Salud Mesoamérica Initiative
3rd Operation Measurement (2022)
Health Facility and Community Survey Report
Belize

Table of contents

Acronyms

BMGF - Bill & Melinda Gates Foundation

CAPI - Computer-assisted personal interview

CSF - Carlos Slim Foundation

EONC - Essential Obstetric and Neonatal Care

ICD - International Classification of Diseases

IDB - Inter-American Development Bank

IHME - Institute for Health Metrics and Evaluation

LQAS - Lot Quality Assurance Sampling

MRR - Medical record review

RBF - Results-based financing

SMI - Salud Mesoamérica Initiative

WHO - World Health Organization

Executive summary

Introduction

The Salud Mesoamérica Initiative (SMI) is a regional public-private partnership that brings together Mesoamerican governments, private foundations, and bilateral and multilateral donors with the purpose of reducing health inequalities affecting the poorest 20% of the population in the region. The Initiative focuses its resources on integrating key interventions aimed at reducing health inequalities that stem from the lack of access to quality reproductive, maternal, neonatal and child health services. The Institute for Health Metrics and Evaluation (IHME) is the independent external evaluator for the Initiative.

SMI third operation measurement

The objectives of the SMI survey are to assess whether countries are reaching the performance indicator targets set by the Initiative and to evaluate the results of specific interventions. In Belize, baseline measurement (2013) and second operation measurement (2017) data were collected in communities and health facilities in intervention areas, while the first operation measurement data collection took place at health facilities in intervention areas only (2014). The third operation measurement (2022), which was delayed two years due to the COVID-19 pandemic, was performed in communities and health facilities in intervention areas. The use of health facility and community data collection methods permits the measurement of supply- and demand-side information on the Initiative. The pairing of community and health facility surveys is a defining feature of the evaluation, designed to capture key indicators in a robust and multidimensional manner. The SMI third operation measurement is comprised of two components: a community survey of eligible women in marketplaces and households, conducted using a Lot Quality Assurance Sampling (LQAS) methodology, and a survey of health facilities, including review of medical records. Data collection completed in Belize across all measurements is summarized in Table E.1 and Table E.2.

Table E.1: Summary of health facility data collection, SMI Belize

	Baseline	1st Operation	2nd Operation	3rd Operation
	Int.	Int.	Int.	Int.
Health facilities	39	38	20	20
Medical records	546	585	790	Pre-Eval*: 384; Eval: 633

*Records were reviewed from two periods at the third operation to account for the effects of the COVID-19 pandemic

Table E.2: Summary of community data collection, SMI Belize

District	Baseline			2nd Operation			3rd Operation		
	Communities	Women	Children	Communities	Women	Children	Communities	Women	Children
Belize District*	1	23	20	0	0	0	0	0	0
Cayo	6	147	145	6	164	182	6	180	55
Corozal	5	115	105	5	135	147	5	150	63
Orange Walk	4	66	41	5	135	151	5	152	64
Total	**16**	**351**	**311**	**16**	**434**	**480**	**16**	**482**	**182**

*During the baseline survey, one Belize District community was interviewed because it is in proximity to a key referral facility for residents of Cayo, Corozal, and Orange Walk.

Summary of results

In Belize, a total of nine performance indicators were measured at the third operation, three from the community survey and six through health facility surveys or systematic medical record review at health facilities. In total, five indicators were met (one measured in the community survey and four measured in health facility surveys or systematic medical record review), and four were not met. The performance indicator results of the third operation measurement are summarized in Table E.3 and Table E.4.

Table E.3: Summary of third operation performance indicator results, SMI Belize

Source	Indicator #	Indicator	Indicator Value (%)	CI	Target (%)	Status
Community	I5020	Complete vaccination for age	52.8	(41 - 64.2)	22.6	Met
Community	I5060	Diarrhea treatment with ORS and zinc at home	0.0	(-)	45.3	Not met
Community	I6000	Cervical cancer screening	53.2	(46.5 - 59.7)	75.5	Not met
Health facility	I3000	Preconception care with quality	0.0	(-)	20.0	Not met
Health facility	I3030	Antenatal care with quality	9.5	(5.1 - 17)	36.9	Not met
Health facility	I4050	Postpartum care with quality	49.2	(36.4 - 62.1)	46.6	Met
Health facility	I4070	Management of neonatal complications	56.2	(45 - 66.9)	44.3	Met
Health facility	I4080	Management of obstetric complications	56.1	(45 - 66.6)	49.6	Met

Source	Indicator #	Indicator	Indicator Value (%)	CI	Target (%)	Status
Health facility	I7500	Use of data for decision-making	50.0	N/A	40.0	Met

Table E.4: Summary of third operation intervention indicator results, SMI Belize

Source	Indicator	Description	Time Period	Intervention		
				N	%	CI
Community	I5020	Complete vaccination for age*	Baseline	Not measured at baseline		
			2nd Operation	223	12.6	(8.8 - 17.6)
			3rd Operation	72	52.8	(41 - 64.2)
Community	I5060	Diarrhea treatment with ORS and zinc at home	Baseline	41	2.4	(0.3 - 16.6)
			2nd Operation	41	4.9	(1.1 - 18.4)
			3rd Operation	21	0	(-)
Community	I6000	Cervical cancer screening**	Baseline	Not measured at baseline		
			2nd Operation	171	65.5	(58 - 72.3)
			3rd Operation	222	53.2	(46.5 - 59.7)
Health Facility	I3000	Preconception care with quality	Baseline	Not measured at baseline		
			1st Operation	Not measured at 1st operation		
			2nd Operation	Not measured at 2nd operation		
			3rd Op. Pre-evaluation	Not measured at 3rd operation pre-evaluation		
			3rd Op. Evaluation	21	0	(-)
Health Facility	I3030	Antenatal care with quality***	Baseline	22	13.6	(4 - 37.2)
			1st Operation	143	10.5	(6.4 - 16.8)
			2nd Operation	148	16.9	(11.6 - 23.9)
			3rd Op. Pre-evaluation	66	9.1	(4.1 - 19.1)
			3rd Op. Evaluation	105	9.5	(5.1 - 17)
Health Facility	I4050	Postpartum care with quality****	Baseline	43	34.9	(21.8 - 50.7)
			1st Operation	68	61.8	(49.4 - 72.7)
			2nd Operation	158	26.6	(20.2 - 34.1)
			3rd Op. Pre-evaluation	40	52.5	(36.6 - 67.9)
			3rd Op. Evaluation	59	49.2	(36.4 - 62.1)
Health Facility	I4070	Management of neonatal complications	Baseline	77	9.1	(4.3 - 18.1)
			1st Operation	Not measured at 1st operation		
			2nd Operation	75	29.3	(20 - 40.8)
			3rd Op. Pre-evaluation	42	31	(18.5 - 47)
			3rd Op. Evaluation	80	56.2	(45 - 66.9)
Health Facility	I4080	Management of obstetric complications	Baseline	78	23.1	(14.9 - 34)
			1st Operation	Not measured at 1st operation		
			2nd Operation	81	34.6	(24.9 - 45.8)
			3rd Op. Pre-evaluation	49	67.3	(52.6 - 79.3)

Source	Indicator	Description	Time Period	Intervention		
				N	%	CI
			3rd Op. Evaluation	82	56.1	(45 - 66.6)
Health Facility	I7500	Use of data for decision-making	Baseline	Not measured at baseline		
			1st Operation	Not measured at 1st operation		
			2nd Operation	Not measured at 2nd operation		
			3rd Operation	4	50	N/A

* The indicator definition for the 2nd operation corresponds to the vaccination scheme in effect at the time of the 2nd operation.
** Data on VIAA and HPV screening was not captured at the 2nd operation.
*** Rapid Plasma Reagin (RPR) not captured as syphilis test at 1st operation or baseline; HIV not captured at baseline; Gestational age eligibility for uterine height and fetal checkups only available for first ANC visit at baseline.
**** Heart rate not measured as alternative to pulse at 1st operation or baseline; unable to exclude births that were referred at 1st operation or baseline.

Key findings

Several indicators showed notable improvement since baseline. In particular, management of obstetric and neonatal complications and complete vaccination for age improved manifold over baseline and second operation results. Routine maternal postpartum care measured in medical records reversed a decline in performance observed at the second operation, an impressive result given the COVID-19 pandemic context.

On the other hand, medical record antenatal care and community survey cervical cancer screening and diarrhea treatment indicators stagnated or regressed compared to earlier measurement rounds. Additionally, a novel medical record indicator designed to evaluate interventions related to preconception care visits did not demonstrate meaningful uptake in practice or at least in record keeping. These indicators tended to focus on non-urgent or routine care and repeated visits, suggesting that reduced care-seeking behavior and shifting health facility priorities amid the pandemic may have impacted their results.

A further novel performance indicator related to decision making practices using data at health facilities displayed adequate results in its first measurement, suggesting that despite limited time for implementation and the impediments of the pandemic, the successful adoption of some recent interventions was achieved in Belize.

Chapter 1: Introduction

1.1 Overview

The Salud Mesoamérica Initiative (SMI) is a regional public-private partnership that brings together Mesoamerican governments, private foundations and bilateral and multilateral donors with the purpose of reducing health inequalities affecting the poorest 20% of the population in the region. Funding focuses on supply- and demand-side interventions, including evidence-based interventions, the expansion of proven and cost-effective healthcare packages, and the delivery of incentives for effective health services. One of its defining features is the application of a results-based financing (RBF) model that relies on performance measurement and enhanced transparency and accountability. The Initiative focuses its resources on integrating key interventions aimed at reducing health inequalities that stem from the lack of access to quality reproductive, maternal, neonatal and child health services (including immunization and nutrition services) for the poorest quintile of the population.

The objectives of the SMI survey are to assess whether countries are reaching the performance indicator targets set by the Initiative and to evaluate the results of specific interventions. In Belize, baseline (2013) and second operation (2017) data were collected at health facilities and in communities, while the first operation data collection took place at health facilities only (2014). The third operation measurement (2022), which was delayed two years due to the COVID-19 pandemic, was performed health facilities and in communities. The use of health facility and community data collection methods permits the measurement of supply- and demand-side information on the Initiative. The pairing of health facility and community surveys is a defining feature of the evaluation, designed to capture key indicators in a robust and multidimensional manner. The timeline of interventions and data collection is shown in Figure 1.1.

Figure 1.1: SMI Belize timeline
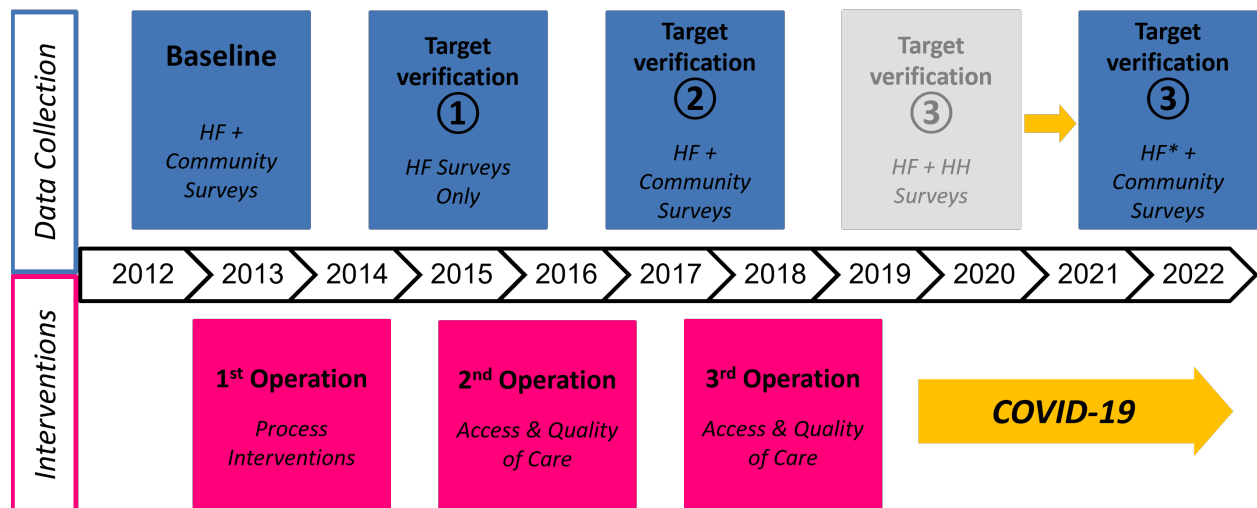
* Due to the delay in caused by the pandemic, medical records for the third operation measurement were reviewed from two distinct time periods (2019-mid 2020; mid 2020-2022). This allowed for a comparative analysis of treatment before and during the pandemic as well as through the evaluation period. For more details on medical record collection time periods, see chapter 2.

1.2 Components of the SMI third operation measurement

The SMI third operation measurement is comprised of two components: a survey of health facilities, including review of medical records, and a community survey of eligible women conducted at households and marketplaces.

1.2.1 Community survey components

The objectives of the SMI community survey are to capture household characteristics and reported maternal and child health data for women 15-49 years of age and for children 0-59 months of age. Community data collection permits the measurement of changes in health status, access to health care, and satisfaction with health care, as well as an array of data points which give context to these factors.

The SMI community survey is conducted as a single interview of eligible women aged 15-49 years, half of which are carried out in public community spaces such as marketplaces while the other half occur at residential households. Unique to Belize, the community survey employs a Lot Quality Assurance Sampling (LQAS) methodology. For more details on methodology, see chapter 2.

During the interview, eligible women aged 15-49 years are asked questions on the following topics: background characteristics (including marital status), birth history; antenatal, delivery, and postpartum care; fertility preferences; and knowledge and use of contraceptive methods (including barriers to use). Those with a child born in the last two years are asked detailed questions on topics such as birth spacing, antenatal care, labor and delivery, postpartum care, and breastfeeding for each live birth in the last two years. Those who cared for children 0-59 months are asked about child health status, feeding practices, and immunization and supplementation history in reference to each child under age five.

1.2.2 Health facility survey components

The objectives of the SMI health facility survey are to assess facility conditions, evaluate service provision and utilization, and measure quality of care. Patient medical records are examined to evaluate facilities' treatment practices retrospectively over the course of the evaluation period. Health facility data collection aims to capture changes produced by interventions at the level of the health services access point, which may foretell changes in population health outcomes.

The SMI health facility survey includes three components: the Interview Questionnaire, the Observation Checklist, and Medical Record Review (MRR).

The Interview Questionnaire captures information reported by the facility director, manager, or person in charge of the health facility. Data are collected on general facility characteristics, infrastructure, and human resource composition, supply logistics, infection control, child health care, vaccine availability, contraceptive services, and maternal, antenatal, delivery, and postpartum care.

The Observation Checklist captures the surveyors' direct observations of equipment and medications at the time of the survey, and includes the review of administrative records to determine the inventory of certain inputs in the three months prior to the survey.

The MRR assesses a variety of treatment and care practices related to maternal and child health, including obstetric and neonatal complications, routine antenatal care, uncomplicated delivery care, postpartum care, cervical cancer screening, and diarrhea treatment among children 0-5 years of age.

1.3 Indicators

The SMI-Belize third operation survey measures indicators defined by IDB and the Belize Ministry of Health and Wellness. For a subset of these indicators, performance targets were set according to results from previous measurements to evaluate the implementation and efficacy of SMI interventions. Achievement of these performance targets in intervention areas determines the disbursement of the SMI award tranche. These indicators are hereafter referred to as "*performance indicators*" (numeric indicator codes in tables are prefixed with "*I*"). The remaining indicators (hereafter referred to as "*monitoring indicators*", prefixed "*MI*") are defined by IDB and the Belize Ministry of Health and Wellness for monitoring purposes only and do not contribute to the evaluation of performance targets.

The body of this report focuses largely on the results of these indicators in SMI-Belize intervention areas. Matrices summarizing intervention-area indicator results are provided in Appendix A. Detailed definitions of each indicator are provided in Appendix B.

1.4 Report tables

Most tables that do not display indicator results take one of two forms. Tabulations of responses for which only one answer was permitted show categories that are mutually exclusive, so the proportions sum to 100%. Counts are shown for non-response ("Don't know" or "Decline to respond" recorded), but these cases are always excluded from the denominator. Tabulations of continuous variables, where respondents were requested to provide a numeric response, present the range and quartiles (25th percentile, median, 75th percentile) in order to illustrate the distribution of responses across the sample. Counts of non-response are listed in the table and excluded from the count of non-missing cases (N).

Chapter 2: Survey methodology

2.1 Study area

The study design for the SMI-Belize survey provides representative estimates of the coverage of key health interventions and indicators for a geographic area that approximates the lowest wealth quintile of the population of Belize.

The primary administrative unit in Belize is the district. Belize has six districts, of which three were purposefully selected for the SMI baseline in Belize: Cayo, Corozal, and Orange Walk (the study area also includes the Ambergis Caye, which is geographically close to Corozal District but administered by Belize District). IDB identified these intervention districts in which to conduct the baseline SMI survey for the Initiative on the basis of their high concentration of residents in the country's lowest wealth quintile.

Figure 2.1: Map of Salud Mesoamérica Initiative study area
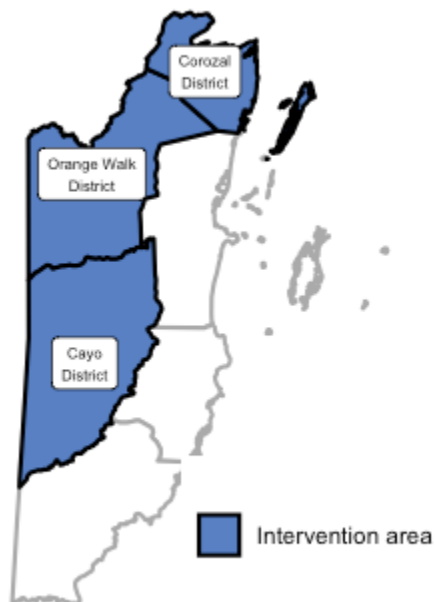
2.2 Health facility sample selection and description

2.2.1 Health facility sample

For the third operation survey, a sample of 20 intervention-area health facilities was selected from a list of all facilities serving the three SMI intervention districts. The list of facilities was constructed according to a referral network outlined by the Belize Ministry of Health and Wellness. Facilities are grouped according to three levels of

Essential Obstetric and Neonatal Care (EONC) services provided: ambulatory, basic, and complete. Ambulatory facilities provide outpatient care, basic facilities are able to attend uncomplicated deliveries and provide immediate emergency obstetric and neonatal care, and complete facilities have surgical capacity in addition to the services above and have capacity to attend complicated deliveries.

All four basic and complete facilities in the study area are included in order to ensure sufficient sample size for the medical record-derived indicators relating to delivery and postpartum care. To complete the facility sample, a stratified random sample of 16 ambulatory facilities is taken, where 50% are facilities visited in previous measurements and 50% are selected at random from a list of facilities that includes eight previously visited facilities and two previously unvisited facilities that were added to the referral network since the second operation measurement.

The remaining two ambulatory facilities in Belize intervention areas are reserved as backup facilities in case sampled facilities cannot be interviewed due to security or logistic concerns. In Belize during the third operation survey, one ambulatory facility that was determined to only be open to patients one day per month was replaced by a backup facility with more regular services.

Due to changes in the referral network in Belize, the sampling process for ambulatory facilities differed between measurement rounds. At baseline and the first operation, a larger sampling frame resulted in samples including 35 and 34 ambulatory-level units respectively. These included separate mobile units functioning out of physical units also in the sample. In the second and third operation measurements, mobile units were not eligible for inclusion in the sample as independent points of attention, but rather were considered together with the corresponding physical unit. As a result of this reduced sampling frame, all 20 health facilities in SMI intervention districts in Belize at the time of the second operation measurement were included with certainty in the measurement (a census rather than a sample of SMI facilities).

2.2.2 Sampling for medical record review

To complete the medical record portion of the survey, records of care conducted during the evaluation period are randomly selected according to the level of services provided at the facility. Quotas of each type of medical record collected are determined according to the number of applicable facilities within the study sample in order to reach a set total sample size of records for each review module. Records of antenatal care were evaluated in all facilities. Diarrhea care and child growth and development follow-up records for children were also collected at ambulatory facilities. Records of delivery, postpartum care, maternal complications and neonatal complications were evaluated at the basic and complete facility level.

Medical record review quotas are set per facility by dividing the total number of records to be reviewed in intervention areas by the number of facilities at each level of EONC. Quota calculations take into account the prevalence of each type of record as measured in the SMI baseline, first, and second operation surveys, as well as the statistical power necessary to detect projected differences from baseline through the third operation for performance indicators measuring SMI interventions. Cases of obstetric and neonatal complications were sampled at random from Ministry of Health and Wellness registries and, if required, additional cases were sampled using a

systematic sampling technique in-facility. For the remaining medical record modules, cases were sampled from attention logs and registries using a systematic sampling technique in-facility.

The COVID-19 pandemic and the subsequent delay of the third operation measurement posed significant challenges to the the sampling and evaluation of medical records related to SMI interventions. Routine medical services such as antenatal care, child health care, and vaccination were greatly reduced during the third operation evaluation time period, and the strain on health systems caused by the pandemic impacted record keeping practices. Additionally, the timing of the pandemic called into question the capacity of medical records to accurately evaluate interventions implemented before the onset of COVID-19.

To address these challenges and capture a more complete picture of the pandemic's impact on health care practices, medical records for the third operation measurement were reviewed from two distinct time periods. One third of the overall medical record quota was allocated to the time period from January 1, 2019 through July 15, 2020 (hereafter referred to as the "pre-evaluation period"). While these records do not contribute to the calculation of performance or monitoring indicator results, they allow for a comparative analysis of indicator performance before and during the pandemic. The remaining two thirds of the overall medical record quota were allocated to the time period from July 16, 2020 through July 15, 2022 (hereafter referred to as the "evaluation period"). This two year window directly preceded the third operation data collection, aligning with the standard evaluation practice of the previous study operations.

An overview of health facility data collection is displayed in Table 2.1.

Table 2.1: Summary of health facility data collection

	Baseline	1st Operation	2nd Operation	3rd Operation
	Int.	Int.	Int.	Int.
Health facilities	39	38	20	20
Medical records	546	585	790	Pre-Eval*: 384; Eval: 633

*Records were reviewed from two periods at the third operation to account for the effects of the COVID-19 pandemic

2.3 Community survey sample selection and description

From the three districts selected for the study, we selected a two-stage sample in order to reach a target minimum sample size of 350 women at the baseline, 400 women at the second operation, and 400 women at the third operation measurement. First, in each round of data collection, a set of 16 communities was selected to match health facilities surveyed in the health facility survey, identified using a referral network provided by the Ministry of Health. Four communities with a hospital that provides basic- or complete-level Essential Obstetric and Neonatal Care were first selected with certainty. The remaining 12 communities were randomly selected among a list of communities with ambulatory-level health facilities. At the second and third operations, selection of these 12 communities was stratified by district, with four facilities selected per district.

For efficiency, half of the total community interviews were conducted with respondents approached in markets and town centers, and half with respondents visited in their homes. This enabled the collection of information from documents stored in the home such as child immunization cards. Communities were randomly assigned to marketplace or household collection. In communities selected for the household sample, households were selected for the interview using field randomization techniques. In the case that more than one eligible woman resided in a selected household, one was selected at random to participate. In communities selected for the marketplace sample, interviewers simply approached women in public places, like markets, where eligible women were likely to be found, and checked for age eligibility before beginning the interview. In the third operation measurement, one rural community selected for the market survey did not have a large community space where a full market quota of interviews could be obtained. Interviews in this community were subsequently collected at households instead of the marketplace.

Between 29 and 31 respondents were interviewed per community. Ultimately, data was collected on 482 women and 182 children during the third operation measurement. Following data collection, we compared estimates for the sub-sample of randomly selected women interviewed in their households with estimates for the sub-sample of women approached in public places. Because results did not differ substantially between these samples, reported estimates are assumed by the investigators to be representative of the sampled population of the aggregate study area. LQAS methodology is not designed to be representative for disaggregation to lower administrative levels, and sampling weights are not derived given that the probability of selection cannot be calculated at the individual level. This analysis does not account for clustering, since the sample of 16 communities makes up the large majority of the 22 total communities identified as the study area.

Table 2.2 shows the total number of completed interviews with women of reproductive age (15-49), and the total number of children aged 0-59 months whose caretakers were interviewed, by district.

Table 2.2: Number of communities surveyed, number of eligible women interviewed, and number of eligible children among interviewed caregivers by district

District	Baseline			2nd Operation			3rd Operation		
	Communities	Women	Children	Communities	Women	Children	Communities	Women	Children
Belize District*	1	23	20	0	0	0	0	0	0
Cayo	6	147	145	6	164	182	6	180	55
Corozal	5	115	105	5	135	147	5	150	63
Orange Walk	4	66	41	5	135	151	5	152	64
Total	**16**	**351**	**311**	**16**	**434**	**480**	**16**	**482**	**182**

*During the baseline survey, one Belize District community was interviewed because it is in proximity to a key referral facility for residents of Cayo, Corozal, and Orange Walk.

2.4 Survey implementation

2.4.1 Data collection instruments

Questionnaires were developed in English. To account for the high number of Spanish speakers in Belize, Spanish translations of the questions were also developed. To best reflect the issues most relevant to the region under study and the local language, both English and Spanish-language questionnaires were revised following input from key stakeholders before each subsequent measurement round.

All surveys were conducted using a computer-assisted personal interview (CAPI). For the third operation measurement, the CAPI was programmed using SurveyCTO and installed onto touch-screen tablets. CAPI supports skip patterns, inter-question answer consistency, and data entry ranges. The aim of introducing CAPI to the field was to reduce survey time by prompting only relevant questions, maintain a logical answering pattern across different questions, decrease data entry errors, and permit rapid data verification.

2.4.2 Training and supervision of data collectors

Training sessions for the third operation survey were conducted in Belize in July 2022. One doctor and one nurse were trained to conduct the health facility surveys. For community data collection, five surveyors and two supervisors were trained. All surveyors underwent a week-long training, which included three days of in-classroom instruction and practice of interview application. Teams were split into their respective groups and given in-depth training and practice for each relevant component of data collection. The training included content review of each survey, proper conduct of the survey, in-depth review of the instrument, research protocols, ethical considerations, and hands-on training on the CAPI software.

Community surveyors participated in a two-day pilot data collection exercise in communities that were not selected to be part of the SMI sample, where they applied the LQAS survey. Health facility surveyors participated in a two-day pilot at health facilities of different EONC levels where they applied the questionnaire, conducted observation exercises, and practiced medical record sampling and review. Representatives from IHME, IDB, and the Belize Ministry of Health and Wellness provided oversight during pilot exercises.

IHME held debriefing and re-training sessions with surveyors post-pilot and provided continued training during the first week of data collection in sampled communities and health facilities.

2.4.3 Data collection, management, and analysis

In Belize, the SMI health facility survey, including the Interview Questionnaire, the Observation Checklist, and Medical Record Review, was conducted between August 3, 2022 and October 8, 2022.

Data collection for the third operation community survey began on August 2, 2022, and was completed on August 29, 2022. In October 2022, some households already visited in the earlier community survey were re-visited to capture more data on HPV screenings as part of a novel evaluation of cervical cancer screening interventions in Belize.

One data collection team consisting of two supervisors and five interviewers was deployed to conduct the SMI community survey. Supervisors were responsible for reviewing questionnaires for quality and consistency prior to departing to each community. One doctor and one nurse were deployed to conduct interviews, observations, and medical record review at health facilities.

Data were collected using touch-screen tablets equipped with CAPI software. Field team leaders monitored the implementation of the survey and reported feedback. Data collection using CAPI allowed data to be transferred instantaneously once a survey was completed via a secure connection to IHME. Modifications based on suggestions and surveyor feedback were incorporated into the instruments and readily transmitted to the field.

IHME conducted real-time monitoring of incoming data throughout the duration of the survey, providing feedback and guidance to data collectors in the field. Any discrepancies and errors were identified at IHME using bespoke quality assurance programs and subsequently resolved through continuous correspondence with the field team. Progress towards sample quotas was also monitored in order to strategize and adapt to logistical challenges.

Data analysis was conducted at IHME using R version 4 and STATA version 17. Performance and monitoring indicators were calculated at IHME following indicator definitions provided by IDB.

Chapter 3: Community survey results

This chapter summarizes the results of the SMI-Belize baseline, second, and third operation community surveys conducted in households and marketplaces using the Lot Quality Assurance Sampling (LQAS) methodology detailed in chapter 2. At the third operation measurement, community interviews were conducted in 16 communities across three districts in intervention areas, shown here in Figure 3.1.

Figure 3.1: Map of communities in the Belize third operation

• Community

3.1 Participant demographics

This section summarizes the demographic characteristics, education status, and childcare of women of reproductive age (15-49 years) participating in the SMI-Belize third operation household survey. In the third operation community survey, 482 women 15-49 years of age were interviewed. The age distribution of community survey participants is shown in Figure 3.2 by five year age groups.

Figure 3.2: Respondent age
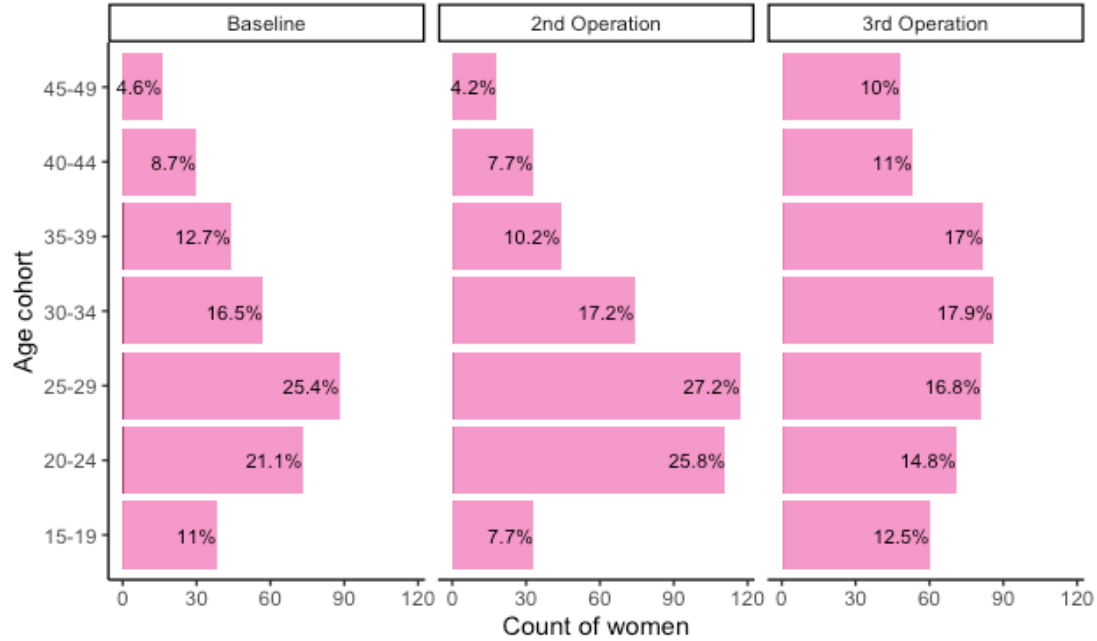
Figure 3.3 displays marital status among community survey participants. In the third operation measurement, a higher proportion of respondents were never married.

Figure 3.3: Respondent marital status
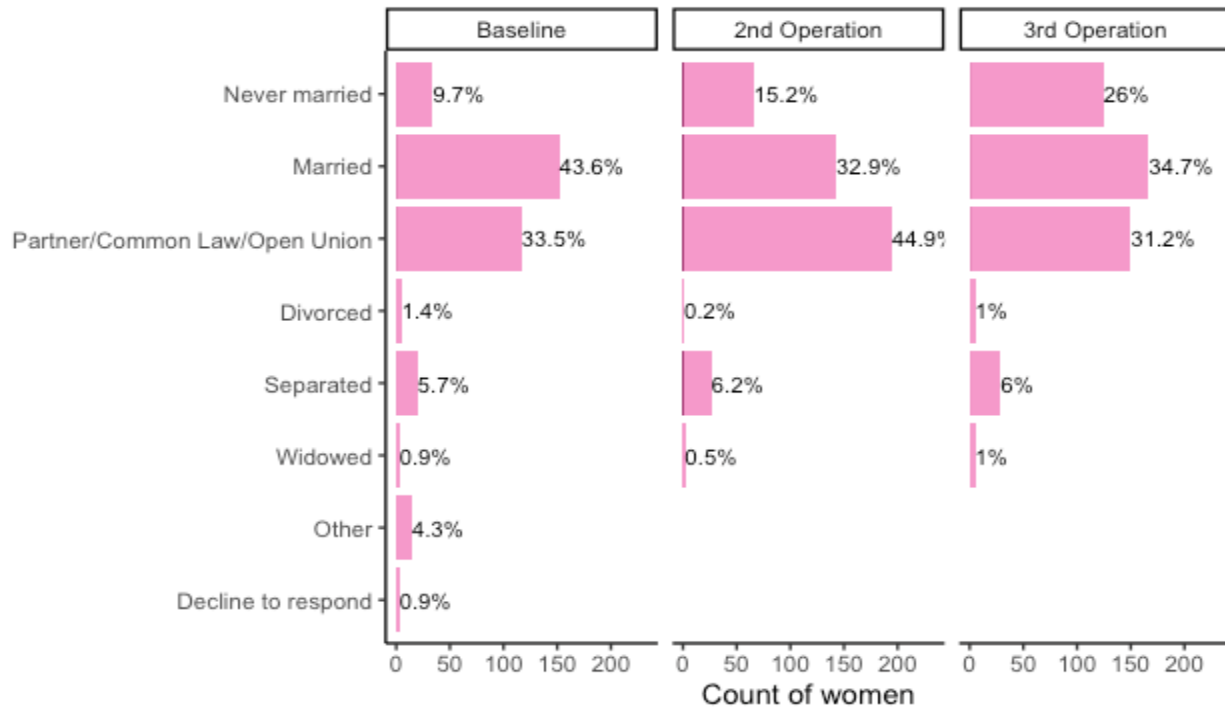
The community survey also captured education attainment among survey respondents, displayed in Figure 3.4. A lower proportion of respondents in the third operation measurement had university-level education status compared to previous measurement rounds.

Figure 3.4: Respondent education attainment
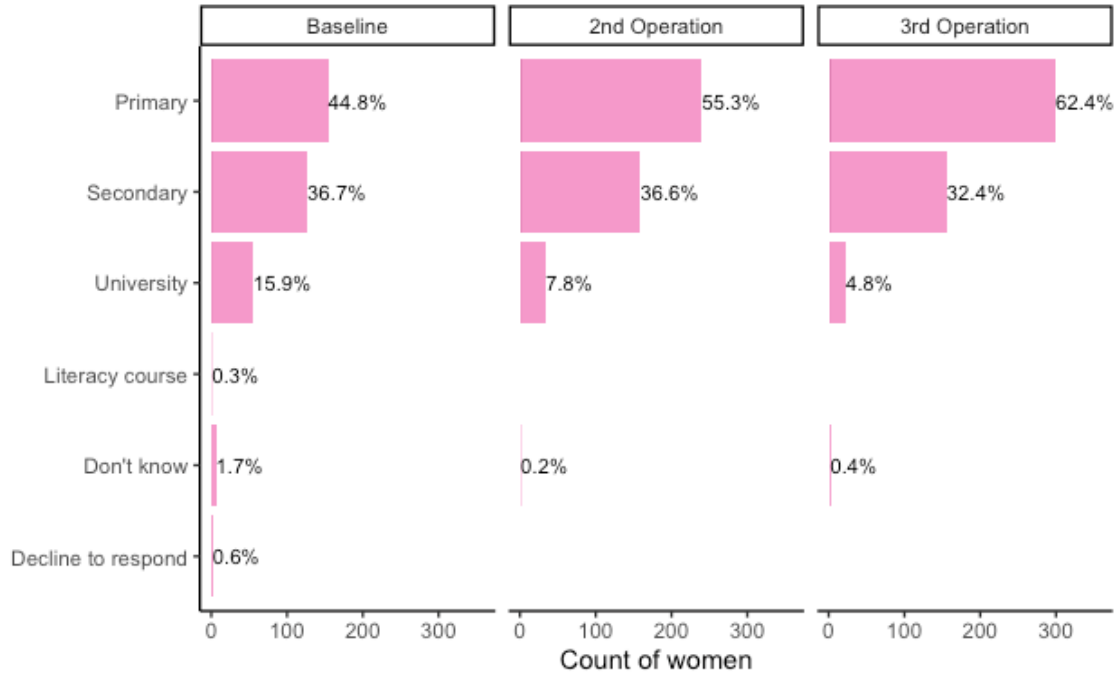
Women were asked their number of biological children under 5 years of age. In the third operation measurement, a substantially larger proportion of respondents indicated that they had no biological children. Figure 3.5 shows the distribution of the number of biological children under 5 years of age.

Figure 3.5: Parity and number of children
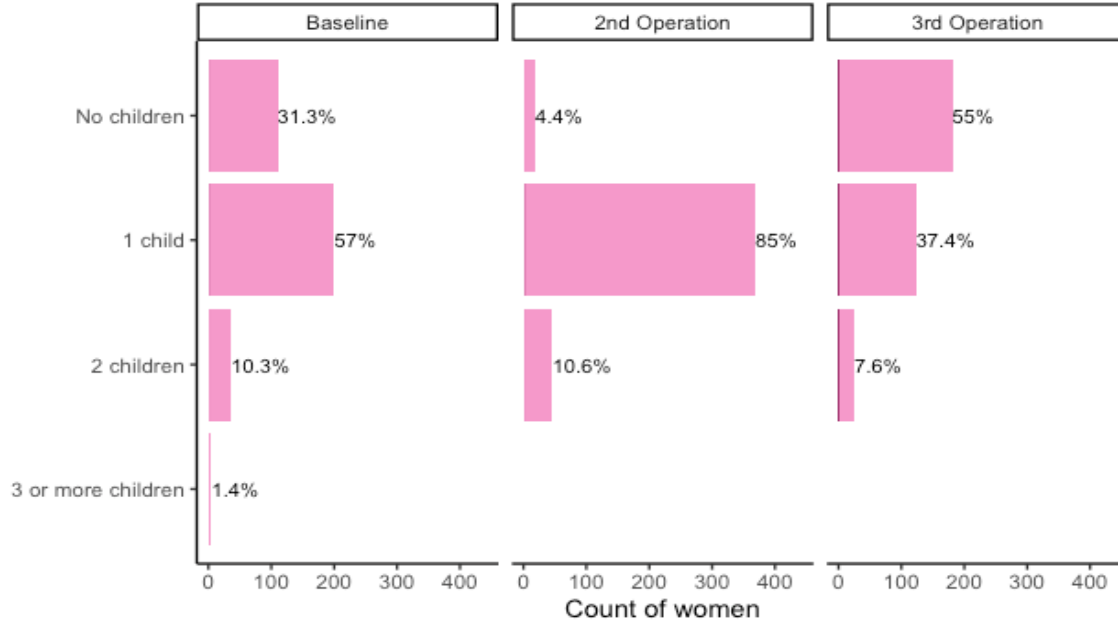
In addition, women were asked if they take care of non-biological children under 5 years of age, such as grandchildren or adopted children. As shown in Figure 3.6, a low proportion of women in the third operation measurement said they take care of non-biological children in this age group.

Figure 3.6: Caretaking of non-biological children
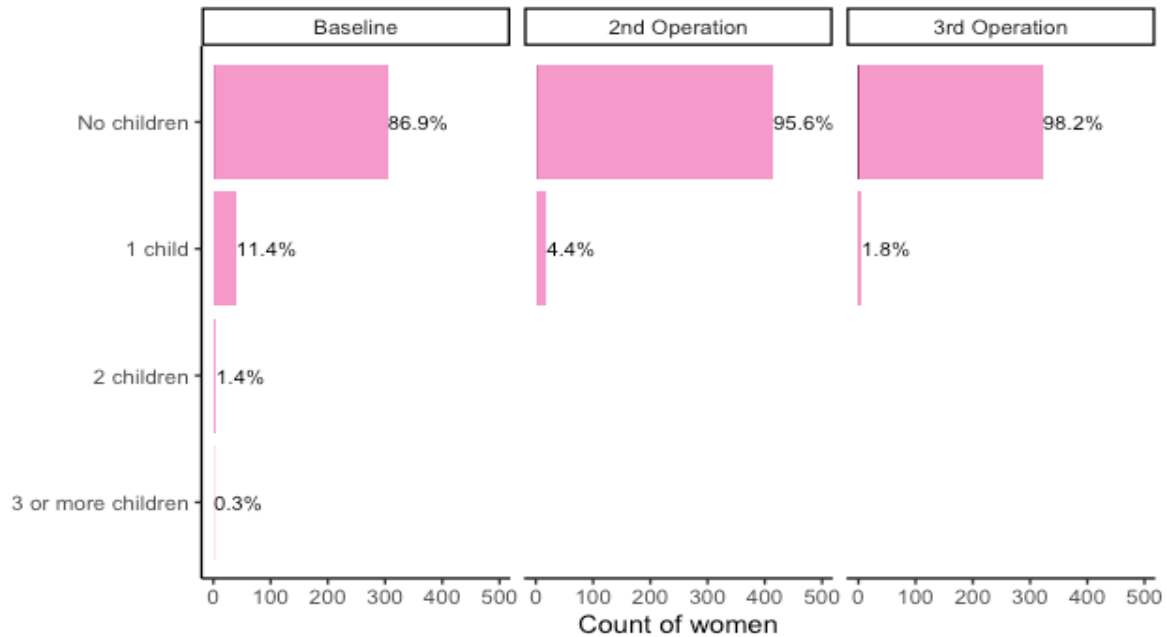
3.2 Women's health

This section summarizes the health status of women of reproductive age (15-49 years) participating in the SMI-Belize third operation community survey.

3.2.1 Contraception

The coverage of contraceptive methods is one of the indicators most frequently used to assess the success of contraception program activities. It is also widely used as a determinant of fertility. Table 3.1 displays the percentage of all married or partnered women using at least one contraceptive method. Women considered "in need" of contraceptive methods are those who are married or partnered, excluding those who report the following characteristics: does not have sexual relations, virgin, menopausal, infertile, pregnant, or wants to become pregnant. Even women not considered "in need" of contraception may use a method (see appendix B for details on the monitoring indicator 2010).

Table 3.1: Current use of contraceptive methods, women 15-49 years of age who are married or partnered (MI2010), community survey

Description	Baseline			2nd Operation			3rd Operation		
	N	%	CI	N	%	CI	N	%	CI
Current use of any method, among all women	267	69.3	(63.5-74.6)	338	84	(79.7-87.6)	299	72.6	(67.2-77.4)
Currently in need of contraception	267	90.6	(86.5-93.6)	338	88.5	(84.6-91.5)	299	82.9	(78.2-86.8)
Women (age 15-49) who currently use (or whose partner is using) a modern method of contraceptive (MI2010)	**267**	**61.8**	**(55.8-67.5)**	**338**	**78.4**	**(73.7-82.5)**	**299**	**67.6**	**(62-72.7)**

3.2.2 Cervical cancer screening

A novel performance indicator (6000) in the third operation survey was introduced to measure recent cervical cancer screening interventions implemented through SMI. Respondents were asked about their recollection of various types of screenings including Papanicolaou test (Pap smear), human papillomavirus (HPV) screening, and visual inspection of the cervix with acetic acid (VIAA), as well as whether the results of those screenings were known to the respondent at the time of the interview.

To better reflect the various types of screenings included in intervention practices, households visited in the initial third operation data collection period were revisited and respondents were asked additional questions regarding HPV screenings, which had not been asked during the second operation survey. VIAA data were also not collected in the the second operation, while no data on cervical cancer screenings was collected at the baseline measurement.

Table 3.1 displays the results of the novel cervical cancer screening indicator.

Table 3.2: Cervical cancer screening (I6000), community survey

Description	2nd Operation			3rd Operation		
	N	%	CI	N	%	CI
Screened in last 3 years (VIAA or Pap)	171	70.2	(62.8-76.6)	222	51.8	(45.2-58.4)
Screened in last 3 years (Pap)	171	70.2	(62.8-76.6)	222	48.6	(42.1-55.3)
Knows results of screening (Pap)	120	93.3	(87.1-96.7)	108	92.6	(85.7-96.3)
Screened in last 3 years (VIAA)	0			222	12.6	(8.8-17.7)

	2nd Operation			3rd Operation		
Knows results of screening (VIAA)	0			28	**92.9**	(73.7-98.4)
Screened in last 5 years (HPV)	0			97	**11.3**	(6.3-19.5)
Knows results of screening (HPV)	0			11	**90.9**	(46.3-99.1)
Cervical screening to standard (I6000)	**171**	**65.5**	**(58-72.3)**	**222**	**53.2**	**(46.5-59.7)**

3.3 Obstetric health

Participating women were interviewed about all live births in the last five years, but to reduce the impact of recall bias, results reported here are for each woman's most recent birth in the last two years. At the third operation measurement, 69 women were interviewed about births in the last two years.

3.3.1 Antenatal care

Early and regular checkups by trained medical providers are important in assessing the physical status of women during pregnancy and provide an opportunity to intervene in a timely manner if any problems are detected. The monitoring indicator 3020 measures whether respondents indicated receiving at least four antenatal care visits, including at least once with a skilled attendant. Though skilled attendance was relatively unchanged since the second operation measurement, the proportion of women who reported receiving at least four visits fell. This reduction may be attributable to the impact of COVID-19 on regular care seeking.

To reduce recall bias, data pertaining to antenatal care are summarized for a woman's most recent birth in the last two years.

Table 3.3: At least four antenatal care visits with skilled attendance (MI3020), community survey

	Baseline			2nd Operation			3rd Operation		
Description	**N**	**%**	**CI**	**N**	**%**	**CI**	**N**	**%**	**CI**
Attended at least one antenatal care visit	119	**97.5**	(92.4-99.2)	199	**94**	(89.6-96.6)	69	**92.8**	(83.4-97)
Attended at least one antenatal care visit with doctor or professional nurse	119	**96.6**	(91.3-98.8)	199	**94**	(89.6-96.6)	69	**91.3**	(81.6-96.1)
Women (age 15-49) who attended at least 4 antenatal care visits, at least one of which was with a skilled attendant, for their most recent pregnancy during the last two years (MI3020)	**119**	**82.4**	**(74.3-88.3)**	**199**	**81.9**	**(75.9-86.7)**	**69**	**71**	**(59-80.7)**

3.3.2 Delivery care

Proper medical attention and hygienic conditions during delivery can reduce the risk of complications, infections, and even death for the mother and newborn baby. Characteristics of the delivery, including place of delivery and assistance at delivery were captured for all births in the two years preceding the survey. To reduce recall bias, only data from the most recent delivery within the last two years are summarized.

The location of delivery and assistance a woman receives during childbirth has important health consequences for both mother and child. The monitoring indicator 4010 evaluates institutional delivery with the presence of a skilled birth attendant. In-facility deliveries include deliveries at public and private hospitals, health centers/clinics, health units, and other health facilities.

Table 3.4: Institutional delivery with a skilled birth attendant, women 15-49 years of age with a birth in the last two years (MI4010), community survey

Description	Baseline			2nd Operation			3rd Operation		
	N	%	CI	N	%	CI	N	%	CI
Delivery with a skilled birth attendant	119	95.8	(90.2-98.3)	198	97	(93.4-98.6)	69	100	(-)
Delivery with a skilled birth attendant in a hospital	119	89.9	(83-94.2)	198	92.9	(88.4-95.8)	69	97.1	(88.8-99.3)
Women (age 15-49) whose most recent birth was attended by a skilled attendant in an institutional setting in the last two years (MI4010)	119	95	(89.1-97.7)	198	94.9	(90.8-97.3)	69	100	(-)

3.4 Child care

This section summarizes the health status of children aged 0-59 months whose caregivers participated in the SMI-Belize third operation community survey. All data summarized here are based on the caregiver's report.

3.4.1 Early initiation of breastfeeding

Early initiation of breastfeeding is defined as the percentage of children born in the 24 months prior to the survey (<24 months old) who are put to the breast within one hour after birth.

Table 3.5: Early initiation of breastfeeding, children <24 months of age (MI5050), community survey

Description	Baseline			2nd Operation			3rd Operation		
	N	%	CI	N	%	CI	N	%	CI
Children born in the last 24 months who were put to the breast within one hour of birth (MI5050)	120	70	(61.1-77.6)	196	64.3	(57.3-70.7)	70	74.3	(62.5-83.3)

3.4.2 Exclusive breastfeeding

Coverage of exclusive breastfeeding is defined as the percentage of infants born in the six months prior to the survey who received only breast milk during the previous day. This information is obtained through a 24-hour dietary recall in which the caregiver indicates whether the child consumed breast milk, other foods, or other drinks during the previous day and night.

Table 3.6: Exclusive breastfeeding among children 0-5 months of age (MI5040), community survey

Description	Baseline			2nd Operation			3rd Operation		
	N	%	CI	N	%	CI	N	%	CI
Children 0-5 months who were exclusively breastfed on the previous day (MI5040)	33	33.3	(18.9-51.8)	34	41.2	(25.4-59)	16	43.8	(20.4-70.2)

3.4.3 Danger signs in newborns

During the interview, women with a birth in the past 2 years were asked about their knowledge of child health danger signs. Women's responses were unprompted and matched to a list of five pre-specified danger signs: feeding problems; reduced activity; difficulty breathing; fevers, fits, and convulsions; and cold to the touch.

Table 3.7: Ability to recognize danger signs in a newborn, women 15-49 years of age with a birth in the last two years (MI4115), community survey

Description	Baseline			2nd Operation			3rd Operation		
	N	%	CI	N	%	CI	N	%	CI
Fever, fits, or convulsions	118	52.5	(43.4-61.5)	196	69.4	(62.5-75.5)	69	72.5	(60.5-81.9)
Feeding problems	117	40.2	(31.6-49.4)	196	34.7	(28.3-41.7)	69	30.4	(20.5-42.5)
Difficulty breathing	117	51.3	(42.1-60.3)	196	24	(18.5-30.5)	69	39.1	(28.1-51.3)
Cold to the touch	117	12.8	(7.8-20.3)	196	18.4	(13.5-24.5)	69	7.2	(3-16.6)
Reduced activity	117	12.8	(7.8-20.3)	196	11.2	(7.5-16.5)	69	14.5	(7.9-25.2)
Women (age 15-49) with a birth in the last two years who can recognize at least 3 danger signs in newborns (MI4115)	**116**	**31.9**	**(24-41)**	**196**	**14.3**	**(10-20)**	**69**	**24.6**	**(15.7-36.4)**

3.4.4 Immunization against common childhood illnesses

Information on immunization coverage was collected on children 0-59 months during the household survey. The results of performance indicator 5020 are displayed in Table 3.8, which shows the number of children who received at least one dose of each vaccination they were eligible at the time of the survey, according to the national vaccination scheme in Belize. Children who were too young and do not require any vaccine yet are excluded from this table. Requirements for immunization are determined according to the nominal vaccination scheme at the time of each measurement period. Comparable immunization data were not captured at the baseline measurement.

Table 3.8: Immunization against common childhood illnesses, children eligible for immunization who received at least one dose, according to caretaker recall (I5020), community survey

Description	2nd Operation			3rd Operation		
	N	%	CI	N	%	CI
BCG immunization according to caregiver recall	223	100	(-)	72	100	(-)
Polio immunization according to caregiver recall	223	18.8	(14.2-24.6)	72	68.1	(56.2-78)
Pentavalent immunization according to caregiver recall	223	19.3	(14.6-25)	72	68.1	(56.2-78)
Measles, mumps, and rubella (MMR) immunization according to caregiver recall	223	62.3	(55.7-68.5)	72	72.2	(60.5-81.5)
DPT immunization according to caregiver recall	223	100	(-)	0		
HepB immunization according to caregiver recall	0			72	93.1	(84.1-97.1)
Children 0-59 months identified as having received full vaccinations for age by caregiver recall (I5020)	**223**	**12.6**	**(8.8-17.6)**	**72**	**52.8**	**(41-64.2)**

3.4.5 Micronutrient supplementation

According to the monitoring indicator 5070, children should consume micronutrient packets daily for 60 day periods, starting at six-month intervals at six months old, twelve months old, and eighteen months old. Children at the third operation did not consume micronutrient packets.

Table 3.9: Micronutrient packets consumed among children 6-23 months (MI5070), community survey

		Baseline			2nd Operation			3rd Operation	
Description	**N**	**%**	**CI**	**N**	**%**	**CI**	**N**	**%**	**CI**
No packets	82	**84.1**	(74.3-90.7)	170	**78.8**	(72-84.4)	55	**100**	(-)
1-10 packets	82	**13.4**	(7.5-22.9)	170	**18.2**	(13.1-24.8)	55	**0**	(-)
11-20 packets	82	**0**	(-)	170	**0**	(-)	55	**0**	(-)
21-30 packets	82	**0**	(-)	170	**0.6**	(0.1-4.1)	55	**0**	(-)
31-40 packets	82	**0**	(-)	170	**0**	(-)	55	**0**	(-)
41-50 packets	82	**0**	(-)	170	**0**	(-)	55	**0**	(-)
51-59 packets	82	**0**	(-)	170	**0**	(-)	55	**0**	(-)
Children 6-23 months who received at least 60 packets of micronutrients in the past six months (MI5070)	**82**	**0**	**(-)**	**170**	**0**	**(-)**	**55**	**0**	**(-)**

3.4.6 Diarrhea treatment

Dehydration caused by severe diarrhea is a major cause of morbidity and mortality among children. Exposure to diarrheal disease-causing agents is frequently a result of use of contaminated water and unhygienic practices related to food preparation and disposal of feces. Caregivers were asked whether their children aged 0-59 months had diarrhea in the two weeks preceding the interview. If the child had diarrhea, the caregiver was asked about treatment and feeding practices during the diarrheal episode.

The performance indicator 5060 specifies the appropriate treatment of diarrhea in children aged 0-59 months via the home administration of oral rehydration solution (ORS) and zinc. The lack of zinc administration was a consistent impediment to indicator performance across measurement rounds.

Table 3.10: Utilization of oral rehydration solution and zinc for diarrhea, among children 0-59 months (I5060), community survey

		Baseline			2nd Operation			3rd Operation	
Description	**N**	**%**	**CI**	**N**	**%**	**CI**	**N**	**%**	**CI**
ORS administered	41	**73.2**	(57-84.9)	41	**56.1**	(40.2-70.9)	21	**61.9**	(38.3-80.9)
Zinc administered	41	**2.4**	(0.3-16.6)	41	**7.3**	(2.3-21.2)	21	**0**	(-)
Diarrhea treatment with ORS and zinc at home (I5060)	**41**	**2.4**	**(0.3-16.6)**	**41**	**4.9**	**(1.1-18.4)**	**21**	**0**	**(-)**

Chapter 4: Health facility survey results

4.1 Summary of health facilities and medical record extraction

4.1.1 Health facility characteristics

A total of 20 facilities in were surveyed for the third operation measurement. Results from these facilities are presented in this chapter. Sixteen ambulatory EONC health units, 2 basic EONC health units, and 2 complete EONC units were included in the sample. Ambulatory level units include *Health Clinic*, *Health Post*, *Polyclinic*, and *Mobile Unit* health facilities, while *Community Hospitals* make up basic level units, and *Regional Hospitals* make up complete level units. Health facilities are broken down by EONC in Table 4.1.

Table 4.1: Health facility classification

EONC	Baseline	1st Operation	2nd Operation	3rd Operation
Ambulatory	35	34	16	16
Basic	2	2	2	2
Complete	2	2	2	2
Total	**39**	**38**	**20**	**20**

Table 4.2: Count of facilities by district

District	Baseline	1st Operation	2nd Operation	3rd Operation
Cayo District	13	13	7	7
Corozal District	12	12	7	7
Orange Walk	14	13	6	6
Total	**39**	**38**	**20**	**20**

Figure 4.1 is a map of all intervention health facilities visited at the third operation measurement. Table 4.2 displays the locations of health facilities by district from the baseline to third operation. Third operation health facilities were surveyed in 3 districts.

Figure 4.1: Map of health facilities in third operation intervention areas

• Health facility

4.1.2 Medical record extraction

The medical record review component of the study included a review of 1,017 medical records at the third operation, 384 from the pre-evaluation period and 633 from the evaluation period (see chapter 2 for details on medical record time periods). The number and type of medical records reviewed varied depending on the type of facility and services provided.

Table 4.3 below shows the total number of medical records of each type collected throughout this study. At all four operations, child follow-up and diarrhea records were collected at ambulatory facilities, and uncomplicated delivery, immediate postpartum care, obstetric complications, and neonatal complications were collected at basic and complete facilities. Antenatal care records were collected across all EONC levels.

As detailed in chapter 2, medical records reviewed for the third operation measurement were allocated into two time periods, pre-evaluation (January 1, 2019 through July 15, 2020) and evaluation (July 16, 2020 through July 15, 2022), to allow for a comparative analysis of indicator performance before and during the COVID-19 pandemic. Medical record indicator tables in this chapter display results for both pre-evaluation and evaluation time periods when available, while only the evaluation time period records are applicable to the performance indicator result.

Table 4.3: Medical Record Review sample size, intervention areas

MRR Type	Baseline	1st Operation	2nd Operation	3rd Operation, Pre-Evaluation	3rd Operation, Evaluation
Antenatal care	192	245	156	89	142
Diarrhea	5	74	163	75	110

MRR Type	Baseline	1st Operation	2nd Operation	3rd Operation, Pre-Evaluation	3rd Operation, Evaluation
Immediate postpartum care	50	71	154	60	92
Neonatal complications	143	40	80	45	84
Obstetric complications	80	63	83	51	89
Uncomplicated delivery	76	92	154	64	116
Total	**546**	**585**	**790**	**384**	**633**

4.2 Women's health

Data were collected to evaluate both a health facility's capacity to offer women's health care (staff, facilities, equipment, medication), as well as a review of the actual women's health care supplied in medical records.

4.2.1 Preconception care

A novel performance indicator (3000) at the third operation measurement was designed to capture information related to preconception care interventions implemented by SMI in Belize. Antenatal care records at ambulatory facilities were evaluated for the presence of at least one preconception care visit, wherein various vital checks, lab tests, and risk factor management practices were to occur prior to the onset of the patient's pregnancy. Among reviewed records, no preconception care visits were recorded. This might suggest that though the implementation of the intervention was underway, record keeping practices was not yet adapted to inclusion of information regarding preconception care visits. For more information about the requirements for preconception care as defined by indicator 3000, see appendix B.

Table 4.4: Preconception care (I3000), ambulatory facilities

Description	3rd Operation: Evaluation		
	N	%	CI
At least one preconception care visit	21	0	(-)
Height checked at least once	0		
Weight checked at least once	0		
Blood pressure checked at least once	0		
Folic acid at least once	0		
Hemoglobin checked at least once	0		
HIV test at least once	0		
At least one preconception care visit to standard (I3000)	**21**	**0**	**(-)**

4.2.2 Antenatal care

Interviewers systematically selected antenatal care (ANC) records from ambulatory facilities for women who delivered in the last two years. ANC visits with quality are defined by the performance indicator 3030, which requires five ANC visits minimum, with physical checkups performed at each ANC visit. The first visit should occur before 13 weeks gestation. Additionally, specific laboratory tests must be performed at least once during the pregnancy. For a detailed definition of ANC standards required for indicator 3050, see appendix B.

The I3030 indicator was first measured at the baseline in which 13.6% of observations met the indicator. In the third operation evaluation period the proportion of observations that met the indicator decreased from the baseline with 9.5% of observations meeting the indicator.

Table 4.5: At least five antenatal care (ANC) visits to standard (I3030), ambulatory facilities

Description	Baseline			1st Operation			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI	N	%	CI
At least five ANC visits	22	54.5	(32.5-74.9)	143	93.7	(88.3-96.7)	148	79.1	(71.7-84.9)	66	47	(35-59.3)	105	37.1	(28.3-46.9)
First visit before 13 weeks gestation	22	31.8	(15-55.3)	143	29.4	(22.4-37.4)	148	41.9	(34.1-50.1)	66	36.4	(25.5-48.9)	105	35.2	(26.6-45)
All appropriate checks performed, at least five ANC visits*	22	50	(28.7-71.3)	143	90.9	(84.9-94.7)	148	76.4	(68.7-82.6)	66	19.7	(11.6-31.4)	105	21	(14.1-29.9)
Among patients with at least 5 visits, all visits had weight checked	12	91.7	(49.9-99.2)	134	100	(-)	117	93.2	(86.8-96.6)	31	45.2	(28-63.5)	39	56.4	(40-71.5)
Among patients with at least 5 visits, all visits had blood pressure checked	12	91.7	(49.9-99.2)	134	100	(-)	117	96.6	(91.1-98.7)	31	48.4	(30.8-66.4)	39	59	(42.4-73.7)
Among patients with at least 5 visits, all visits >= 14 weeks gestation had uterine height checked	7	85.7	(25.7-99)	134	53.7	(45.2-62.1)	117	55.6	(46.3-64.4)	27	25.9	(12.2-46.8)	38	36.8	(22.6-53.8)
Among patients with at least 5 visits, all visits >= 20 weeks gestation had fetal checkups	2	100	(-)	134	94.8	(89.4-97.5)	117	93.2	(86.8-96.6)	23	82.6	(59.7-93.8)	37	67.6	(50.3-81.1)
All lab tests performed at least once during pregnancy:	22	50	(28.7-71.3)	143	30.1	(23-38.2)	148	31.8	(24.7-39.8)	66	57.6	(45.1-69.1)	105	62.9	(53.1-71.7)
Blood group	22	81.8	(58.1-93.6)	143	95.8	(90.9-98.1)	148	96.6	(92.1-98.6)	66	83.3	(72-90.7)	105	81.9	(73.2-88.2)
Rh factor	22	81.8	(58.1-93.6)	143	93.7	(88.3-96.7)	148	95.3	(90.3-97.7)	66	83.3	(72-90.7)	105	81.9	(73.2-88.2)
Blood glucose	22	54.5	(32.5-74.9)	143	66.4	(58.2-73.8)	148	40.5	(32.8-48.7)	66	72.7	(60.5-82.3)	105	70.5	(60.9-78.5)
HIV test**	0			143	93.7	(88.3-96.7)	148	98.6	(94.7-99.7)	66	95.5	(86.5-98.6)	105	96.2	(90.1-98.6)
Syphilis test (VDRL / RPR***)	22	81.8	(58.1-93.6)	143	78.3	(70.7-84.4)	148	89.2	(83-93.3)	66	93.9	(84.6-97.8)	105	94.3	(87.7-97.4)
Hemoglobin	22	81.8	(58.1-93.6)	143	98.6	(94.5-99.7)	148	63.5	(55.4-70.9)	66	84.8	(73.7-91.8)	105	82.9	(74.3-89)
Urinalysis	22	77.3	(53.5-90.9)	143	56.6	(48.3-64.6)	148	91.9	(86.2-95.4)	66	80.3	(68.6-88.4)	105	78.1	(69-85.1)
Antenatal care performed according to standard (I3030)	22	13.6	(4-37.2)	143	10.5	(6.4-16.8)	148	16.9	(11.6-23.9)	66	9.1	(4.1-19.1)	105	9.5	(5.1-17)

* Gestational age eligibility for uterine height and fetal checkups only available for first ANC visit at baseline.
** HIV not captured at baseline.
*** Rapid Plasma Reagin (RPR) not captured as syphilis test at 1st operation or baseline.

4.2.3 Postpartum care

The performance indicator 4050 specifies the standards for appropriate postpartum care (PPC) within two hours after birth, as measured from postpartum care medical records for deliveries in the past two years. The indicator

requires that certain checks be performed at least four times in the first hour after delivery, twice in the second hour after delivery, and once at discharge. For a detailed definition of indicator 4050, see appendix B.

The I4050 indicator was first measured at the baseline in which 34.9% of observations met the indicator. In the third operation evaluation period the proportion of observations that met the indicator increased from the baseline with 49.2% of observations meeting the indicator.

Table 4.6: Maternal postpartum care within two hours after birth (I4050), basic and complete facilities

Description	Baseline			1st Operation			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Blood pressure	43	37.2	(23.7-53)	68	70.6	(58.4-80.4)	158	31.6	(24.8-39.4)	40	60	(43.6-74.4)	59	49.2	(36.4-62.1)
Temperature	43	34.9	(21.8-50.7)	68	72.1	(60-81.6)	158	31	(24.2-38.7)	40	60	(43.6-74.4)	59	49.2	(36.4-62.1)
Heart rate / pulse*	43	34.9	(21.8-50.7)	68	73.5	(61.5-82.8)	158	28.5	(21.9-36.1)	40	57.5	(41.3-72.3)	59	49.2	(36.4-62.1)
Respiratory rate	43	34.9	(21.8-50.7)	68	67.6	(55.4-77.9)	158	28.5	(21.9-36.1)	40	55	(38.9-70.1)	59	50.8	(37.9-63.6)
Immediate maternal PPC to standard (I4050)	**43**	**34.9**	**(21.8-50.7)**	**68**	**61.8**	**(49.4-72.7)**	**158**	**26.6**	**(20.2-34.1)**	**40**	**52.5**	**(36.6-67.9)**	**59**	**49.2**	**(36.4-62.1)**

* Heart rate not measured as alternative to pulse at 1st operation or baseline; unable to exclude births that were referred at 1st operation or baseline.
** Unable to exclude births that were referred at 1st operation or baseline.

4.2.4 Partograph use

Monitoring indicator 4060 evaluates the use of a partograph in birth records. A number of checks are included to verify that the partograph was completed to standard, including the use of note taking in the case that the fetal heart rate went below 120 beats per minute or if the alert curve is surpassed. For a detailed definition of the standards required for indicator 4060, see appendix B. Partograph data from the baseline evaluation are not applicable to this indicator.

Table 4.7: Partograph use (MI4060), basic and complete facilities

Description	1st Operation			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Patient arrived in imminent birth or elective C-section (no partograph included)	90	7.8	(3.7-15.6)	139	2.9	(1.1-7.5)	63	27	(17.3-39.6)	114	41.2	(32.5-50.6)
Partograph included and filled out (regardless of delivery type)	90	91.1	(83-95.6)	139	80.6	(73.1-86.4)	63	65.1	(52.2-76)	114	42.1	(33.3-51.5)
Dilation >= 4.5 cm	82	74.4	(63.6-82.8)	112	44.6	(35.6-54.1)	41	70.7	(54.5-83)	48	72.9	(58.2-83.9)
Emergency C-section (if dilation < 4.5 cm)	21	4.8	(0.6-30.9)	62	1.6	(0.2-11.1)	12	16.7	(3.3-54.3)	13	0	(-)
Fetal heart rate and alert curve recorded (if dilation > 4.5 cm)	61	77	(64.5-86.1)	50	96	(84.7-99)	29	93.1	(74.6-98.4)	35	88.6	(72.2-95.9)
Fetal heart rate < 120 bpm	47	0	(-)	48	6.3	(1.9-18.3)	29	41.4	(24.3-60.8)	34	32.4	(18.3-50.5)
Note written within 30 minutes if fetal heart rate < 120 bpm	0			3	0	(-)	12	0	(-)	11	0	(-)
Alert curve surpassed	47	4.3	(1-16.2)	49	4.1	(1-15.6)	27	14.8	(5.3-35.1)	32	37.5	(22-56.1)
Note written within 30 minutes if alert curve surpassed	2	100	(-)	2	0	(-)	4	50	(2.5-97.5)	12	25	(6.7-60.7)
Partograph filled according to standard (MI4060)	**90**	**61.1**	**(50.5-70.8)**	**139**	**34.5**	**(27-42.9)**	**63**	**50.8**	**(38.3-63.2)**	**114**	**55.3**	**(45.9-64.2)**

4.2.5 Management of obstetric complications

Interviewers evaluated records of obstetric complications (sepsis, hemorrhage, severe pre-eclampsia, and eclampsia) that were systematically sampled by IHME from electronic discharge registries provided by the Ministry of Health and Wellness at basic and complete facilities. These records were used to evaluate quality of care, as defined by the obstetric complications performance indicator 4080 (see appendix B for detailed definitions of the care requirements for indicator 4080). Note that some records may have been evaluated for multiple obstetric complications.

The 4080 indicator was first measured at the baseline in which 23.1% of observations met the indicator. In the third operation evaluation period the proportion of observations that met the indicator increased from the baseline with 56.1% of observations meeting the indicator.

Table 4.8: Management of obstetric complications (I4080), basic and complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Sepsis managed to standard	9	55.6	(19.5-86.6)	5	60	(8.1-96.2)	2	100	(-)	0		
Hemorrhage managed to standard	36	25	(13.1-42.4)	36	58.3	(41.1-73.7)	31	77.4	(58.4-89.3)	53	71.7	(57.7-82.5)
Pre-eclampsia managed to standard	27	11.1	(3.3-31.1)	36	8.3	(2.6-23.9)	16	43.8	(20.4-70.2)	25	32	(16-53.7)
Eclampsia managed to standard	7	14.3	(1-74.3)	6	16.7	(0.9-81.4)	0			5	20	(0.8-88.9)
Maternal complications managed to standard (I4080)	78	23.1	(14.9-34)	81	34.6	(24.9-45.8)	49	67.3	(52.6-79.3)	82	56.1	(45-66.6)

Sepsis cases are evaluated as one component of the obstetric complications indicator 4080. Table 4.9 and Table 4.10 below display sepsis management practices in each operation measurement. By chance, no records of obstetric sepsis were selected to the sample in the third operation evaluation period. For a detailed definition of the standards required for appropriate sepsis management, see appendix B.

Table 4.9: Management of obstetric complications (I4080), sepsis, basic facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked:	7	100	(-)	3	100	(-)	1	100	(-)	0		
Pulse / heart rate	7	100	(-)	3	100	(-)	1	100	(-)	0		
Blood pressure	7	100	(-)	3	100	(-)	1	100	(-)	0		
Temperature	7	100	(-)	3	100	(-)	1	100	(-)	0		
Antibiotics administered (double or triple therapy)	7	71.4	(21.5-95.8)	3	66.7	(0.3-99.9)	1	100	(-)	0		
Causes treated appropriately:	3	100	(-)	0			0			0		
Septic abortion	0			0			0			0		
Pelvic abscess	0			0			0			0		
Retained product	0			0			0			0		
Puerperal fever	0			0			0			0		
Uterine perforation	0			0			0			0		
Postpartum endometritis	3	100	(-)	0			0			0		
Neonatal sepsis managed according to standard	7	71.4	(21.5-95.8)	3	66.7	(0.3-99.9)	1	100	(-)	0		

Table 4.10: Management of obstetric complications (I4080), sepsis, complete facilities

Description	Baseline N	Baseline %	Baseline CI	2nd Operation N	2nd Operation %	2nd Operation CI	3rd Operation: Pre-evaluation N	3rd Operation: Pre-evaluation %	3rd Operation: Pre-evaluation CI	3rd Operation: Evaluation N	3rd Operation: Evaluation %	3rd Operation: Evaluation CI
Vital signs checked:	2	100	(-)	2	100	(-)	1	100	(-)	0		
Pulse / heart rate	2	100	(-)	2	100	(-)	1	100	(-)	0		
Blood pressure	2	100	(-)	2	100	(-)	1	100	(-)	0		
Temperature	2	100	(-)	2	100	(-)	1	100	(-)	0		
Lab tests (blood biometry):	2	0	(-)	2	50	(0-100)	1	100	(-)	0		
Leukocyte count	2	100	(-)	2	50	(0-100)	1	100	(-)	0		
Platelet count	2	50	(0-100)	2	50	(0-100)	1	100	(-)	0		
Hemoglobin	2	0	(-)	2	50	(0-100)	1	100	(-)	0		
Hematocrit	2	100	(-)	2	50	(0-100)	1	100	(-)	0		
Antibiotics administered (double or triple therapy)	2	100	(-)	2	100	(-)	1	100	(-)	0		
Causes treated appropriately:	2	100	(-)	1	100	(-)	1	100	(-)	0		
Septic abortion	0			0			0			0		
Pelvic abscess	0			0			0			0		
Retained product	2	100	(-)	0			1	100	(-)	0		
Puerperal fever	0			0			0			0		
Uterine perforation	0			0			0			0		
Postpartum endometritis	0			1	100	(-)	0			0		
Maternal sepsis managed according to standard	**2**	**0**	**(-)**	**2**	**50**	**(0-100)**	**1**	**100**	**(-)**	**0**		

Hemorrhage cases are evaluated as one component of the obstetric complications indicator 4080. Table 4.11 and Table 4.12 below display hemorrhage management practices in each operation measurement. For a detailed definition of the standards required for appropriate hemorrhage management, see appendix B.

Table 4.11: Management of obstetric complications (I4080), hemorrhage, basic facilities

Description	Baseline N	Baseline %	Baseline CI	2nd Operation N	2nd Operation %	2nd Operation CI	3rd Operation: Pre-evaluation N	3rd Operation: Pre-evaluation %	3rd Operation: Pre-evaluation CI	3rd Operation: Evaluation N	3rd Operation: Evaluation %	3rd Operation: Evaluation CI
Vital signs checked:	11	100	(-)	16	100	(-)	19	100	(-)	22	95.5	(70.4-99.5)
Pulse / heart rate	11	100	(-)	16	100	(-)	19	100	(-)	22	95.5	(70.4-99.5)
Blood pressure	11	100	(-)	16	100	(-)	19	100	(-)	22	95.5	(70.4-99.5)
Ringer's lactate / Hartmann's / saline solution administered	11	90.9	(46.3-99.1)	16	75	(45.7-91.4)	19	84.2	(57.8-95.4)	22	95.5	(70.4-99.5)
Causes treated appropriately:	3	33.3	(0.1-99.7)	6	50	(9.1-90.9)	7	71.4	(21.5-95.8)	13	84.6	(49-96.9)
Abortion	0			1	100	(-)	5	80	(11.1-99.2)	3	66.7	(0.3-99.9)
Ectopic pregnancy	0			0			0			0		
Placenta previa	3	33.3	(0.1-99.7)	4	25	(0.5-95.9)	1	100	(-)	2	100	(-)
Uterine rupture	0			0			0			0		
Uterine atony	0			1	100	(-)	1	100	(-)	5	100	(-)
Uterine inversion	0			0			0			0		
Retained product	0			0			1	0	(-)	3	66.7	(0.3-99.9)
Hemorrhage managed according to standard	**11**	**72.7**	**(35.4-92.8)**	**16**	**62.5**	**(34.8-83.9)**	**19**	**78.9**	**(52.7-92.7)**	**22**	**81.8**	**(58.1-93.6)**

Table 4.12: Management of obstetric complications (I4080), hemorrhage, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked:	25	88	(66.7-96.4)	20	90	(64.5-97.8)	12	100	(-)	31	77.4	(58.4-89.3)
Pulse / heart rate	25	92	(70.9-98.2)	20	90	(64.5-97.8)	12	100	(-)	31	77.4	(58.4-89.3)
Blood pressure	25	92	(70.9-98.2)	20	90	(64.5-97.8)	12	100	(-)	31	77.4	(58.4-89.3)
Lab tests:	25	4	(0.5-26.3)	20	75	(49.7-90.1)	12	75	(39.3-93.3)	31	93.5	(76.1-98.5)
Hematocrit	25	88	(66.7-96.4)	20	90	(64.5-97.8)	12	83.3	(45.7-96.7)	31	100	(-)
Hemoglobin	25	52	(31.8-71.6)	20	90	(64.5-97.8)	12	83.3	(45.7-96.7)	31	100	(-)
Platelet count	25	8	(1.8-29.1)	20	75	(49.7-90.1)	12	75	(39.3-93.3)	31	93.5	(76.1-98.5)
Ringer's lactate / Hartmann's / saline solution administered	25	72	(50.2-86.8)	20	85	(59.6-95.6)	12	100	(-)	31	80.6	(61.9-91.5)
Causes treated appropriately:	15	66.7	(37.2-87.1)	9	88.9	(37.4-99.1)	5	100	(-)	17	82.4	(53.7-94.9)
Abortion	4	100	(-)	3	100	(-)	0			1	100	(-)
Ectopic pregnancy	0			0			0			0		
Placenta previa	5	40	(3.8-91.9)	1	100	(-)	0			1	100	(-)
Uterine rupture	0			0			0			0		
Uterine atony	3	100	(-)	4	75	(4.1-99.5)	5	100	(-)	11	100	(-)
Uterine inversion	0			0			0			0		
Retained product	3	33.3	(0.1-99.7)	1	100	(-)	0			4	25	(0.5-95.9)
Hemorrhage managed according to standard	25	4	(0.5-26.3)	20	55	(31.8-76.2)	12	75	(39.3-93.3)	31	64.5	(45.5-79.9)

Pre-eclampsia cases are evaluated as one component of the obstetric complications indicator 4080. Table 4.13, Table 4.14, and Table 4.15 below display pre-eclampsia management practices in each operation measurement. Because requirements at complete facilities differ based on whether the patient was referred or not, separate tables are displayed for referred and non-referred cases. For a detailed definition of the standards required for appropriate pre-eclampsia management, see appendix B.

Table 4.13: Management of obstetric complications (I4080), pre-eclampsia, basic facilities, referred

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	10	100	(-)	20	95	(67.7-99.4)	6	83.3	(18.6-99.1)	9	100	(-)
Blood pressure	10	100	(-)	20	95	(67.7-99.4)	6	83.3	(18.6-99.1)	9	100	(-)
All appropriate medications administered	10	10	(0.9-57.8)	20	10	(2.2-35.5)	6	83.3	(18.6-99.1)	9	77.8	(33-96.1)
Magnesium sulfate	10	60	(24.3-87.5)	20	90	(64.5-97.8)	6	100	(-)	9	100	(-)
Ringer's lactate / Hartmann's / saline solution	10	30	(7.6-69)	20	10	(2.2-35.5)	6	83.3	(18.6-99.1)	9	77.8	(33-96.1)
Pre-eclampsia managed according to standard	10	10	(0.9-57.8)	20	10	(2.2-35.5)	6	83.3	(18.6-99.1)	9	77.8	(33-96.1)

Table 4.14: Management of obstetric complications (I4080), pre-eclampsia, basic facilities, not referred.

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	2	0	(-)	6	0	(-)	2	0	(-)	5	20	(0.8-88.9)
Pulse / heart rate	2	100	(-)	6	66.7	(14.9-95.8)	2	100	(-)	5	60	(8.1-96.2)
Blood pressure	2	100	(-)	6	83.3	(18.6-99.1)	2	100	(-)	5	80	(11.1-99.2)
Respiratory rate	2	100	(-)	6	66.7	(14.9-95.8)	2	100	(-)	5	60	(8.1-96.2)
Patellar reflex	2	0	(-)	6	0	(-)	2	0	(-)	5	20	(0.8-88.9)
Lab tests	2	50	(0-100)	6	33.3	(4.2-85.1)	2	50	(0-100)	5	60	(8.1-96.2)
Platelet count	2	100	(-)	6	50	(9.1-90.9)	2	50	(0-100)	5	80	(11.1-99.2)
Aspartate aminotransferase / glutamic-oxalacetic transaminase	2	50	(0-100)	6	33.3	(4.2-85.1)	2	50	(0-100)	5	60	(8.1-96.2)
Alanine transaminase / glutamic-pyruvic transaminase	2	50	(0-100)	6	33.3	(4.2-85.1)	2	50	(0-100)	5	80	(11.1-99.2)
All appropriate medications administered	2	0	(-)	6	50	(9.1-90.9)	2	50	(0-100)	5	80	(11.1-99.2)
Magnesium sulfate	2	0	(-)	6	50	(9.1-90.9)	2	50	(0-100)	5	80	(11.1-99.2)
Hydralazine / labetalol / nifedipine (if diastolic blood pressure > 110 at first checkup)	0			0			0			1	100	(-)
Dexamethasone / betamethasone (if gestational age >=24 or <34 weeks)	0			0			0			1	100	(-)
Eclampsia managed according to standard	**2**	**0**	**(-)**	**6**	**0**	**(-)**	**2**	**0**	**(-)**	**5**	**20**	**(0.8-88.9)**

Table 4.16: Management of obstetric complications (I4080), pre-eclampsia, complete facilities, not referred

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	15	13.3	(2.8-45.4)	10	20	(3.7-62.2)	8	37.5	(8.7-79.2)	11	0	(-)
Pulse / heart rate	15	93.3	(58.4-99.3)	10	90	(42.2-99.1)	8	100	(-)	11	27.3	(7.2-64.6)
Blood pressure	15	100	(-)	10	100	(-)	8	100	(-)	11	36.4	(11.7-71.2)
Respiratory rate	15	93.3	(58.4-99.3)	10	90	(42.2-99.1)	8	100	(-)	11	27.3	(7.2-64.6)
Patellar reflex	15	13.3	(2.8-45.4)	10	30	(7.6-69)	8	37.5	(8.7-79.2)	11	0	(-)
Lab tests	15	60	(31.8-82.9)	10	50	(18.1-81.9)	8	75	(27.6-95.9)	11	81.8	(42-96.5)
Platelet count	15	66.7	(37.2-87.1)	10	50	(18.1-81.9)	8	100	(-)	11	90.9	(46.3-99.1)
Aspartate aminotransferase / glutamic-oxalacetic transaminase	15	66.7	(37.2-87.1)	10	80	(37.8-96.3)	8	75	(27.6-95.9)	11	90.9	(46.3-99.1)
Alanine transaminase / glutamic-pyruvic transaminase	15	73.3	(42.9-91)	10	80	(37.8-96.3)	8	75	(27.6-95.9)	11	90.9	(46.3-99.1)
All appropriate medications administered	15	60	(31.8-82.9)	10	90	(42.2-99.1)	8	100	(-)	11	45.5	(16.8-77.4)
Magnesium sulfate	15	73.3	(42.9-91)	10	90	(42.2-99.1)	8	100	(-)	11	45.5	(16.8-77.4)
Hydralazine / labetalol / nifedipine (if diastolic blood pressure > 110 at first checkup)	3	100	(-)	1	100	(-)	0			1	100	(-)
Dexamethasone / betamethasone (if gestational age >=24 or <34 weeks)	4	25	(0.5-95.9)	0			0			0		
Eclampsia managed according to standard	**15**	**13.3**	**(2.8-45.4)**	**10**	**10**	**(0.9-57.8)**	**8**	**25**	**(4.1-72.4)**	**11**	**0**	**(-)**

Table 4.15: Management of obstetric complications (I4080), pre-eclampsia, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	15	13.3	(2.8-45.4)	10	20	(3.7-62.2)	8	37.5	(8.7-79.2)	11	0	(-)
Pulse / heart rate	15	93.3	(58.4-99.3)	10	90	(42.2-99.1)	8	100	(-)	11	27.3	(7.2-64.6)
Blood pressure	15	100	(-)	10	100	(-)	8	100	(-)	11	36.4	(11.7-71.2)
Respiratory rate	15	93.3	(58.4-99.3)	10	90	(42.2-99.1)	8	100	(-)	11	27.3	(7.2-64.6)
Patellar reflex	15	13.3	(2.8-45.4)	10	30	(7.6-69)	8	37.5	(8.7-79.2)	11	0	(-)
Lab tests	15	60	(31.8-82.9)	10	50	(18.1-81.9)	8	75	(27.6-95.9)	11	81.8	(42-96.5)
Platelet count	15	66.7	(37.2-87.1)	10	50	(18.1-81.9)	8	100	(-)	11	90.9	(46.3-99.1)
Aspartate aminotransferase / glutamic-oxalacetic transaminase	15	66.7	(37.2-87.1)	10	80	(37.8-96.3)	8	75	(27.6-95.9)	11	90.9	(46.3-99.1)
Alanine transaminase / glutamic-pyruvic transaminase	15	73.3	(42.9-91)	10	80	(37.8-96.3)	8	75	(27.6-95.9)	11	90.9	(46.3-99.1)
All appropriate medications administered	15	60	(31.8-82.9)	10	90	(42.2-99.1)	8	100	(-)	11	45.5	(16.8-77.4)
Magnesium sulfate	15	73.3	(42.9-91)	10	90	(42.2-99.1)	8	100	(-)	11	45.5	(16.8-77.4)
Hydralazine / labetalol / nifedipine (if diastolic blood pressure > 110 at first checkup)	3	100	(-)	1	100	(-)	0			1	100	(-)
Dexamethasone / betamethasone (if gestational age >=24 or <34 weeks)	4	25	(0.5-95.9)	0			0			0		
Eclampsia managed according to standard	**15**	**13.3**	**(2.8-45.4)**	**10**	**10**	**(0.9-57.8)**	**8**	**25**	**(4.1-72.4)**	**11**	**0**	**(-)**

Eclampsia cases are evaluated as one component of the obstetric complications indicator 4080. Table 4.17, Table 4.18, and Table 4.19 below display eclampsia management practices in each operation measurement. Because requirements at basic facilities differ based on whether the patient was referred or not, separate tables are displayed for referred and non-referred cases. For a detailed definition of the standards required for appropriate eclampsia management, see appendix B.

Table 4.17: Management of obstetric complications (I4080), eclampsia, basic facilities, referred

Description	Baseline			2nd Operation		
	N	%	CI	N	%	CI
Vital signs checked	3	100	(-)	2	100	(-)
Blood pressure	3	100	(-)	2	100	(-)
All appropriate medications administered	3	33.3	(0.1-99.7)	2	50	(0-100)
Magnesium sulfate	3	66.7	(0.3-99.9)	2	100	(-)
Ringer's lactate / Hartmann's / saline solution	3	33.3	(0.1-99.7)	2	50	(0-100)
Pre-eclampsia managed according to standard	**3**	**33.3**	**(0.1-99.7)**	**2**	**50**	**(0-100)**

No eclampsia obstetric complications with referral records were found at basic facilities in the third operation sample.

Table 4.18: Management of obstetric complications (I4080), eclampsia, basic facilities, not referred

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	0			0			0			2	0	(-)
Pulse / heart rate	0			0			0			2	100	(-)
Blood pressure	0			0			0			2	100	(-)
Respiratory rate	0			0			0			2	100	(-)
Patellar reflex	0			0			0			2	0	(-)
Lab tests	0			0			0			2	50	(0-100)
Platelet count	0			0			0			2	100	(-)
Aspartate aminotransferase / glutamic-oxalacetic transaminase	0			0			0			2	50	(0-100)
Alanine transaminase / glutamic-pyruvic transaminase	0			0			0			2	50	(0-100)
All appropriate medications administered	0			0			0			2	100	(-)
Magnesium sulfate	0			0			0			2	100	(-)
Hydralazine / labetalol / nifedipine (if diastolic blood pressure > 110 at first checkup)	0			0			0			1	100	(-)
Dexamethasone / betamethasone (if gestational age >=24 or <34 weeks)	0			0			0			0		
Eclampsia managed according to standard	0			0			0			2	0	(-)

Table 4.19: Management of obstetric complications (I4080), eclampsia, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	4	25	(0.5-95.9)	4	0	(-)	0			3	66.7	(0.3-99.9)
Pulse / heart rate	4	100	(-)	4	50	(2.5-97.5)	0			3	66.7	(0.3-99.9)
Blood pressure	4	100	(-)	4	100	(-)	0			3	100	(-)
Respiratory rate	4	100	(-)	4	50	(2.5-97.5)	0			3	66.7	(0.3-99.9)
Patellar reflex	4	25	(0.5-95.9)	4	25	(0.5-95.9)	0			3	66.7	(0.3-99.9)
Lab tests	4	25	(0.5-95.9)	4	50	(2.5-97.5)	0			3	66.7	(0.3-99.9)
Platelet count	4	50	(2.5-97.5)	4	50	(2.5-97.5)	0			3	100	(-)
Aspartate aminotransferase / glutamic-oxalacetic transaminase	4	25	(0.5-95.9)	4	50	(2.5-97.5)	0			3	100	(-)
Alanine transaminase / glutamic-pyruvic transaminase	4	25	(0.5-95.9)	4	50	(2.5-97.5)	0			3	66.7	(0.3-99.9)
All appropriate medications administered	4	50	(2.5-97.5)	4	100	(-)	0			3	100	(-)
Magnesium sulfate	4	50	(2.5-97.5)	4	100	(-)	0			3	100	(-)
Hydralazine / labetalol / nifedipine (if diastolic blood pressure > 110 at first checkup)	1	100	(-)	0			0			0		
Dexamethasone / betamethasone (if gestational age >=24 or <34 weeks)	0			0			0			0		
Eclampsia managed according to standard	4	0	(-)	4	0	(-)	0			3	33.3	(0.1-99.7)

4.3 Neonatal care

Data were collected to evaluate both a health facility's capacity to offer neonatal care (staff, facilities, equipment, medication), as well as a review of the actual neonatal care supplied in medical records.

4.3.1 Neonatal complications

Interviewers evaluated records of neonatal complications (sepsis, asphyxia, low birth weight, and prematurity) that were systematically sampled by IHME from electronic discharge registries provided by the Ministry of Health and Wellness at basic and complete facilities. These records were used to evaluate quality of care, as defined by the neonatal complications performance indicator 4070 (see appendix B for detailed definitions of the care requirements for indicator 4070). Note that some records may have been evaluated for multiple neonatal complications.

The I4070 indicator was first measured at the baseline in which 9.1% of observations met the indicator. In the third operation evaluation period the proportion of observations that met the indicator increased from the baseline with 56.2% of observations meeting the indicator.

Table 4.20: Management of neonatal complications (I4070), basic and complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Sepsis managed to standard	41	14.6	(6.5-29.7)	11	27.3	(7.2-64.6)	8	12.5	(0.9-68.1)	5	20	(0.8-88.9)
Asphyxia managed to standard	21	0	(-)	16	0	(-)	2	50	(0-100)	4	25	(0.5-95.9)
Low birth weight managed to standard	10	0	(-)	37	51.4	(34.9-67.5)	25	44	(25.2-64.7)	53	67.9	(53.8-79.4)
Prematurity managed to standard	14	7.1	(0.7-44.1)	23	30.4	(14.3-53.4)	13	23.1	(6.3-57.2)	31	41.9	(25.3-60.6)
Neonatal complications managed to standard (I4070)	**77**	**9.1**	**(4.3-18.1)**	**75**	**29.3**	**(20-40.8)**	**42**	**31**	**(18.5-47)**	**80**	**56.2**	**(45-66.9)**

Sepsis cases are evaluated as one component of the neonatal complications indicator 4070. Table 4.21 and Table 4.22 below display sepsis management practices in each operation measurement. For a detailed definition of the standards required for appropriate sepsis management, see appendix B.

Table 4.21: Management of neonatal complications (I4070), sepsis, basic facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	8	75	(27.6-95.9)	4	100	(-)	1	100	(-)	1	100	(-)
Pulse / heart rate	8	75	(27.6-95.9)	4	100	(-)	1	100	(-)	1	100	(-)
Respiratory rate	8	87.5	(31.9-99.1)	4	100	(-)	1	100	(-)	1	100	(-)
Temperature	8	87.5	(31.9-99.1)	4	100	(-)	1	100	(-)	1	100	(-)
Antibiotics administered (double or triple therapy)	8	75	(27.6-95.9)	4	75	(4.1-99.5)	1	100	(-)	1	100	(-)
Referred to complete facility (if hemodynamic failture or shock)	0			0			0			1	100	(-)
Sepsis managed to standard	**8**	**75**	**(27.6-95.9)**	**4**	**75**	**(4.1-99.5)**	**1**	**100**	**(-)**	**1**	**100**	**(-)**

Table 4.22: Management of neonatal complications (I4070), sepsis, complete facilities

Description	Baseline N	Baseline %	Baseline CI	2nd Operation N	2nd Operation %	2nd Operation CI	3rd Operation: Pre-evaluation N	3rd Operation: Pre-evaluation %	3rd Operation: Pre-evaluation CI	3rd Operation: Evaluation N	3rd Operation: Evaluation %	3rd Operation: Evaluation CI
Vital signs checked	33	78.8	(60.6-90)	7	71.4	(21.5-95.8)	7	85.7	(25.7-99)	4	50	(2.5-97.5)
Pulse / heart rate	33	100	(-)	7	71.4	(21.5-95.8)	7	100	(-)	4	50	(2.5-97.5)
Respiratory rate	33	97	(79.7-99.6)	7	71.4	(21.5-95.8)	7	100	(-)	4	50	(2.5-97.5)
Temperature	33	87.9	(70.6-95.6)	7	71.4	(21.5-95.8)	7	100	(-)	4	50	(2.5-97.5)
Lab tests	33	0	(-)	7	0	(-)	7	0	(-)	4	0	(-)
Oxygen saturation	33	48.5	(31.4-65.9)	7	28.6	(4.2-78.5)	7	28.6	(4.2-78.5)	4	25	(0.5-95.9)
C-reactive protein	33	33.3	(18.9-51.8)	7	71.4	(21.5-95.8)	7	71.4	(21.5-95.8)	4	0	(-)
Complete blood count	33	0	(-)	7	0	(-)	7	0	(-)	4	25	(0.5-95.9)
Antibiotics administered (double or triple therapy)	33	81.8	(63.9-92)	7	85.7	(25.7-99)	7	71.4	(21.5-95.8)	4	100	(-)
Sepsis managed to standard	**33**	**0**	**(-)**	**7**	**0**	**(-)**	**7**	**0**	**(-)**	**4**	**0**	**(-)**

Asphyxia cases are evaluated as one component of the neonatal complications indicator 4070. Table 4.23 and Table 4.24 below display asphyxia management practices in each operation measurement. For a detailed definition of the standards required for appropriate asphyxia management, see appendix B.

Table 4.23: Management of neonatal complications (I4070), asphyxia, basic facilities

Description	Baseline N	Baseline %	Baseline CI	2nd Operation N	2nd Operation %	2nd Operation CI	3rd Operation: Pre-evaluation N	3rd Operation: Pre-evaluation %	3rd Operation: Pre-evaluation CI	3rd Operation: Evaluation N	3rd Operation: Evaluation %	3rd Operation: Evaluation CI
Vital signs checked	0			4	0	(-)	0			2	50	(0-100)
Pulse / heart rate	0			4	100	(-)	0			2	50	(0-100)
Respiratory rate	0			4	100	(-)	0			2	50	(0-100)
APGAR score at one minute	0			4	100	(-)	0			2	50	(0-100)
APGAR score at five minutes	0			4	0	(-)	0			2	50	(0-100)
Oxygen application (if APGAR <= 7 at five minutes)	0			4	75	(4.1-99.5)	0			0		
AMBU / positive pressure ventilation (if APGAR <= 7 at five minutes)	0			4	100	(-)	0			0		
Referred to complete facility (if APGAR <= 7 at five minutes)	0			4	75	(4.1-99.5)	0			0		
Asphyxia managed to standard	**0**			**4**	**0**	**(-)**	**0**			**2**	**50**	**(0-100)**

Table 4.24: Management of neonatal complications (I4070), asphyxia, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	21	0	(-)	12	0	(-)	2	50	(0-100)	2	50	(0-100)
Pulse / heart rate	21	100	(-)	12	100	(-)	2	50	(0-100)	2	50	(0-100)
Respiratory rate	21	95.2	(69.1-99.4)	12	100	(-)	2	50	(0-100)	2	50	(0-100)
APGAR score at one minute	21	100	(-)	12	100	(-)	2	100	(-)	2	100	(-)
APGAR score at five minutes	21	0	(-)	12	0	(-)	2	100	(-)	2	100	(-)
Oxygen saturation lab test (if APGAR <= 7 at five minutes)	14	71.4	(39.9-90.4)	3	100	(-)	1	100	(-)	2	0	(-)
Oxygen application (if APGAR <= 7 at five minutes)	14	64.3	(34-86.3)	3	100	(-)	1	100	(-)	2	100	(-)
AMBU / positive pressure ventilation / endotracheal intubation / chest compressions (if APGAR <= 7 at five minutes)	14	50	(23.2-76.8)	3	66.7	(0.3-99.9)	1	0	(-)	2	100	(-)
Asphyxia managed to standard	**21**	**0**	**(-)**	**12**	**0**	**(-)**	**2**	**50**	**(0-100)**	**2**	**0**	**(-)**

Low birth weight cases are evaluated as one component of the neonatal complications indicator 4070. Table 4.25 and Table 4.26 below display low birth weight management practices in each operation measurement. For a detailed definition of the standards required for appropriate low birth weight management, see appendix B.

Table 4.25: Management of neonatal complications (I4070), low birth weight, basic facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	1	100	(-)	16	87.5	(57-97.4)	16	62.5	(34.8-83.9)	24	83.3	(61.1-94.1)
Weight	1	100	(-)	16	100	(-)	16	100	(-)	24	95.8	(72.6-99.5)
Pulse / heart rate	1	100	(-)	16	93.7	(60.7-99.3)	16	81.2	(51.4-94.7)	24	87.5	(65.5-96.3)
Respiratory rate	1	100	(-)	16	93.7	(60.7-99.3)	16	81.2	(51.4-94.7)	24	87.5	(65.5-96.3)
Head circumference	1	100	(-)	16	100	(-)	16	93.7	(60.7-99.3)	24	95.8	(72.6-99.5)
Skin evaluation	1	100	(-)	16	87.5	(57-97.4)	16	68.7	(40.2-87.8)	24	83.3	(61.1-94.1)
Length	1	100	(-)	16	100	(-)	16	93.7	(60.7-99.3)	24	95.8	(72.6-99.5)
Gestational age calculated using Capurro/Ballard	1	0	(-)	16	100	(-)	16	93.7	(60.7-99.3)	24	91.7	(69.8-98.1)
Weight classification (if in-facility)	1	100	(-)	15	100	(-)	15	100	(-)	23	100	(-)
Heat application	1	100	(-)	16	87.5	(57-97.4)	16	93.7	(60.7-99.3)	24	95.8	(72.6-99.5)
Breastfed / given glucose	1	100	(-)	16	93.7	(60.7-99.3)	16	93.7	(60.7-99.3)	24	95.8	(72.6-99.5)
Referred to a complete facility (if complications or weight < 1500 g)	0			0			3	66.7	(0.3-99.9)	4	25	(0.5-95.9)
Low birth weight managed to standard	**1**	**0**	**(-)**	**16**	**75**	**(45.7-91.4)**	**16**	**50**	**(25-75)**	**24**	**75**	**(52.6-89)**

Table 4.26: Management of neonatal complications (I4070), low birth weight, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	9	33.3	(8.1-73.8)	21	81	(56.4-93.3)	9	44.4	(13.4-80.5)	29	69	(49-83.7)
Weight	9	88.9	(37.4-99.1)	21	95.2	(69.1-99.4)	9	88.9	(37.4-99.1)	29	96.6	(77-99.6)
Pulse / heart rate	9	55.6	(19.5-86.6)	21	90.5	(66-97.9)	9	55.6	(19.5-86.6)	29	89.7	(70.9-96.9)

	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
Respiratory rate	9	33.3	(8.1-73.8)	21	90.5	(66-97.9)	9	55.6	(19.5-86.6)	29	86.2	(67-95.1)
Head circumference	9	88.9	(37.4-99.1)	21	95.2	(69.1-99.4)	9	88.9	(37.4-99.1)	29	93.1	(74.6-98.4)
Skin evaluation	9	88.9	(37.4-99.1)	21	100	(-)	9	77.8	(33-96.1)	29	86.2	(67-95.1)
Length	9	77.8	(33-96.1)	21	95.2	(69.1-99.4)	9	88.9	(37.4-99.1)	29	93.1	(74.6-98.4)
Gestational age calculated using Capurro/Ballard	9	33.3	(8.1-73.8)	21	90.5	(66-97.9)	9	100	(-)	29	100	(-)
Weight classification (if in-facility)	9	88.9	(37.4-99.1)	19	63.2	(38-82.7)	7	100	(-)	29	100	(-)
Heat application	9	22.2	(3.9-67)	21	95.2	(69.1-99.4)	9	100	(-)	29	96.6	(77-99.6)
Breastfed / given glucose	9	77.8	(33-96.1)	21	95.2	(69.1-99.4)	9	88.9	(37.4-99.1)	29	89.7	(70.9-96.9)
Appropriate management of associated complications:	1	100	(-)	3	33.3	(0.1-99.7)	2	100	(-)	0		
Pneumonia	0			0			0			0		
Hypoglycemia (glucose =< 40mg/dl)	1	100	(-)	3	33.3	(0.1-99.7)	2	100	(-)	0		
Low birth weight managed to standard	9	0	(-)	21	33.3	(15.7-57.4)	9	33.3	(8.1-73.8)	29	62.1	(42.4-78.4)

Prematurity cases are evaluated as one component of the neonatal complications indicator 4070. Table 4.27 and Table 4.28 below display prematurity management practices in each operation measurement. For a detailed definition of the standards required for appropriate prematurity management, see appendix B.

Table 4.27: Management of neonatal complications (I4070), prematurity, basic facilities

	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
Description	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	2	100	(-)	4	25	(0.5-95.9)	3	0	(-)	9	55.6	(19.5-86.6)
Weight	2	100	(-)	4	75	(4.1-99.5)	3	100	(-)	9	66.7	(26.2-91.9)
Pulse / heart rate	2	100	(-)	4	50	(2.5-97.5)	3	66.7	(0.3-99.9)	9	55.6	(19.5-86.6)
Respiratory rate	2	100	(-)	4	50	(2.5-97.5)	3	66.7	(0.3-99.9)	9	55.6	(19.5-86.6)
Head circumference	2	100	(-)	4	75	(4.1-99.5)	3	66.7	(0.3-99.9)	9	66.7	(26.2-91.9)
Skin evaluation	2	100	(-)	4	50	(2.5-97.5)	3	33.3	(0.1-99.7)	9	55.6	(19.5-86.6)
Gestational age calculated using Capurro/Ballard	2	100	(-)	4	100	(-)	3	100	(-)	9	88.9	(37.4-99.1)
Gestational age classification (if in-facility)	2	50	(0-100)	4	25	(0.5-95.9)	3	100	(-)	8	100	(-)
Glycemia lab test	2	50	(0-100)	4	50	(2.5-97.5)	3	0	(-)	9	44.4	(13.4-80.5)
Heat application	2	50	(0-100)	4	100	(-)	3	100	(-)	9	77.8	(33-96.1)
Breastfed / given glucose	2	100	(-)	4	50	(2.5-97.5)	3	100	(-)	9	66.7	(26.2-91.9)
Referred to complete facility (if complications or gestation <=34 weeks)	1	0	(-)	2	100	(-)	1	100	(-)	5	80	(11.1-99.2)
Prematurity managed to standard	2	0	(-)	4	25	(0.5-95.9)	3	0	(-)	9	44.4	(13.4-80.5)

Table 4.28: Management of neonatal complications (I4070), prematurity, complete facilities

Description	Baseline			2nd Operation			3rd Operation: Pre-evaluation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Vital signs checked	12	66.7	(32.9-89.1)	19	94.7	(66.2-99.4)	10	50	(18.1-81.9)	22	59.1	(36.5-78.4)
Weight	12	91.7	(49.9-99.2)	19	100	(-)	10	100	(-)	22	77.3	(53.5-90.9)
Pulse / heart rate	12	91.7	(49.9-99.2)	19	100	(-)	10	60	(24.3-87.5)	22	86.4	(62.8-96)
Respiratory rate	12	83.3	(45.7-96.7)	19	100	(-)	10	60	(24.3-87.5)	22	81.8	(58.1-93.6)
Head circumference	12	66.7	(32.9-89.1)	19	94.7	(66.2-99.4)	10	90	(42.2-99.1)	22	86.4	(62.8-96)
Skin evaluation	12	100	(-)	19	100	(-)	10	80	(37.8-96.3)	22	59.1	(36.5-78.4)
Gestational age calculated using Capurro/Ballard	12	41.7	(15.7-73.3)	19	89.5	(62.9-97.7)	10	100	(-)	22	90.9	(67.3-98)
Gestational age classification (if in-facility)	12	33.3	(10.9-67.1)	18	66.7	(40.3-85.6)	10	80	(37.8-96.3)	22	100	(-)
Glycemia lab test	12	41.7	(15.7-73.3)	19	57.9	(33.5-78.9)	10	80	(37.8-96.3)	22	86.4	(62.8-96)
Oxygen saturation lab test	12	83.3	(45.7-96.7)	19	94.7	(66.2-99.4)	10	70	(31-92.4)	22	68.2	(44.7-85)
Heat application	12	91.7	(49.9-99.2)	19	94.7	(66.2-99.4)	10	100	(-)	22	86.4	(62.8-96)
Breastfed / given glucose	12	83.3	(45.7-96.7)	19	100	(-)	10	90	(42.2-99.1)	22	86.4	(62.8-96)
Appropriate management of associated complications:	1	0	(-)	2	100	(-)	0			0		
Pneumonia	1	0	(-)	1	100	(-)	0			0		
Hypoglycemia (glucose =< 40mg/dl)	0			1	100	(-)	0			0		
Prematurity managed to standard	12	8.3	(0.8-50.1)	19	31.6	(13.7-57.3)	10	30	(7.6-69)	22	40.9	(21.6-63.5)

4.4 Child health

Data were collected to evaluate both a health facility's capacity to offer child health care (staff, facilities, equipment, medication), as well as a review of the actual child health care supplied in child follow-up and diarrhea medical records.

4.4.1 Deworming treatment

Monitoring indicator 5030 evaluates deworming treatment, captured as part of a review of follow-up records of children aged 12-59 months, at ambulatory facilities. The indicator evaluates if two doses of albendazole (400 mg) or mebendazole (500 mg) were administered to the child. The combination or use of one drug (twice) is considered as a requirement to meet this indicator. For a detailed definition of the standards required for indicator 5030, see appendix B. While the proportion of children receiving at least one deworming dose improved each operation, the proportion receiving both required doses stagnated.

Table 4.29: Deworming treatment in the past year, children aged 12-59 months (MI5030), ambulatory facilities

Description	Baseline			1st Operation			2nd Operation			3rd Operation: Evaluation		
	N	%	CI	N	%	CI	N	%	CI	N	%	CI
Received at least one correct deworming dose	84	27.4	(18.8-38.1)	161	39.8	(32.4-47.6)	122	60.7	(51.6-69)	58	70.7	(57.4-81.2)
Received at least two correct deworming doses (MI5030)	89	12.4	(6.9-21.2)	120	14.2	(8.9-21.7)	122	21.3	(14.9-29.6)	58	13.8	(6.9-25.7)

4.5 Data for decision-making

As part of a new performance indicator (7500) implemented to measure interventions conducted during the SMI third operation, basic and complete facilities in Belize were evaluated on their capacity to use data for decision-making related to uncomplicated deliveries. Specifically, administrative records, staff meeting notes, and electronic dashboards for the past three months were reviewed for the information such as graphs and reports related to uncomplicated deliveries. The indicator requires the observation of quality improvement plans developed for each of the past three months, and evidence that planned activities were carried out for the most recent month. For a detailed definition of the standards required for indicator 7500, see appendix B.

Table 4.30: Use of data for decision-making (I7500), basic and complete facilities

Description	3rd Operation		
	N	%	CI
Uncomplicated Deliveries indicator displays information (graphs/reports) for April, May, & June 2022	4	100	N/A
Quality Improvement Plans were developed for each month	4	50	N/A
Evidence of planned activities in the latest plan	4	100	N/A
Use of data for decision making to standard (I7500)	**4**	**50**	**N/A**

Chapter 5: Challenges and conclusions

5.1 Challenges and limitations

5.1.1 Community data collection

In Belize, relatively few problems with data collection in communities were encountered and the community survey was completed on schedule. In the third operation measurement, one rural community selected for the market survey did not have a large community space where a full market quota of interviews could be obtained. Interviews in this community were subsequently collected at households instead of the marketplace. After the community survey was completed, a need was identified to better capture the various types of screenings included in intervention practices related to cervical cancer screening. To address these concerns, households visited in the initial third operation data collection period were revisited and respondents were asked additional questions regarding HPV screenings.

5.1.2 Health facility data collection

Most challenges encountered in accessing health facilities in Belize related to facility closures or inconsistent opening hours, resulting in some delays during data collection. During the third operation survey, one ambulatory facility that was determined to only be open to patients one day per month was replaced by a backup facility with more regular services.

Beyond accessibility, challenges emerged in meeting quotas for medical record review. Deficits in archiving practices impeded the retrieval of sampled medical records. Access to paper medical records was inconsistent across intervention areas. In particular, maternal clinical history records used to track antenatal care (known as CLAP forms) were often not stored at the ambulatory facility where care was provided. To meet ambulatory antenatal care quotas, CLAP forms were tracked to archives at the hospitals where the subsequent delivery occurred, and reviewed there.

A further medical record collection challenge was encountered while attempting to match electronic indexes of complicated deliveries to paper files in the archive at hospitals. In some cases, docket numbers provided in the index were not encountered in the paper archive; backup samples of complications records were provided to meet quotas.

5.2 COVID-19 pandemic considerations

The results of the third operation SMI measurement cannot be fully understood outside of the context of the COVID-19 pandemic, which requires consideration of both its burden on health systems and also its impact on the capacity to conduct rigorous data collection programs. This measurement, intended to evaluate interventions conducted between 2018-2020, was delayed two years due to travel advisories, facility closures, and public health recommendations. This resulted in a significant lag between the effective intervention period and the evaluation period and introduced the potential for recall bias to influence interview responses. Additionally, ongoing

treatment of COVID-19 cases at health facilities and social distancing measures in communities posed health risks to data collectors and created logistical hurdles for meeting data collection quotas.

SMI interventions have likely contributed to a resilient infrastructure that facilitated the response to the COVID-19 pandemic, but the impacts to the health system are far-reaching. Demand for health services was lowered by delayed or diminished care-seeking. Global shortages impacted local availability of medical and pharmaceutical supplies. Management of the pandemic required a diversion of limited resources, which may have had adverse effects on routine care and diagnosis of new conditions. Longer-term, macroeconomic repercussions of the pandemic have also likely impacted access to healthcare and institutional capacity throughout the Mesoamerica region.

5.3 Key findings

5.3.1 Performance indicator results

In total, nine performance indicators were measured by IHME after the third operation interventions. Five indicators were measured through medical record review at health facilities, one indicator was measured via the health facility observation, and three indicators were measured through community surveys.

Several indicators showed notable improvement since baseline. In particular, management of obstetric and neonatal complications and complete vaccination for age improved manifold over baseline and second operation results. Routine maternal postpartum care measured in medical records reversed a decline in performance observed at the second operation, an impressive result given the COVID-19 pandemic context.

On the other hand, medical record antenatal care and community survey cervical cancer screening and diarrhea treatment indicators stagnated or regressed compared to earlier measurement rounds. Additionally, a novel medical record indicator designed to evaluate interventions related to preconception care visits did not demonstrate meaningful uptake in practice or at least in record-keeping. These indicators tended to focus on non-urgent or routine care and repeated visits, suggesting that reduced care-seeking behavior and shifting health facility priorities amid the pandemic may have impacted their results.

A further novel performance indicator related to decision making practices using data at health facilities displayed adequate results in its first measurement, suggesting that despite limited time for implementation and the impediments of the pandemic, the successful adoption of some recent interventions was achieved in Belize.

For a summary of the results of each performance indicator across measurement rounds, see appendix A.

5.3.2 Monitoring indicator results

In addition to the nine performance indicators, two medical record and seven community survey monitoring indicators defined by IDB and the Belize Ministry of Health and Wellness were measured in the third operation survey. The medical record monitoring indicators pertained to deworming treatment for children aged 12-59 months at ambulatory facilities and the revision of a partograph chart during uncomplicated deliveries at basic and complete facilities. Community survey monitoring indicators tracked contraceptive use, skilled antenatal care

attendance, newborn danger sign recognition, institutional delivery, early initiation of breastfeeding, exclusive breastfeeding, and micronutrient supplementation.

While in many cases subcomponents of these monitoring indicators showed improvement, few overall indicators improved substantially over the baseline or second operation results, suggesting that SMI outcomes in Belize were focused more narrowly on interventions measured by performance indicators. Given that many monitoring indicators are related to routine care seeking, the COVID-19 pandemic may have had a pronounced impact on their performance, yet SMI may have still had a mitigating effect.

5.4 Conclusions

Several SMI indicators saw meaningful increases since the baseline. The third operation included ambitious new indicators with impressive progress despite the COVID-19 pandemic. Though some indicator targets were not met, it is important to keep in mind that the indicator requirements are stringent and all subcomponents must be met in order to reach the target. Even for indicators where the target was not met for the third operation, there were notable improvements in key subcomponents. For indicators measured through the medical record review, low performance may be driven by poor record-keeping rather than by failures in care provision - medical record storage and data management has been identified as an area for continued focus, recognizing the distinct value of both care and documentation.

Appendix A: Indicator matrices

A.1 Performance indicator matrices

Table A.1: Community performance indicators

Indicator	Description	Time Period	N	%	CI
I5020	Complete vaccination for age	Baseline	Not measured at baseline		
		2nd Operation	223	12.6	(8.8 - 17.6)
		3rd Operation	72	52.8	(41 - 64.2)
I5060	Diarrhea treatment with ORS and zinc at home	Baseline	41	2.4	(0.3 - 16.6)
		2nd Operation	41	4.9	(1.1 - 18.4)
		3rd Operation	21	0	(-)
I6000	Cervical screening	Baseline	Not measured at baseline		
		2nd Operation	171	65.5	(58 - 72.3)
		3rd Operation	222	53.2	(46.5 - 59.7)

Table A.2: Health facility MRR-based performance indicators

Indicator	Description	Time Period	N	%	CI
I3000	Preconception care with quality	Baseline	Not measured at baseline		
		1st Operation	Not measured at 1st operation		
		2nd Operation	Not measured at 2nd operation		
		3rd Op. Pre-evaluation	Not measured at 3rd operation pre-evaluation		
		3rd Op. Evaluation	21	0	(-)
I3030	Antenatal care with quality*	Baseline	22	13.6	(4 - 37.2)
		1st Operation	143	10.5	(6.4 - 16.8)
		2nd Operation	148	16.9	(11.6 - 23.9)
		3rd Op. Pre-evaluation	66	9.1	(4.1 - 19.1)
		3rd Op. Evaluation	105	9.5	(5.1 - 17)
I4050	Postpartum care with quality**	Baseline	43	34.9	(21.8 - 50.7)
		1st Operation	68	61.8	(49.4 - 72.7)
		2nd Operation	158	26.6	(20.2 - 34.1)
		3rd Op. Pre-evaluation	40	52.5	(36.6 - 67.9)
		3rd Op. Evaluation	59	49.2	(36.4 - 62.1)
I4070	Management of neonatal complications	Baseline	77	9.1	(4.3 - 18.1)
		1st Operation	Not measured at 1st operation		
		2nd Operation	75	29.3	(20 - 40.8)
		3rd Op. Pre-evaluation	42	31	(18.5 - 47)
		3rd Op. Evaluation	80	56.2	(45 - 66.9)
I4080	Management of obstetric complications	Baseline	78	23.1	(14.9 - 34)
		1st Operation	Not measured at 1st operation		
		2nd Operation	81	34.6	(24.9 - 45.8)
		3rd Op. Pre-evaluation	49	67.3	(52.6 - 79.3)
		3rd Op. Evaluation	82	56.1	(45 - 66.6)

* Rapid Plasma Reagin (RPR) not captured as syphilis test at 1st operation or baseline; HIV not captured at baseline; Gestational age eligibility for uterine height and fetal checkups only available for first ANC visit at baseline.
** Heart rate not measured as alternative to pulse at 1st operation or baseline; unable to exclude births that were referred at 1st operation or baseline.

Table A.3: Health facility observation-based performance indicators

Indicator	Description	Time Period	N	%	CI
I7500	Use of data for decision-making	Baseline	Not measured at baseline		
		1st Operation	Not measured at 1st operation		
		2nd Operation	Not measured at 2nd operation		
		3rd Operation	4	50	N/A

A.2 Monitoring indicator matrices

Table A.4: Community monitoring indicators

Indicator	Description	Time Period	N	%	CI
MI2010	Contraceptive prevalence	Baseline	267	61.8	(55.8 - 67.5)
		2nd Operation	338	78.4	(73.7 - 82.5)
		3rd Operation	299	67.6	(62 - 72.7)
MI3020	Antenatal care, 4 visits	Baseline	119	82.4	(74.3 - 88.3)
		2nd Operation	199	81.9	(75.9 - 86.7)
		3rd Operation	69	71	(59 - 80.7)
MI4010	Skilled in-facility delivery	Baseline	119	95	(89.1 - 97.7)
		2nd Operation	198	94.9	(90.8 - 97.3)
		3rd Operation	69	100	(-)
MI5050	Breastfeeding initiation before 1 hour	Baseline	120	70	(61.1 - 77.6)
		2nd Operation	196	64.3	(57.3 - 70.7)
		3rd Operation	70	74.3	(62.5 - 83.3)
MI4115	Danger signs	Baseline	116	31.9	(24 - 41)
		2nd Operation	196	14.3	(10 - 20)
		3rd Operation	69	24.6	(15.7 - 36.4)
MI5040	Exclusive breastfeeding, previous day	Baseline	33	33.3	(18.9 - 51.8)
		2nd Operation	34	41.2	(25.4 - 59)
		3rd Operation	16	43.8	(20.4 - 70.2)
MI5070	Micronutrient intake	Baseline	82	0	(-)
		2nd Operation	170	0	(-)
		3rd Operation	55	0	(-)

Table A.5: Health facility MRR-based monitoring indicators

Indicator	Description	Time Period	N	%	CI
MI4060	Partograph use	Baseline	Not measured at baseline		
		1st Operation	90	61.1	(50.5 - 70.8)
		2nd Operation	139	34.5	(27 - 42.9)
		3rd Op. Pre-evaluation	63	50.8	(38.3 - 63.2)
		3rd Op. Evaluation	114	55.3	(45.9 - 64.2)
MI5030	Deworming treatment	Baseline	89	12.4	(6.9 - 21.2)
		1st Operation	120	14.2	(8.9 - 21.7)
		2nd Operation	122	21.3	(14.9 - 29.6)
		3rd Op. Pre-evaluation	Not measured at 3rd operation pre-evaluation		
		3rd Op. Evaluation	58	13.8	(6.9 - 25.7)

Appendix B: Indicator definitions

B.1 Community performance indicators

5020: Complete vaccination for age

Source: Community survey

Denominator: Total number of children aged 0-59 months in LQAS household surveys

Formula: Caregiver recalls the following vaccinations for their child, depending on the child's age at the time of the survey:

- Hepatitis B
    - Birth dose (3rd operation only)
- BCG
    - 3 months
- Polio
    - 2 months
    - 4 months
    - 6 months
- Pentavalent
    - 2 months
    - 4 months
    - 6 months
- DPT
    - 4-5 years (2nd operation only)
- MMR
    - 12 months
    - 18 months (3rd operation only)
    - 24 months (2nd operation only)

5060: Diarrhea treatment with ORS and zinc at home

Source: Community survey

Denominator: Total number of children aged 0-59 months with reported diarrhea in the past two weeks in Community surveys

Formula: Caregiver reports giving the child the following: (a fluid made from oral rehydration salts / a pre-packaged ORS liquid (bottled oral serum) / homemade liquid recommended by health authorities) + (zinc pills / zinc syrup)

6000: Cervical cancer screening

Source: Community survey

Denominator: Total number of women aged 28-49

Formula: Woman reports the following: (Pap test in the last 3 years / VIA test in the last 3 years / HPV test in the last 5 years) + woman knows result of screening if the screening was more than one month before

B.2 Health facility performance indicators

3000: Preconception care

Source: Medical record review

Denominator: Total number of antenatal care records in the sample at ambulatory facilities for which the woman was pregnant in the last three months

Formula: Observe the following in the record: at least 1 preconception care visit (or health consultation) + height + weight + blood pressure + folic acid supplementation + Hemoglobin level + HIV test

3030: Antenatal care with quality

Source: Medical record review

Denominator: Total number of antenatal care records in the sample at ambulatory facilities

Formula: Observe the following in the record: five antenatal care visits + 1st control before 13 weeks + (in each visit: weight + blood pressure) + (in each visit if gestation age >=14 weeks: uterine height) + (in each visit if gestation age >20 weeks: fetal movements + fetal heart rate) + (lab tests at least once: blood type + Factor Rh + HIV test + syphilis test + blood glucose + hemoglobin test + urinalysis) + tetanus vaccine (administered or prior fully vaccinated)

4050: Postpartum care with quality

Source: Medical record review

Denominator: Total number of postpartum care records in the sample at basic and complete facilities

Formula: Observe the following in the record: 4 times during the first hour (blood pressure + temperature + respiratory rate + pulse) + 2 times in the second hour (blood pressure + temperature + respiratory rate + pulse) + at discharge (blood pressure + temperature + respiratory rate + pulse)

4070: Management of neonatal complications

Source: Medical record review

Denominator: Total number of records of neonates with birth complications (prematurity, low birth weight, birth asphyxia, or sepsis) in the sample at basic and complete facilities

Formula:

Low Birth Weight (excluding neonates with weight >=2500 gr)

Basic:

Observe the following in the record: Gestational age calculation using Capurro or Ballard + classification based on birth weight (if neonate was born in the facility) + weight + (heart rate / pulse) + respiratory rate + length / height + head circumference + skin evaluation + heat application / warm chain + (early breastfeeding / glucose solution: (oral / IV)) + referred to a complete facility (if neonate weight < 1500 gr or has pneumonia or hypoglycemia (glucose level <= 40 mg / dl))

Complete:

Observe the following in the record: Gestational age calculation using Capurro or Ballard + classification based on birth weight (if neonate was born in the facility) + weight + (heart rate / pulse) + respiratory rate + length / height + head circumference + skin evaluation + heat application / warm chain + (early breastfeeding / glucose solution: (oral / IV)) + any of the following if they apply:

- • if pneumonia: antibiotics
- • if hypoglycemia (glucose level <= 40 mg / dl): glucose IV

Prematurity (excluding neonates with gestational age >=37 weeks)

Basic:

Observe the following in the record: Gestational age calculation using Capurro or Ballard + classification based on gestational age (if neonate was born in the facility) + weight + (heart rate / pulse) + respiratory rate + head circumference + skin evaluation + glycemia test + heat application / warm chain + (early breastfeeding / glucose solution: (oral / IV)) + referred to a complete facility (if neonate gestational age <=34 weeks or has pneumonia or hypoglycemia (glucose level <= 40 mg / dl))

Complete:

Observe the following in the record: Gestational age calculation using Capurro or Ballard + classification based on gestational age (if neonate was born in the facility) + weight + (heart rate / pulse) + respiratory rate + head circumference + skin evaluation + glubose lab test + oxygen saturation level + heat application / warm chain + (early breastfeeding / glucose solution: (oral / IV)) + any of the following if they apply:

- • if pneumonia: antibiotics
- • if hypoglycemia (glucose level <= 40 mg / dl): glucose IV

Asphyxia (excluding neonates who were not born in the facility)

Basic:

Observe the following in the record: Heart rate / pulse + respiratory rate + APGAR score at 1 minute + APGAR score at 5 minutes + oxygen administration (if APGAR score at 5 minutes is <=7) + AMBU / positive pressure ventilation (if APGAR score at 5 minutes is <=7) + referred to a complete facility (if APGAR score at 5 minutes is <=7)

Complete:

Observe the following in the record: Heart rate / pulse + respiratory rate + APGAR score at 1 minute + APGAR score at 5 minutes + oxygen saturation level (if APGAR score at 5 minutes is <=7) + oxygen administration (if APGAR score at 5 minutes is <=7) + AMBU / positive pressure ventilation / chest compressions / endotracheal intubation (if APGAR score at 5 minutes is <=7)

Sepsis

Basic:

Observe the following in the record: Temperature + heart rate / pulse + respiratory rate + antibiotic administered (2 or more distinct antibiotics) + referred to a complete facility (if hemodynamic failure or septic shock)

Complete:

Observe the following in the record: Temperature + heart rate / pulse + respiratory rate + abdominal examination + oxygen saturation + complete blood count (platelets + leukocytes + neutrophil band ratio / absolute neutrophil count + hemoglobin + hematocrit) + protein c reactive + antibiotic administered (2 or more distinct antibiotics)

4080: Management of obstetric complications

Source: Medical record review

Denominator: Total number of records of women with maternal complications (hemorrhage, severe pre-eclampsia, eclampsia, or sepsis) in the sample at basic and complete facilities

Formula:

Hemorrhage

Basic:

Observe the following in the record: (heart rate / pulse) + blood pressure + (ringer's lactate / hartmann's / saline solution) + appropriate care (below):

- If hemorrhage following incomplete or complete abortion: MVA / instrumental curettage / transfer to complete facility
- If ectopic / broken ectopic pregnancy: laparotomy / salpingectomy / surgical repair / transfer to complete facility
- If placenta previa with hemorrhage: C-section / hysterectomy / transfer to complete facility

- If uterine rupture: laparotomy / hysterectomy / surgical repair / C-Section / transfer to complete facility
- If uterine atony: uterotonic + bimanual compression / uterine massage / hydrostatic balloon / uterine tamponade / hypogastric artery ligation / uterine artery ligation / B-lynch suture / transfer to complete facility
- If uterine inversion: uterotonic + repositioning of the uterus with anesthesia / sedation by nonsurgical or surgical procedures / hysterectomy / transfer to complete facility
- If retained product: uterotonic + manual extraction / instrumental curettage / hysterectomy /transfer to complete facility

Complete:

Observe the following in the record: (heart rate / pulse) + blood pressure + hematocrit + hemoglobin + platelet count + (ringer's lactate / hartmann's / saline solution) + appropriate care (below):

- If hemorrhage following incomplete or complete abortion: MVA / instrumental curettage
- If ectopic / broken ectopic pregnancy: laparotomy / salpingectomy / surgical repair
- If placenta previa with hemorrhage: C-section / hysterectomy
- If uterine rupture: laparotomy / hysterectomy / surgical repair / C-Section
- If uterine atony: uterotonic + bimanual compression / uterine massage / hydrostatic balloon / uterine tamponade / hypogastric artery ligation / uterine artery ligation / B-lynch suture
- If uterine inversion: uterotonic + repositioning of the uterus with anesthesia / sedation by nonsurgical or surgical procedures / hysterectomy
- If retained product: uterotonic + manual extraction / instrumental curettage / hysterectomy

Severe Pre-eclampsia & Eclampsia

Basic with referral:

Observe the following in the record: blood pressure: (systolic + diastolic) + (ringer's lactate / hartmann's / saline solution) + magnesium sulfate

Basic without referral and Complete:

Observe the following in the record: (heart rate / pulse) + blood pressure: (systolic + diastolic) + respiratory rate + patellar reflex + platelet count + (aspartate aminotransferase / glutamic-oxalacetic transaminase) + (alanine aminotransferase / glutamic-pyruvic transaminase) + (ringer's lactate / hartmann's / saline solution) + magnesium sulfate + if diastolic bp > 110: (hydralazine / labetalol / nifedipine) + if 24 <= gestational age < 34: (dexamethasone / betamethasone)

Sepsis

Basic:

Observe the following in the record: (heart rate / pulse) + blood pressure + temperature + antibiotics (2 or more distinct antibiotics) + appropriate care (below):

- If septic abortion: MVA / instrumental curettage / hysterectomy / transfer to complete facility
- If uterine perforation: surgical repair / hysterectomy / transfer to complete facility
- If pelvic abscess: laparotomy / drainage / hysterectomy / transfer to complete facility
- If postpartum endometritis: antibiotic administration / transfer to complete facility
- If retained product: instrumental curettage / laparotomy / hysterectomy / transfer to complete facility
- If puerperal fever: antibiotic administration / transfer to complete facility

Complete:

Observe the following in the record: (heart rate / pulse) + blood pressure + temperature + hemoglobin + hematocrit + platelet count + leukocyte count + antibiotics (2 or more distinct antibiotics) + appropriate care (below):

- If septic abortion: MVA / instrumental curettage / hysterectomy
- If uterine perforation: surgical repair / hysterectomy
- If pelvic abscess: laparotomy / drainage / hysterectomy
- If postpartum endometritis: antibiotic administration
- If retained product: instrumental curettage / laparotomy / hysterectomy
- If puerperal fever: antibiotic administration

B.3 Community monitoring indicators

2010: Contraceptive prevalence

Source: Community survey

Denominator: Number of women of reproductive age 15-49 years who are married or partnered and do not report the following characteristics: does not have sexual relations, virgin, menopausal, infertile, pregnant, or wants to become pregnant (these women are considered in need of contraception)

Formula: Woman reports the use of (or whose partner is using) a modern method of contraception (female or male sterilization, IUD, injections, implants, oral contraceptives, male or female condom, diaphragm, sponge, emergency contraception, other modern method)

3020: Antenatal care, 4 visits

Source: Community survey

Denominator: Number of women of reproductive age 15-49 years who had a live birth in the past two years

Formula: Woman reports at least four antenatal care visits with skilled personnel for the most recent pregnancy in the past two years

4010: Skilled in-facility delivery

Source: Community survey

Denominator: Number of women of reproductive age 15-49 years who had a live birth in the past two years

Formula: Woman reports delivering in a health facility (public or private: hospital, health center / clinic, medical ward, mobile facility, other health facility) with qualified personnel (medical doctor or professional nurse) for the most recent pregnancy in the past two years

5050: Breastfeeding initiation before 1 hour

Source: Community survey

Denominator: Number of live births in the past two years to women of reproductive age 15-49 years

Formula: Number of children born whose mothers reported first breastfeeding the child within 1 hour of birth

4115: Danger signs

Source: Community survey

Denominator: Number of women of reproductive age 15-49 years who had a live birth in the past two years

Formula: Woman who can recognize at least 3 out of 5 of the following danger signs in newborns:

- Feeding problems
- Reduced activity
- Difficulty breathing
- Fever, convulsions, or fits
- Cold to the touch

5040: Exclusive breastfeeding, previous day

Source: Community survey

Denominator: Number of children 0-5 months

Formula: Caregiver reports number of children who consumed only breast milk the previous day (and did not consume water, sugar water, tea, or any other foods besides breast milk)

5070: Micronutrient intake

Source: Community survey

Denominator: Number of children age 6-23 months

Formula: Caregiver reports number of children who consumed micronutrients in adequate doses (at least 60 packets) in the past six months

B.4 Health facility monitoring indicators

4060: Partograph revision in the last two years

Source: Medical record review

Denominator: Total number of birth records from the previous two years

Formula: Observe the following in the record: If woman did not arrive on imminent birth or planned C-Section: [partograph included and filled] + if dilation <4.5 cm: [Emergency C-Section] + if dilation >=4.5 cm: [FHR and alert curve are registered] + if FHR <120 bm or the alert curve was surpassed: [there is a note on the partograph or medical records within 30 min].

5030: Deworming treatment for children 12-59 months in the past year

Source: Medical record review

Denominator: Total number of deworming records in the past year at ambulatory facilities

Formula: Observe the following in the record: two doses of albendazole (400 mg) or mebendazole (500 mg) were administered to the child. The combination or only one drug is considered as a requirement to meet this indicator

This report on the Salud Mesoamérica Initiative (SMI) Belize 3rd operation survey was produced in agreement with the Inter-American Development Bank (IDB). All analyses and writing were conducted by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington.

About IHME

The Institute for Health Metrics and Evaluation (IHME) is an independent population health research center at UW Medicine, part of the University of Washington, that provides rigorous and comparable measurement of the world's most important health problems and evaluates the strategies used to address them. IHME makes this information freely available so that policymakers have the evidence they need to make informed decisions about how to allocate resources to best improve population health.

IHME aspires to make available to the world high-quality information on population health, its determinants, and the performance of health systems. We seek to achieve this directly, by catalyzing the work of others, and by training researchers as well as policymakers.

Our mission is to improve the health of the world's populations by providing the best information on population health.

IHME Team

Joseph Camarda, BA
Research Manager, IHME

Matt Dearstyne, MS
Data Analyst, IHME

Amanda Deen, MPH
Senior Research Manager, IHME

Yenny Guzman, MD, MPH
Data Analyst, IHME

Katie Panhorst Harris, MPA
Lead Evaluation Scientist, IHME

Bernardo Hernandez, MS, DSc
Professor, IHME

Casey Johanns, MPH
Senior Research Manager, IHME

Ali H. Mokdad, PhD, *Principal Investigator*
Professor, IHME

Haaris Saqib, MA
Data Analyst, IHME

Alex Schaefer, MPA
Evaluation Scientist, IHME

Max Thom, BS
Data Specialist, IHME

Acknowledgements