 months. For the latter, we estimate a buffer stock of 6 months. In order to calculate each of the quantities:

- **First**, take the stock on hand for each product. In this case, we use the available supplies at the MCH Program warehouse in Belmopan (Column B) as of October 30 2015. Ideally, the stock on hands should represent the total amount of stocks on hand in each of the regions, including all health facilities (hospitals, clinics, health posts, community health workers, etc.), the regional warehouses and the central warehouses.
- **Second**, use total women using each of the contraceptive methods (Column C)
- **Third**, use the couple-years-of protection factor for each method (Column D)
- **Fourth**, multiply (Column C X Column D) and then multiply the result X 12. Subtract the result from Column B for each method and write the result on Column E.
- **Fifth**, multiply (Column C X Column D) and then multiply the result X 18. Subtract the result from Column B for each method and write the result on Column E.

Even though the procedure may seem cumbersome, it's actually very simple: if the MCH Program only wants to procure enough supplies to cover consumption for 12 months, Column E represents the quantities to procure, after subtracting the stock on hand available; if the MCH Program wants to have a buffer stock of 6 months (after securing 12 months of consumption), then Column F represents the quantities to procure, after subtracting the stock on hand available.

Again, it's important to stress the importance of having stock data from all levels of the system. Otherwise, the MCH Program would be at risk of overestimating the quantities to procure and therefore, the potential of expiry products.

Previously, table No.1 shows the quantification for contraceptives based on 2011 contraceptive prevalence rates. Since the MoH doesn't have consumption data, we compared the projections with the contraceptive forecasts made by the MCH program for 2016, which are shown on Table 2:

TABLE 2: Comparison between MCH contraceptive needs for 2016 and JSI quantification based on data collected in November 2015 and contraceptive prevalence rates reported in 2011

CONTRACEPTIVE	STOCK ON HAND (in units, at central MCH warehouse only)		TO PROCURE FOR 12 MONTHS		TO PROCURE FOR 18 MONTHS	
	MCH	JSI	MCH	JSI	MCH	JSI
Microlut (cycles)	12,870	12,870	24,999	2,293	0	9,875
Microgynon (cycles)	68,100	68,100	38,000	22,153	0	67,280
Emergency contraceptive pills (2-pill)	1,200	7,200	10,000	0	0	0
Medroxyprogesterone sol. Injection 150 ml/1 ml	0	0	10,700	25,146	0	37,719
Noristerat (1-dose vial)	7,400	5,342	29,500	0	44,250	0
Norigynon (1-dose vial)	59,800	59,800	0	16,400	0	54,500
Copper T IUD 380A	2,400	2,400	2,600	0	0	0
Male condom	ND	763,200	0	279,720	0	801,180
Implanon (sub-dermal implant)	ND	0	0	1,165	0	1,748

It's important to note that the stock on hand reported on Table 2 represents the stock available at the MCH warehouse in Belmopan. Since the MCH Program doesn't have data on stocks on hand from hospitals and health facilities (including community HECOPAB), it is likely that there are significant quantities of stocks of the different methods at the regional hospitals and health facilities which should be taken into account when quantifying contraceptive needs for 2016. For this reason, JSI recommended to conduct a national

physical inventory as of December 30 2015 or January 30 2016, in order to adjust the procurement quantities.

Also, Table 2 shows some discrepancies between what the MCH Program quantified for contraceptive procurement in 2016 and what the consultants from JSI analyzed and quantified for the same year. The most significant discrepancies concentrate on Microlut, the emergency contraceptive, medroxyprogesterone (Depo-Provera®), Norigynon, condoms and Copper T IUD. The MCH Program should consider reviewing the figures and conducting the physical inventory as soon as possible so that they can adjust the quantities to procure.

In the case of male condoms, even though the MCH Program does neither forecast nor quantify needs, JSI recommends that the MCH Program request the HIV/AIDS Program to forecast and quantify condoms needs in a joint effort to ensure availability of condoms based on real needs. One thing to consider in these projections is that stock on hand data at the health facilities was not available, even though we found physical stocks of contraceptives during the field visits. Because of the lack of records, inventory control cards and the inability to locate all stocks and do a physical count, it was not possible to obtain a reliable count on the available quantities.

3.2 Maternal, infant and child health supplies

Tables 3 through 5 show the quantified amounts for medicines and supplies for the maternal, infant and child health services. As with contraceptives, we used issues/distribution data for 24 months (years 2014-2015) because we couldn't not get consumption data despite many efforts to obtain this data.

Also, the calculation of the procurement quantities are based on the same formulas we explained under Table 1.

Table 3: Quantification of infant and child health medicines and supplies based on issues/distribution data from 2014-2015, of CMS and MCH for Corozal, Cayo and Orange Walk Regions

Medicines 2014-2015	Total quantities issued to Regions by CMS and MCH Program 2014 -15	Average monthly distribution	To procure for 12 months
Amoxicillin oral suspension mg / 5 ml. JAR. 100 ML	1,992	83	996
Erythromycin ethylsuccinate 250 mg/ 5ML. Bottle 100 ml oral suspension	36,000	1,500	18,000
Gentamicin sulfate. Solution for injection 40 mg / 1 mL. AMP.2ML. I. M. / I.V.	14,200	592	7,100
Albendazole 400 mg oral Suspension bottle 10-20 ml.	3,780	158	1,890
Oral Electrolyte Solution reduced osmolarity envelope	24,800	1,033	12,400
Retinol (Vitamin A) Solution 25,000 IU / Drop*	2,000	83	1,000
Retinol (Vitamin A) capsule 50,000 IU**	11,000	458	5,500
Retinol (Vitamin A) Soft Capsule 100,000 IU*	12,000	500	6,000
Retinol (Vitamin A) Soft Capsule 100,000 IU**	19,900	829	9,950
Retinol (Vitamin A) capsule 200,000 IU **	69,500	2,896	34,750
Zinc Sulphate 20mg **	488,200	20,342	244,100

Source: CMS and MCH** warehouse in Belmopan, October 2015

WHO classifies infants as follows:

Newborn : 0-27 days ; Lower lactating infant, under 28 days to 11 months and 29 days ; higher lactating infant, 1 year to 23 months and 29 days ; Preschooler: 2 to 5 years old; Schooler: 6-14 years old. Based on this classification, it is not recommended to classify the drugs for exclusive use by certain age groups like in the case of oral rehydration salts or Amoxicillin suspension, as these drugs can be used by higher lactating infants as well as by toddlers/preschoolers.

Table 4: Quantification for maternal health medicines, based on issues/distribution data from years 2014-2015, of CMS and MCH for Corozal, Cayo and Orange Walk Regions.

Medicines 2014-2015	Total quantities issued to Regions by CMS and MCH Program 2014 -15	Average monthly distribution	To procure for 12 months
Amoxicillin 500 mg/ oral tab/ oral capsule	304,000	12,667	152,000
Ampicillin powder 1 g. Fam. I.V	8,900	371	4,450
Nitrofurantoin 100 mg tablet / Capsule oral	16,000	667	8,000
Albendazole 400 mg. Oral tablet Chewable*	130,500	5,438	65,250
Albendazole 400 mg. Oral tablet Chewable**	121,000	5,042	60,500
Hydralazine 20 mg / ml solution for injection AMP / FAM.2ML IM. I	730	30	365
Folic Acid 5 mg oral tablet	83,000	3,458	41,500
Ferrous Sulfate 60mg + folic acid 400mcg. Tablet/caplet	672,000	28,000	336,000
Hartman Solution for injection 1000 ML. I.V	54,024	2,251	27,012
Sodium Chloride Solution injection solution IV 0.9%	38,616	1,609	19,308
Magnesium Sulfate 10 % 1G.Solution injectable AMP. 10 ML. IM. IV.	4,626	193	2,313
Synthetic Oxytocin 5 U.I / ml. Injectable Solution. Amp. 1 ml. I. M. I.V.	2,200	92	1,100
Ergometrine (ergonovine) 0.2 mg / ml (200 mcg / ml) AMP. IM. IV	1,450	60	725
Prenatal Multi-vitamins and Minerals Tablet / Capsule Vitamin Bottle of 5,000	793	33	397
Iron 200mg + Folic Acid 0.4mg**	1,293,000	53,875	646,500
Multi-vitamin for adults**	1,393,700	58,071	696,850

Source: Central Medical Store and MCH warehouse**, November 2015

Even though this analysis may seem simplistic, the data used for this quantification shows:

- At the central level (i.e. CMS, MCH and HIV/AIDS Programs) the total quantities issued to all regions during 2014-2015. The Programs were not fully aware of the total quantities distributed to the regions, as these products are stored at CMS and this information is not shared with the Programs. In addition, the Regions don't report the information on quantities received from different sources.

- The lack of data visibility across Programs, regions, and warehouses only stresses the importance of setting up a reliable information system to improve forecasting and quantification practices.
- The need to standardize drugs presentation and packaging is an urgent issue to address as soon as possible, to allow the MCH Program a more efficient management of the procurement system. For example, Retinol Vitamin A has 4 different presentations: 25,000, 50,000, 100,000 and 200,000 IU, which makes the procurement and inventory systems very complex to manage.
- The fact that each Program and system (i.e. CMS) makes its own forecasting and quantification exercise as a separate entity, this leads to duplication of efforts, waste of funds and supplies, as well as fragmentation of data and poor forecasting and quantification of real demand at the different levels of the MoH.

Table 5: Condom quantification (in units) for the National HIV Program, based on issues/distribution data from 2015, for all Regions

Stock on hand as of October 30 2015	Total quantities issued to Regions by CMS and MCH Program 2014 -15	Average monthly distribution	To procure for 12 months
763,200	864,000	72,000	100,800

*Source: National HIV/AIDS Program

IV. Summary of quantities to be procured by the MCH Program for 2016

The following table describes the quantities that JSI recommends for procurement during 2016, based on the analysis described in previous sections of this document.

Table 6: Summary of quantities of medicines to be procured for 12 months, by the MCH Program in Belize, for 2016

Medicines 2014-2015	To procure for 12 months
Maternal Health	
Amoxicillin 500 mg/ oral tab/ oral capsule	152,000
Ampicillin powder 1 g. Fam. I.V	4,450
Nitrofurantoin 100 mg tablet / Capsule oral	8,000
Albendazole 400 mg. Oral tablet Chewable	65,250
Albendazole 400 mg. Oral tablet Chewable	60,500
Hydralazine 20 mg / ml solution for injection AMP / FAM.2ML IM. I	365
Folic Acid 5 mg oral tablet	41,500
Ferrous Sulfate 60mg + folic acid 400mcg. Tablet/caplet	336,000
Hartman Solution for injection 1000 ML. I.V	27,012
Sodium Chloride Solution injection solution IV 0.9%	19,308
Magnesium Sulfate 10 % 1G.Solution injectable AMP. 10 ML. IM. IV.	2,313
Synthetic Oxytocin 5 U.I / ml. Injectable Solution. Amp. 1 ml. I. M. I.V.	1,100
Ergometrine (ergonovine) 0.2 mg / ml (200 mcg / ml) AMP. IM. IV	725
Prenatal Multivitamins And Minerals Tablet / Capsule Vitamin Bottle of 5,000	397
Iron 200mg + Folic Acid 0.4mg	646,500
Multi-vitamin for adults	696,850
Infant and child health	
Amoxicillin oral suspension mg / 5 ml. JAR. 100 ML	996
Erythromycin ethylsuccinate 250 mg/ 5ML. Botlle 100 ml oral suspension	18,000
Gentamicin sulfate. Solution for injection 40 mg/1 mL. AMP.2ML. I. M./ I.V.	7,100
Albendazole 400 mg oral Suspension bottle 10-20 ml.	1,890

Medicines 2014-2015	To procure for 12 months
Oral Electrolyte Solution reduced osmolarity envelope	12,400
Retinol (Vitamin A) Solution 25,000 IU / Drop	1,000
Retinol (Vitamin A) capsule 50,000 IU	5,500
Retinol (Vitamin A) Soft Capsule 100,000 IU	6,000
Retinol (Vitamin A) Soft Capsule 100,000 IU	9,950
Retinol (Vitamin A) capsule 200,000 IU	34,750
Zinc Sulfate 20mg	244,100
Male condoms for HIV/AIDS	100,800
Contraceptives	
Microlut (cycles)	2,293
Microynon (cycles)	22,153
Emergency contraceptive (pks=2 tabs)	0
Medroxiprogesterona Sol. Injection 150 mg/1ml	25,146
Noristerat (1dose vials)	0
Norigynon (1dose vials)	16,400
Copper T IUD (units)	0
Male condom	79,720
Implanon	1,165

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