Availability and Quality of Emergency Obstetrical and Newborn Care Services in Kenya

Results of Three Annual Health Facility Assessments

August 2017

USAID
FROM THE AMERICAN PEOPLE

MEASURE Evaluation PIMA

Availability and Quality of Emergency Obstetrical and Newborn Care Services in Kenya

Results of Three Annual Health Facility Assessments

MEASURE Evaluation PIMA

August 2017

MEASURE Evaluation
University of North Carolina at Chapel Hill
400 Meadowmont Village Circle, 3rd Floor
Chapel Hill, NC 27517 USA
Phone: +1 919-445-9350
measure@unc.edu
www.measureevaluation.org

MEASURE Evaluation PIMA is funded by the United States Agency for International Development (USAID) through associate award AID-623-LA-12-00001 and is implemented by the Carolina Population Center at the University of North Carolina at Chapel Hill, in partnership with ICF International; Management Sciences for Health; Palladium; and Tulane University. The views expressed in this publication do not necessarily reflect the views of USAID or the United States government. TR-17-195

USAID
FROM THE AMERICAN PEOPLE

MEASURE
Evaluation PIMA

ACKNOWLEDGEMENTS

We thank the United States Agency for International Development (USAID) for its support of this research and publication.

Several staff members of the USAID-funded MEASURE Evaluation PIMA (MEval-PIMA) contributed to this report. Overall coordination was provided by Benter Owino Dinda, with data analysis and report writing provided by Ambrose Agweyu. Field coordination for training, data collection, and county action planning was provided by Carol Njeru, Susan Kinyua, Karen Owuor, Sylvester Ochieng, and Nimo Omar. Technical and management support were provided by Judith Omumbo, Abdinasir Amin, and Edward Kunyanga.

The following people and institutions are acknowledged for their contributions to the development and conduct of the project: the national task force for leading the design and implementation of the EmONC scale-up, constituted by the Reproductive and Maternal Health Services Unit of the Ministry of Health (Wangui Muthigani); the USAID Kenya Family Health Team (Sheila Macharia and Lillian Mutea); USAID Kenya Strategic Information (Lize Ojowi and Washington Omwomo); MEASURE Evaluation PIMA; Maternal and Child Survival Program (MCSP)/Kenya (Gathari Ndirangu and Lynn Kanyuuru); and University Research Company/ASSIST (Peter Mutanda).

The following partners were involved in the implementation of the project: the county health management teams of Baringo, Busia, Isiolo, Kisumu, Kitui, Machakos, Makueni, Mandera, Meru, Migori, Muranga, Nairobi, Narok, Nyamira, Samburu, Tharaka Nithi, Trans Nzoia, and Wajir Counties; USAID implementing partners AIDS, Population, and Health Integrated Assistance Plus (APHIAplus) and AMPATH PLUS; and Liverpool School of Tropical Medicine.

The MEASURE Evaluation communications team of Allison Schmale, Geoffrey Lairumbi, and Yvonne Otieno provided editorial and design support for the report.

CONTENTS

FIGURES

TABLES

ABBREVIATIONS

AMSTL	active management of the third stage of labor
APHIAplus	AIDS, Population, and Health Integrated Assistance Plus
BEmONC	basic emergency obstetrical and newborn care
CEmONC	comprehensive emergency obstetrical and newborn care
CHMT	county health management team
EmONC	emergency obstetrical and newborn care
KMC	kangaroo mother care
M&E	monitoring and evaluation
MEval-PIMA	MEASURE Evaluation PIMA
MNCH	maternal, newborn, and child health
MOH	Ministry of Health
MPDSR	maternal and perinatal death surveillance and reporting
MVA	manual vacuum aspiration
SDGs	Sustainable Development Goals
USAID	U.S. Agency for International Development
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

EXECUTIVE SUMMARY

Preventing maternal and newborn mortality is a national and global priority. Health facilities serve an important role in providing essential services to manage the leading causes of maternal and newborn mortality. Developed by the World Health Organization (WHO), the United Nations Population Fund (UNFPA), and the United Nations Children's Fund (UNICEF), emergency obstetrical and newborn care (EmONC) is an integrated strategy that aims to equip health facilities with the capacity to provide evidence-based, cost-effective interventions to attend to maternal and newborn emergencies.

In 2013, the U.S. Agency for International Development (USAID) received increased funding for maternal, newborn, and child health (MNCH) programs in Kenya. Recognizing the significant burden of maternal and newborn death in Kenya and that the limited resources could not cover all aspects of MNCH, USAID sought to use the funds in a focused and effective way, by undertaking a national scale-up of EmONC services. In consultation with Kenya's Ministry of Health (MOH), 13 counties were initially selected. County health officials, working with USAID implementing partners—AIDS, Population, and Health Integrated Assistance Plus (APHIAplus), AMPATH PLUS, and the Maternal and Child Survival Program (MCSP)—identified high-volume health facilities for inclusion in the assessments to evaluate the scale-up of EmONC services. Support was provided through EmONC in-service training for health workers; provision of national EmONC guidelines; and supply of MNCH equipment, commodities, and drugs.

Beginning in 2014, three successive annual cross-sectional surveys of facilities were conducted to assess readiness to provide core EmONC signal functions and availability of essential MNCH equipment and supplies. Orientation for county teams on the data collection tools was conducted using standard operating procedures and training materials developed collaboratively by the Reproductive and Maternal Health Services Unit of the Ministry of Health, USAID, and implementing partners: MEASURE Evaluation PIMA, MCSP, and University Research Company/ASSIST. Data were entered in Microsoft Excel by the county teams and transmitted electronically and in paper copies to MEval-PIMA for cleaning, collation, analysis, and reporting. Results of each assessment were shared with the respective county health management teams and USAID implementing partners including APHIAplus, AMPATH PLUS and MCSP for dissemination and action planning.

Between 2014 and 2016, a total of 1,413 health facility assessments were conducted in 18 counties. More than half of the counties (10 out of 18) were included in all 3 assessments. The 2016 assessments included 528 health facilities (380 health centres and dispensaries and 148 hospitals). Health centres and dispensaries comprised approximately three-quarters of the total number of facilities included across the three years.

Availability of equipment to perform all seven basic EmONC (BEmONC) signal functions increased progressively over the three annual assessments. In 2016, essential items for performing all seven BEmONC signal functions were available in 28 percent of health centres and dispensaries (a 14-fold increase from 2014) and 54 percent of hospitals (a twofold increase from 2014). In 2016, all hospitals located in Narok, Samburu, and Tharaka-Nithi Counties reported availability of all seven indicators required to perform BEmONC signal functions.

Although the availability of items such as oxytocin, magnesium sulphate, and pediatric ambu bags was observed to be high in most counties, other items such as elbow-length gloves, vacuum extractors,

manual vacuum aspiration kits, and misoprostol were unavailable in many facilities. All hospitals are expected to provide comprehensive care, including caesarean delivery and blood transfusion. In the most recent assessment, the availability of caesarean section sets and blood transfusion sets was used as a proxy measure for the availability of these two lifesaving services. The two items were unavailable in more than half of the hospitals included in the assessment.

Process of care was examined over two cycles (2015 and 2016) using three maternal indicators: oxytocin use for active management of the third stage of labor, partograph completion, and monitoring of blood pressure during labor. One newborn indicator—appropriate newborn resuscitation—was examined. Improvements were noted between the two assessments for the indicators related to maternal care; however, performance of newborn resuscitation declined between the two assessments in health centres and dispensaries and in hospitals. In the most recent assessment, the tools were expanded to include process indicators on maternal and perinatal death surveillance and reporting (MPDSR). Slightly more than half of the hospitals assessed and only a quarter of health centres and dispensaries had an operational MPDSR committee. Mortality audits were reported to be high for maternal deaths but low for perinatal deaths.

Notable improvements were observed in the availability of items required to provide EmONC. The target to attain full readiness to provide EmONC, however, is yet to be achieved in most of the focus counties. The findings of this report provide tangible insights into the scale-up counties' needs and offer a powerful tool for advocacy and rational resource allocation.

Sustaining the gains achieved over the successive cycles of this scale-up intervention will require commitment from stakeholders at all levels and leadership from national and county governments. Specific priorities include the integration of assessment tools with routine monitoring and evaluation (M&E) tools; investment in health systems, including strengthening the ability of routine systems to capture high-quality data on maternal and newborn care; and fostering a culture of accountability and data use for decision making at all levels.

INTRODUCTION

Globally, the leading causes of maternal and perinatal death are known and are, in most cases, preventable through effective, low-cost interventions. Annually, obstetric haemorrhage, obstructed labor, hypertensive disorders (e.g., severe preeclampsia or eclampsia), complications related to abortion, and postpartum sepsis account for more than 80 percent of an estimated 289,000 maternal deaths, and complications of prematurity, perinatal asphyxia, and neonatal sepsis are the main causes of approximately 2.8 million neonatal deaths (Kassebaum, et al., 2014; Wang, et al., 2014).

Launched in 2010, the Global Strategy for Women's, Children's and Adolescents' Health (Global Strategy) has fuelled efforts to achieve a broad range of targets for maternal and neonatal health. The Global Strategy and the Every Woman Every Child advocacy movement promote collective action, joint messaging, and effective partnerships to generate funding, improved policies and service delivery, and sustained focus on accountability across stakeholders (United Nations Foundation, n.d.). With this approach, there is a growing emphasis to consider reproductive, maternal, newborn, child, and adolescent health services as parts of a continuous spectrum of care. Building on lessons learned during the Millennium Development Goals era, 2000–2015, the Global Strategy reflects the priorities of new Sustainable Development Goals (SDGs) adopted by governments and development partners in September 2015 (United Nations, 2015). Under this framework, which defines the 2016–2030 global development agenda, 17 goals are outlined that target areas relating to reproductive, maternal, newborn, child, and adolescent health. Specifically, SDG 3 aims to decrease the global maternal mortality ratio to fewer than 70 deaths per 100,000 live births; to decrease preventable deaths of newborns to no more than 12 per 1,000 live births; and to reduce mortality in children under 5 years of age to no more than 25 per 1,000 live births (United Nations, n.d.). Aligned with this strategy, USAID launched an ambitious call in 2012 to prevent child and maternal deaths, focusing on 25 priority countries (including Kenya), which collectively account for more than two-thirds of global maternal and child deaths (USAID, 2016).

Emergency Obstetrical and Newborn Care: A Strategy to Prevent Maternal and Newborn Deaths

To comprehensively address the causes of maternal mortality, the determinants of maternal and newborn outcomes must be understood. These factors are often summarized in the three-delay model, first proposed more than 20 years ago (Thaddeus & Maine, 1994). This model recognizes three common delays in the continuum of care: the delay by pregnant women in deciding to seek care from a skilled attendant, the delay by pregnant women in reaching a facility that has the capacity to offer BEmONC, and the delay in receiving emergency care upon reaching a health facility.

Developed by WHO, UNFPA, and UNICEF, EmONC is an integrated strategy that aims to equip health facilities with the capacity to provide evidence-informed, cost-effective interventions to attend to the leading causes of maternal and newborn mortality, primarily targeting the third stage of delay (i.e., the delay in receiving emergency care upon reaching a health facility) (WHO, et al., 2009). This strategy also indirectly addresses the other two stages of delay, such as the case of an expectant mother recognizing the need to seek care and being more likely to opt to access an EmONC health facility if she is aware of the availability of high-quality services. Two levels of care are recognized under EmONC: BEmONC and comprehensive EmONC (CEmONC). As Table 1 shows, primary care facilities, such as dispensaries and health centres, are required to provide a set of seven services or BEmONC signal functions, and hospitals are expected to provide the seven BEmONC services plus caesarean delivery and blood transfusion, or

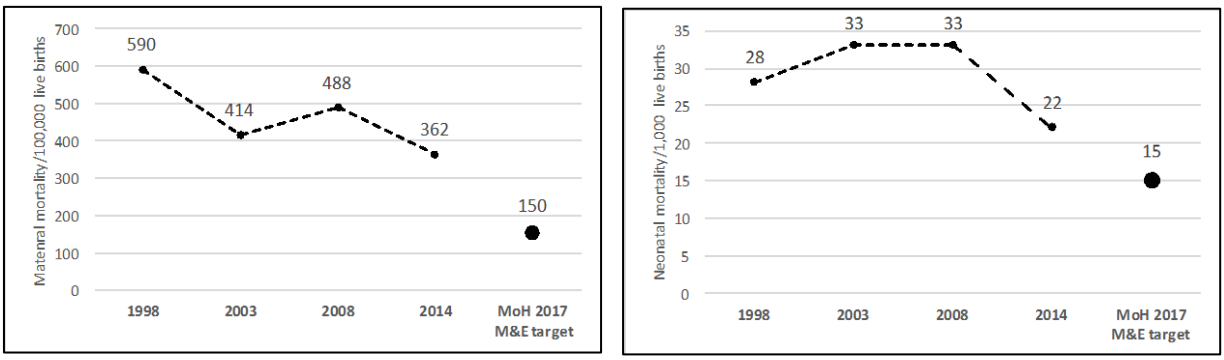
CEmONC signal functions. The effectiveness of this intervention in reducing maternal and newborn mortality has been demonstrated across a wide range of settings (Paxton et al., 2005; Adam et al., 2005; Lee et al., 2011).

Table 1. EmONC signal functions

BEmONC signal functions
(1) Administer parenteral antibiotics
(2) Administer uterotonic drugs (i.e., parenteral oxytocin)
(3) Administer parenteral anticonvulsants for preeclampsia and eclampsia (i.e., magnesium sulphate)
(4) Manually remove the placenta
(5) Remove retained products of conception (e.g., manual vacuum aspirations, misoprostol for medical evacuation)
(6) Perform assisted vaginal delivery (e.g., vacuum extraction, forceps delivery)
(7) Perform basic neonatal resuscitation (e.g., with bag and mask)
CEmONC signal functions
Perform all seven components of BEmONC, plus the following:
(8) Caesarean section
(9) Blood transfusion

The Government of Kenya is committed to improving maternal and newborn survival through ensuring universal access to EmONC services. In 2014–2018 M&E framework of the Ministry of Health (MOH), the government set a goal to reduce maternal mortality to 150 per 100,000 live births by 2017 against an estimated baseline of 400 per 100,000 live births in 2012, and to reduce neonatal mortality to 15 per 1,000 live births against a baseline of 31 per 1,000 live births in 2012. Figure 1 illustrates the trends in maternal and neonatal mortality.

Figure 1. Trends in maternal and neonatal mortality in Kenya



Source: Kenya Demographic and Health Surveys

The introduction in June 2013 of free maternity care at all public health facilities was a major step toward achieving this goal. This policy has removed a major barrier to access to maternal and newborn services, and initial reports indicate an overall increase in the total and proportional number of deliveries since the introduction of this policy (Ministry of Health, Government of Kenya, 2015). However, the increase in use of services at health facilities may have undesirable effects on the quality of services provided in the

absence of a proportionate increase in the capacity to deliver care. These effects can only be assessed with data of sufficient quality on the care provided at health facilities.

EmONC Scale-Up in Kenya

Since the first wave of assessments after the launch of the EmONC scale-up in July 2013, notable progress has been made in the scale and quality of assessments conducted. During the initial assessments, teams generating data reported that the tools for data collection were difficult to use. Training and supervision on the use of the tools was also extremely limited, resulting in poor quality data with large quantities of missing data, which made interpretation unreliable.

In the second wave of assessments in 2014, revised tools were jointly developed by the core team and formally introduced to the county teams during participatory orientation exercises. Dashboards developed in Microsoft Excel were linked to the tools to allow M&E teams in each county to conduct analyses using locally generated data. Facility profiles were also introduced in this wave, allowing implementing teams to review in detail the data from each participating facility.

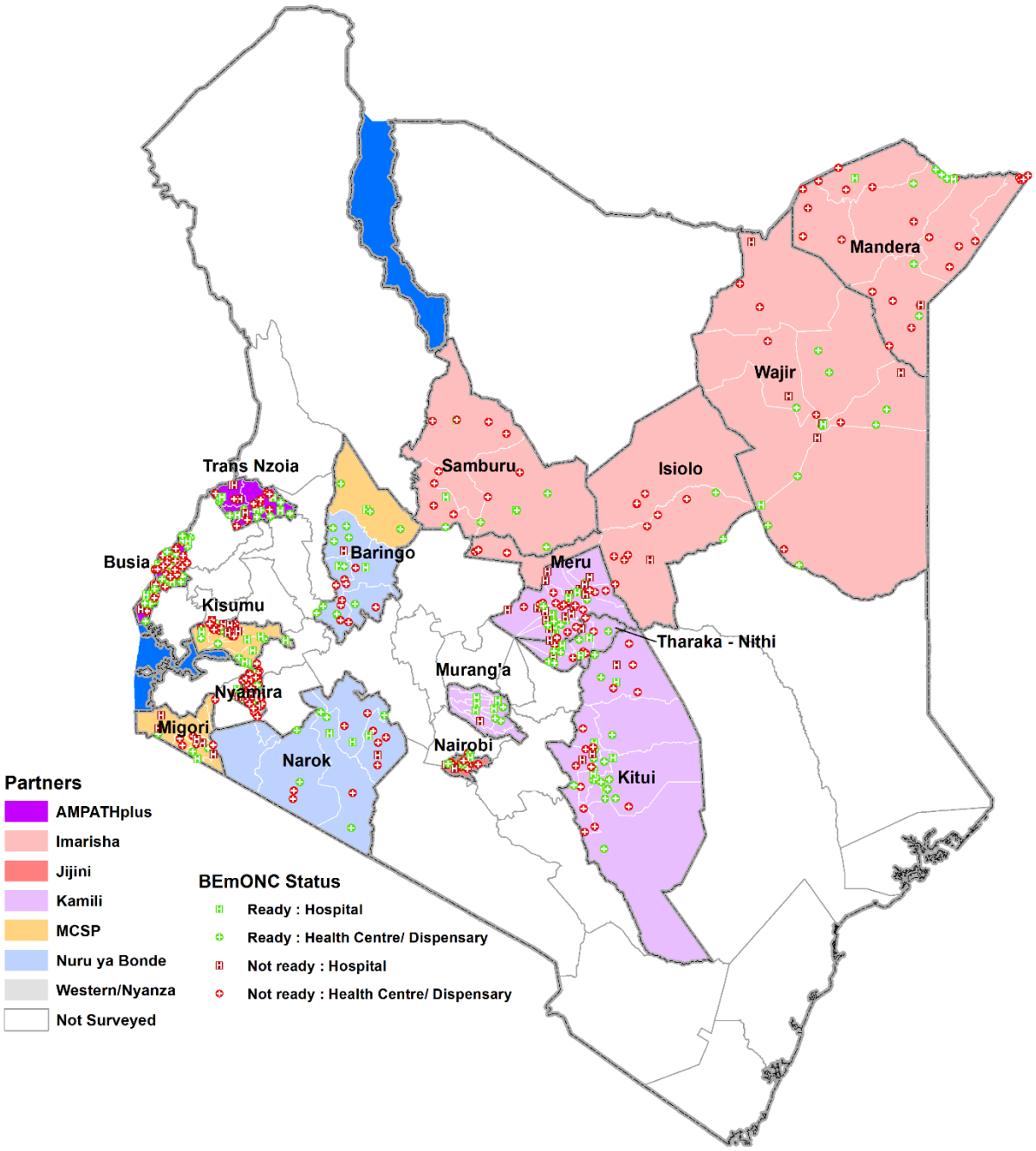
In the third phase of the 2015 scale-up, the evaluation tools were further developed to capture additional data on the capacity of health facilities to provide four process-of-care indicators, including administration of oxytocin for active management of the third stage of labor (AMTSL), blood pressure monitoring, partograph completion, and newborn resuscitation. Performance of facilities that participated in the 2014 and 2015 assessments was compared. A monthly monitoring tool was also launched to enable the county teams to track and report performance between annual assessments.

In the fourth phase of the 2016 scale-up, the assessment tools were further refined in response to feedback from the implementing teams in the focus counties. Additional indicators were also introduced to capture information on the readiness to provide kangaroo mother care[1] and the implementation of maternal and perinatal death surveillance and response (MPDSR) activities.

Recognizing the limitations in the quality of routine data sources, the M&E framework further sought to work with the M&E departments of the national and county governments to develop and improve systems for reporting indicators useful for tracking progress toward predefined targets. However, appropriate indicators alone are not sufficient for monitoring service delivery. Other dimensions of data quality, including reliability and timeliness of reporting, were also supported through regular training and supervision.

[1] "Kangaroo mother care" entails skin-to-skin contact between mother and baby from birth; exclusive breastfeeding; and attending to the needs of mother and baby without separating them: http://www.kangaroomothercare.com/.

Figure 2. Focus counties for national scale-up of EmONC



Kenyan counties in the national scale-up were Baringo, Busia, Isiolo, Kisumu, Kitui, Machakos, Makueni, Mandera, Meru, Migori, Murang'a, Nairobi, Narok, Nyamira, Samburu, Tharaka-Nithi, Trans-Nzoia, and Wajir. Some of these counties were included in only two of the three assessments.

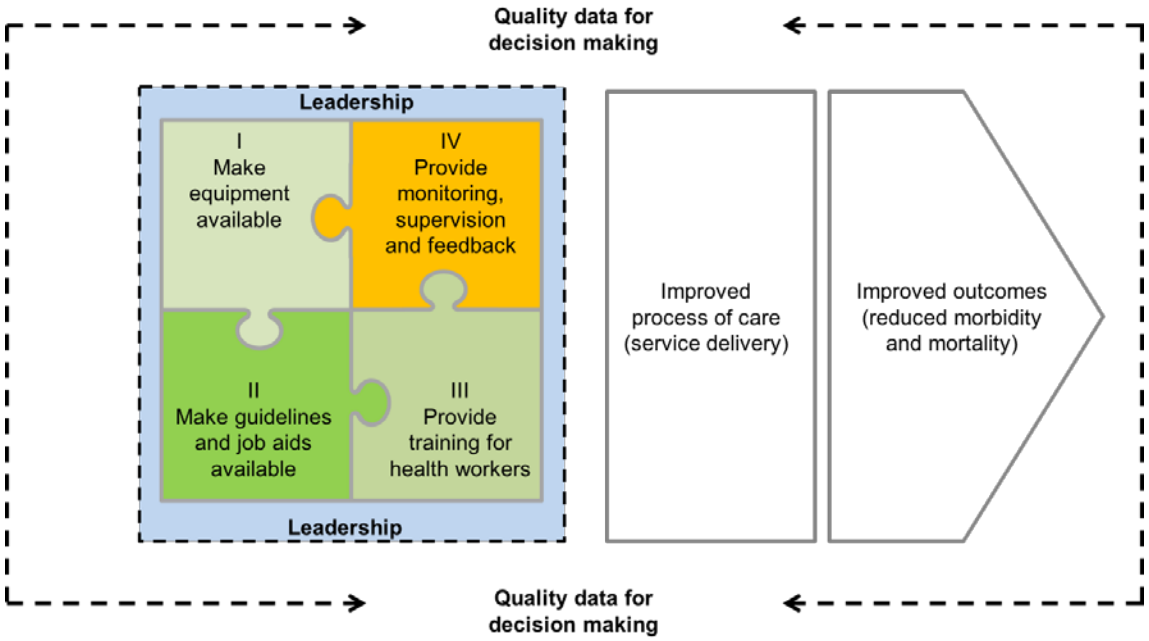
National and county governments, working with various development partners, have made substantial investments in training healthcare workers and supplying commodities and equipment for maternal and newborn care. However, these efforts have been coordinated poorly and formally evaluated only rarely. Furthermore, the extent to which available data are used to inform allocation of resources remains unclear. A focused scale-up of EmONC and effective M&E are expected to address these shortcomings.

This report examines the capacity of primary care and referral health facilities in 18 counties in Kenya that are supported by USAID implementing partners to provide EmONC signal functions. Specifically, the report addresses the question: *What proportion of the facilities offering primary healthcare (health centres and dispensaries) and hospitals assessed in the selected counties are sufficiently equipped and staffed to provide the EmONC signal functions?*

The report further discusses using the survey findings to develop action plans for addressing gaps identified in the delivery of EmONC services. Support to these counties is provided through EmONC in-service training for health workers; provision of national EmONC guidelines; and the supply of MNCH equipment, commodities, and drugs. The tools and training materials developed and used for the assessments have been packaged in a publicly available EmONC toolkit (MEval-PIMA, 2017).

The theoretical framework upon which the intervention is based draws from the Donabedian model that represents a quality-of-care framework in three interlinked unidirectional dimensions: structure, process, and outcome (Donabedian, 1988). Thus, changes in structure-related items (e.g., commodities, buildings, equipment, and guidelines) directly influence the process of care (e.g., patient diagnosis and treatment), which, in turn, determines outcomes (e.g., morbidity and mortality). Through assessing the capacity of health facilities to provide the EmONC signal functions, inferences on the ability of facilities to reduce maternal and newborn mortality can, therefore, be made. Figure 3 is a simplified illustration of this framework.

Figure 3. Theoretical model for evaluation of the scale-up of EmONC in Kenya



METHODS

Annual cross-sectional surveys were conducted in selected health facilities in 18 counties with a high burden of maternal and newborn mortality. County health officials working with USAID implementing partners APHIAplus, AMPATH PLUS, and MCSP identified high-volume health facilities for inclusion in the assessments to evaluate the scale-up of EmONC services. Facilities that were included in previous assessments were given priority, to allow for comparative assessment of performance.

Data Collection and Orientation

County directors for health services and the USAID implementing partners APHIAplus, AMPATH PLUS, and MCSP in target counties identified participants to attend one-day meetings for orientation and practical training on use of the data collection tool (MEval-PIMA, 2017). At these meetings, participants also received an overview of the EmONC training package, basic principles of data management, feedback on results from previous assessments, and the actionable recommendations from previous implementing partners' meetings. Training was conducted using standard operating procedures and training materials developed jointly by MEval-PIMA and MCSP to ensure uniformity of data collection and data entry processes across all sites. Tools were modified to incorporate feedback from the county teams and the MOH prior to distribution to trainees.

Structure Indicators

Each EmONC signal function was assigned an indicator or a set of indicators regarded as essential for the proper provision of the respective service. In addition, data were collected on the proportion of health workers providing services in the maternal and newborn units who had received EmONC training within the 12 months preceding the survey and on the availability of copies of the national EmONC guidelines handbook. Table 2 summarizes the structure indicators for each of the nine EmONC signal functions and the major causes of maternal and newborn mortality targeted by the indicators.

Table 2. Structure indicators for signal functions used in the assessment

Basic signal functions	Indicators	Conditions targeted
(1) Administer parenteral antibiotics	Availability of injectable penicillin *and* gentamicin *and* metronidazole OR ceftriaxone *and* metronidazole	Puerperal sepsis
(2) Administer uterotonic drugs	Availability of parenteral oxytocin	Postpartum haemorrhage
(3) Administer parenteral anticonvulsants for severe preeclampsia and eclampsia	Availability of magnesium sulphate	Preeclampsia/eclampsia
(4) Manually remove the placenta	Availability of sterile elbow-length gloves	Postpartum haemorrhage, puerperal sepsis
(5) Remove retained products of conception	Availability of manual vacuum aspiration kit OR misoprostol for medical evacuation	Abortion
(6) Perform assisted vaginal delivery	Availability of vacuum extractor	Obstructed labor
(7) Perform basic neonatal resuscitation	Availability of pediatric bag valve mask device	Perinatal asphyxia

Comprehensive signal functions	Indicators	Conditions targeted
(8) Perform surgery (e.g., caesarean delivery)	Availability of caesarean delivery set	Obstructed labor, preeclampsia and eclampsia, obstetric haemorrhage, perinatal asphyxia
(9) Perform blood transfusion	Availability of blood transfusion sets	obstetric haemorrhage
Additional indicators		
Training of health workers on EmONC		All
Availability of national EmONC guidelines		All

Process Indicators

Although "structure-related" indicators represent the basic elements of the provision of high-quality care, their availability does not necessarily reflect appropriate use. Examination of this dimension of care requires the assessment of the "process of care." Measures of process of care are, however, often difficult to define and, unless observed directly, are greatly affected by the quality of documentation—a major limitation in low-resource settings. Table 3 displays the five indicators selected for the assessment of process of care of EmONC and the main causes of maternal and newborn mortality targeted.

Table 3. Process indicators for signal functions used in the assessment

EmONC process indicator		Indicator assessed	Conditions targeted
1.	Administration of oxytocin within one minute of delivery	Percentage of deliveries at the health facility for which oxytocin was delivered within one minute of delivery	Postpartum haemorrhage
2.	Appropriate use of partograph	Percentage of deliveries at the health facility for which partograph was filled in appropriately for the monitoring of foetal heart rate, maternal condition, and reporting of the outcome of labor	Obstructed labor, preeclampsia and eclampsia, perinatal asphyxia, postpartum haemorrhage
3.	Appropriate monitoring of maternal blood pressure	Percentage of deliveries at the health facility for which blood pressure was monitored *at least* every four hours during labor	Preeclampsia and eclampsia
4.	Appropriate newborn resuscitation	Percentage of newborns who required resuscitation that are documented to have received appropriate resuscitation	Perinatal asphyxia
		Requirement of resuscitation defined by five-minute Apgar Score <7 or irregular shallow breathing or pulse rate < 60 beats per minute	
5.	Implementation of MPDSR*	Percentage of sampled maternal and perinatal deaths for which a mortality audit was conducted	All causes of maternal and perinatal death

* MPSDR was introduced in the 2016 assessments.

To assess process indicators, the goal at each facility was to sample 100 maternity records for a three-month period. Small health facilities with fewer than 100 deliveries over the three-month period were asked to include all available records. In high-volume facilities, data were extracted from the first 35 maternity records in each month, counting backward from the last day of the month for each of the

three months starting from March. If any of the three months had fewer than 35 records, all records for that month were included in the sample with the deficit evenly distributed between the other two months. Although this approach was likely to result in oversampling of observations from small facilities, it was purposefully applied as a crude method for correcting for the bias in the original sampling strategy that favoured the selection of high-volume health facilities.

Data Management and Analysis

After orientation, county assessment teams collected data from selected facilities in their respective counties. This exercise took place roughly between June and September each year across the 18 counties. The county teams entered data in Microsoft Excel and transmitted them electronically and in paper copies to MEval-PIMA for cleaning, collation, analysis, reporting, and archiving. In preparation for the second (2014) and subsequent assessments (2015 and 2016), M&E teams in the counties were trained on the use of simple Excel dashboards to conduct their own analyses using locally generated data and use the findings to develop appropriate action plans. Quantitative data on the availability of essential supplies required to perform the EmONC signal functions at the county and individual health facility levels were reported as proportions. Comparisons of performance between the 2014 and 2016 assessments were reported as absolute differences and excluded those facilities that were not common to all assessments. Where mean performance was reported, sampling weights were applied to account for imbalance in the size of facilities (e.g., health centres and dispensaries versus hospitals) in the counties included in the assessment. Analyses were conducted using Stata version 12.1.

Dissemination of Results and Development of Action Plans

Results of the assessment were shared with the respective county health management teams (CHMTs) and USAID implementing partners APHIAplus, AMPATH PLUS, and MCSP for dissemination and action planning. Each county team scheduled a meeting and invited relevant stakeholders, CHMT members, subcounty reproductive health teams, and health records information officers. Local nongovernmental organizations, community-based organizations, and faith-based organizations were also represented. Those present, led by the CHMT, discussed the findings and developed action plans targeting identified areas of need.

RESULTS

Findings

Between 2014 and 2016, 1,413 health facility assessments were conducted in 18 counties. More than half of the counties (10 out of 18) were included in all three assessments. The 2016 assessments covered 528 health facilities (380 health centres and dispensaries and 148 hospitals), representing an increase of almost 100 facilities over the preceding years. Health centres and dispensaries comprised approximately three-quarters of the total facilities represented across the three years. As Table 4 shows, the number of facilities assessed per county ranged from four in Migori County in 2015 to 66 in Makueni County in 2015. Of the total number of health facilities assessed between 2014 and 2016, 221 were included in each annual assessment (150 health centres and dispensaries and 71 hospitals). These facilities were purposefully covered in this analysis of annual trends in availability of EmONC signal function indicators.

Table 4. Counties and number of health facilities included in the annual assessments

County	2014	2015	2016
Number of health facilities (health centres and dispensaries and hospitals)			
Baringo	20 (14, 6)	21 (15, 6)	27 (21, 6)
Busia	40 (36, 4)	61 (52, 9)	59 (52, 7)
Isiolo	–	20 (16, 4)	20 (16, 4)
Kisumu	–	33 (28, 5)	59 (33, 26)
Kitui	41 (29, 12)	45 (31, 14)	39 (29, 10)
Machakos	43 (39, 4)	42 (38, 4)	–
Makueni	54 (44, 10)	66 (55, 11)	–
Mandera	32 (27, 5)	–	35 (29, 6)
Meru	54 (27, 27)	51 (24, 27)	50 (24, 26)
Migori	–	4 (2, 2)	14 (8, 6)
Murang'a	9 (3, 6)	9 (3, 6)	9 (3, 6)
Nairobi	20 (11, 9)	–	48 (36, 12)
Narok	13 (11, 2)	13 (11, 2)	18 (16, 2)
Nyamira	32 (26, 6)	–	58 (48, 10)
Samburu	18 (15, 3)	18 (15, 3)	18 (15, 3)
Tharaka-Nithi	20 (15, 5)	20 (15, 5)	20 (15, 5)
Trans-Nzoia	30 (21, 9)	33 (22, 11)	31 (20, 11)
Wajir	23 (15, 8)	23 (15, 8)	23 (15, 8)
Total	**449 (333, 116)**	**436 (327, 109)**	**528 (380, 148)**

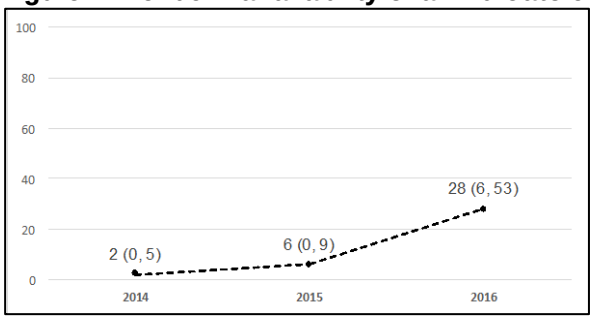
Facility Preparedness to Provide EmONC Services

Facilities were assessed for their preparedness to provide EmONC signal functions as defined by the WHO guidelines (WHO, et al., 2009), which the Kenya MOH has adopted. EmONC preparedness was defined as the availability of a predefined list of equipment, commodities, and drugs required for health centres and dispensaries to provide each of the seven BEmONC signal functions and for hospitals to provide the nine CEmONC signal functions (see Table 2).

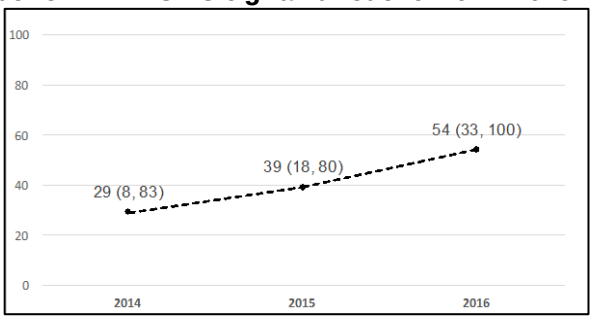
Availability of Items for All BEmONC Signal Functions

Availability of equipment to perform all seven BEmONC signal functions increased progressively over the three annual assessments. In 2016, essential items for performing all seven BEmONC signal functions were available in 28 percent of health centres and dispensaries (a 14-fold increase from 2014) and 54 percent of hospitals (a twofold increase from 2014). In the most recent assessments, all hospitals located in Narok, Samburu, and Tharaka-Nithi Counties reported the availability of all seven indicators required to perform BEmONC signal functions.

Figure 4. Trends in availability of all indicators to perform BEmONC signal functions: 2014–2016

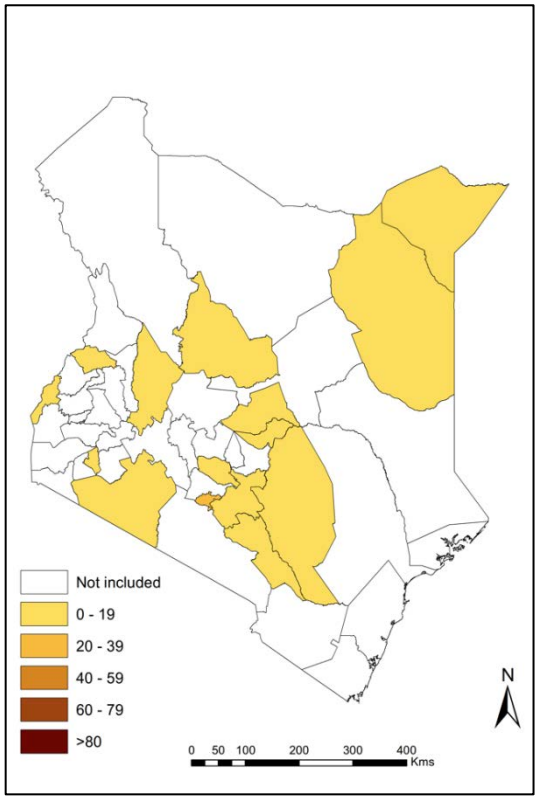


Health centres/dispensaries: percentage (range)

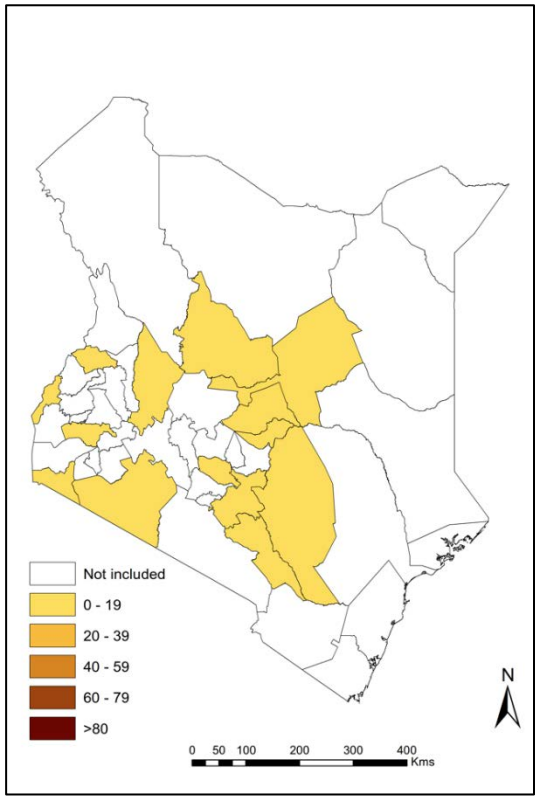


Hospitals: percentage (range)

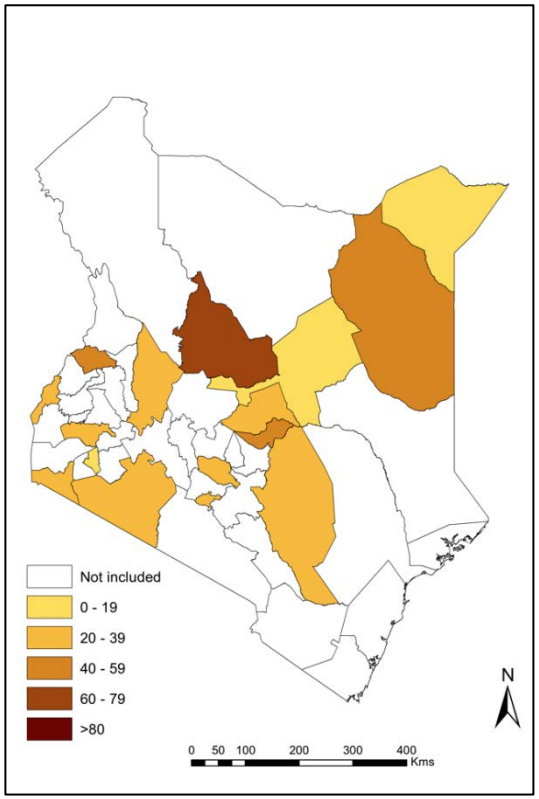
Figure 5. Availability by county of all indicators to perform BEmONC signal functions: 2014–2016 (health centres and dispensaries)



2014

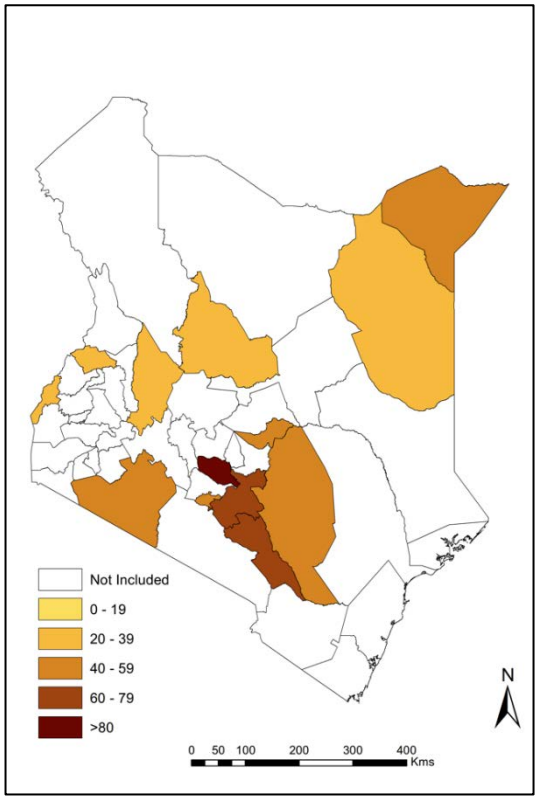


2015

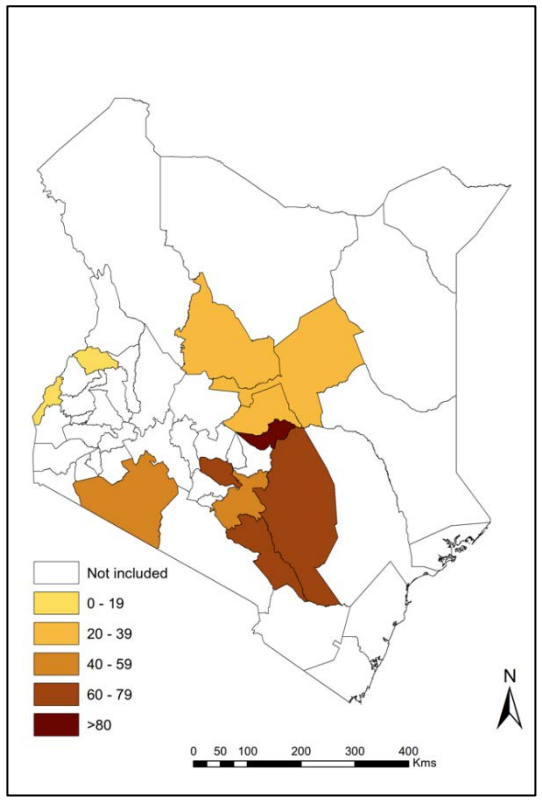


2016

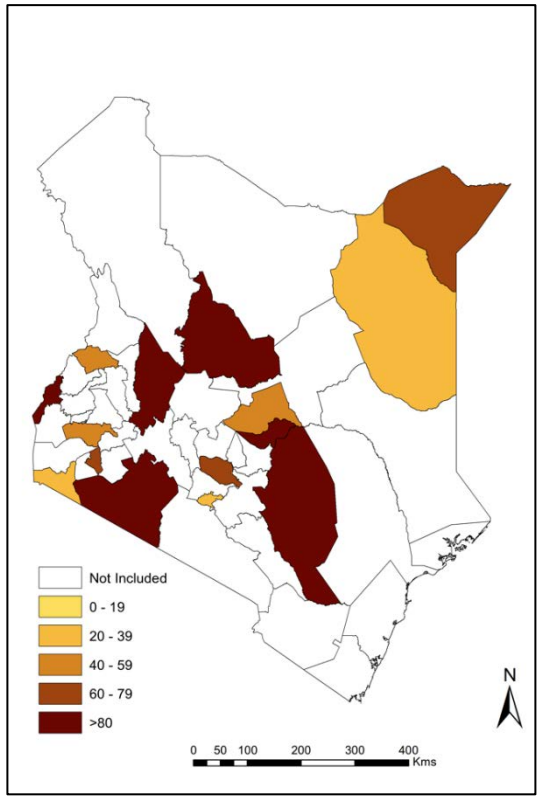
Figure 6. Availability by county of all indicators to perform BEmONC signal functions: 2014–2016 (hospitals)



2014



2015

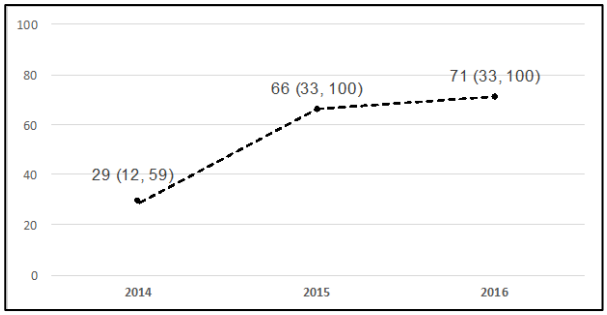


2016

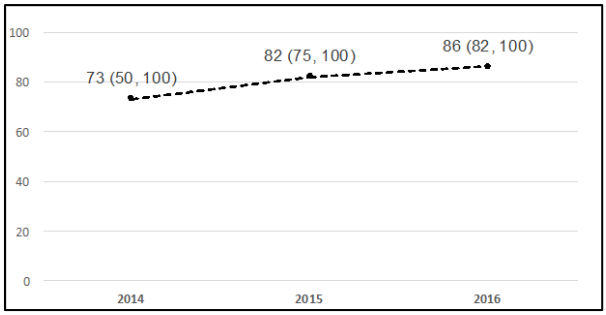
Signal Function 1: Availability of Injectable Antibiotics

There was a steady increase in the availability of injectable antibiotics over the three years, peaking at 71 percent across health centres and dispensaries and 86 percent in hospitals. Availability remained low (below 50 percent) in health centres and dispensaries in Murang'a and Nyamira Counties. Antibiotics were available in all health facilities assessed in Samburu and Wajir Counties.

Figure 7. Trends in availability of injectable antibiotics



Health centres/dispensaries: percentage (range)

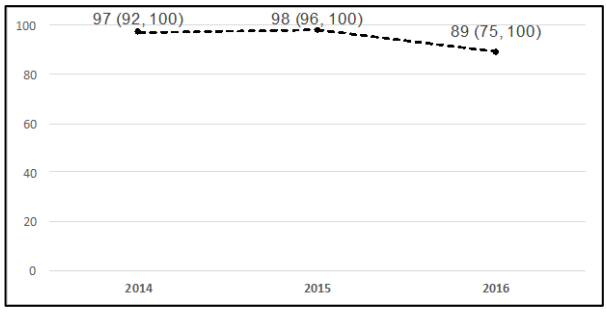


Hospitals: percentage (range)

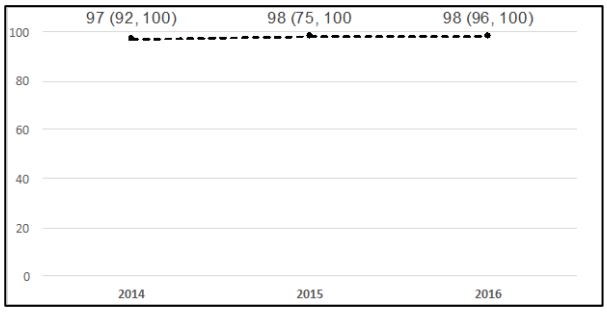
Signal Function 2: Availability of Oxytocin

Availability of oxytocin remained high between 2014 and 2016. This finding was consistent with that from the 2014 assessment, in which oxytocin was found to be available in 97 percent of facilities assessed. Oxytocin was unavailable in approximately 25 percent of health centres and dispensaries in Busia, Kisumu, and Mandera Counties. Other counties reported availability in almost all health facilities that were assessed.

Figure 8. Trends in availability of oxytocin



Health centres/dispensaries: percentage (range)

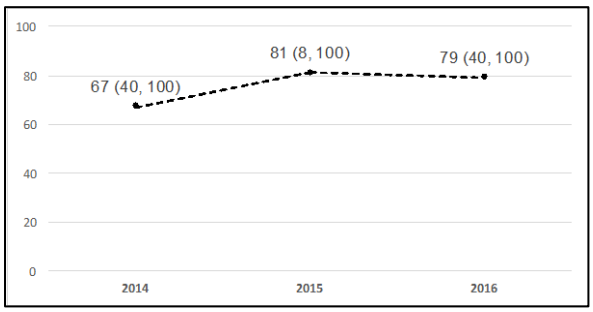


Hospitals: percentage (range)

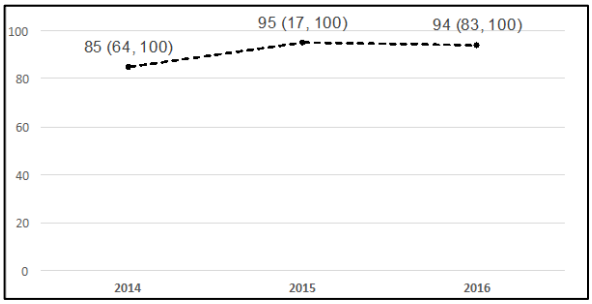
Signal Function 3: Availability of Magnesium Sulphate

In the 2016 assessment, magnesium sulphate was found to be available in 79 percent of health centres and dispensaries and 94 percent of hospitals, representing an improvement from 2014, when only 67 percent of health centres and dispensaries and 85 percent of hospitals reported availability of this commodity. Notable improvements in availability were observed in Baringo (36 percent increase in health centres and dispensaries and 33 percent in hospitals), Narok (50 percent increase in health centres and dispensaries), and Trans-Nzoia (31 percent increase in health centres and dispensaries). Only 40 percent of health centres and dispensaries in Nyamira and 69 percent of those in Samburu County had magnesium sulphate.

Figure 9. Trends in availability of magnesium sulphate



Health centres/dispensaries: percentage (range)

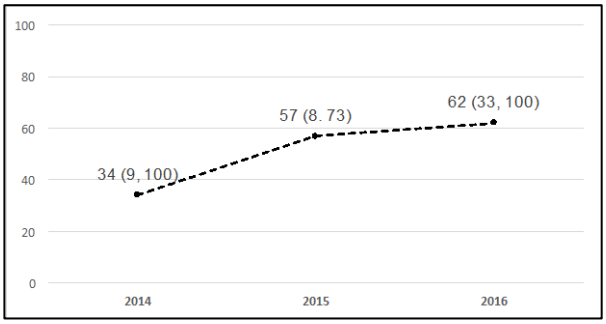


Hospitals: percentage (range)

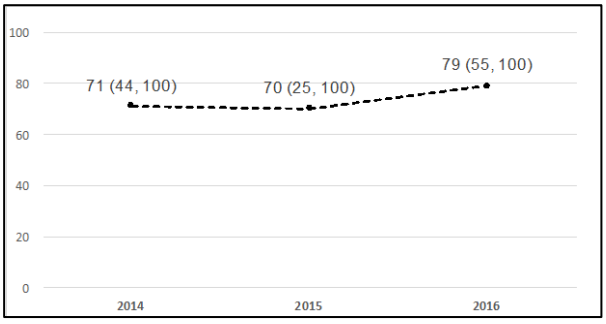
Signal Function 4: Availability of Elbow-Length Gloves

In 2016, elbow-length gloves for manual removal of the placenta were available in 62 percent of health centres (an improvement of 28 percent from 2014), and in 70 percent of hospitals (an improvement of 8 percent from 2014). Availability was notably low in Isiolo, Mandera, Murang'a, Narok, and Nyamira Counties, where elbow-length gloves were unavailable in more than half of health centres and dispensaries. In contrast, elbow-length gloves were available in all hospitals in Baringo, Busia, Narok, Samburu, and Tharaka-Nithi Counties.

Figure 10. Trends in availability of elbow-length gloves



Health centres/dispensaries: percentage (range)

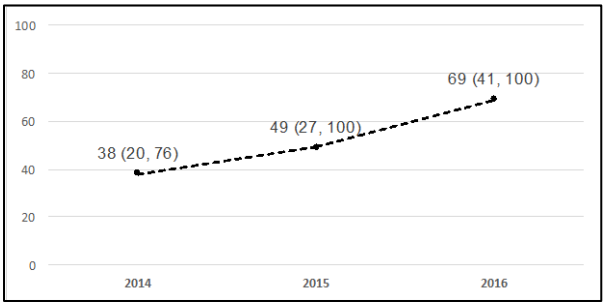


Hospitals: percentage (range)

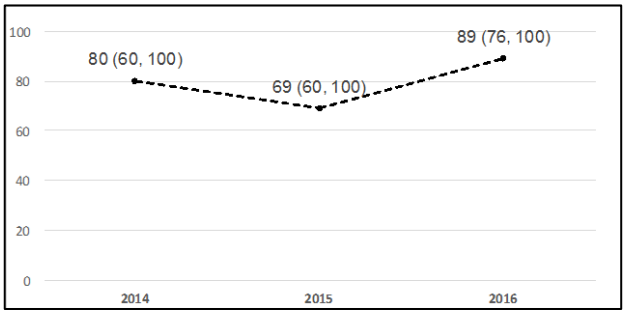
Signal Function 5: Availability of Manual Vacuum Aspiration Kits or Misoprostol

Health centres and dispensaries reported a notable increase in availability of manual vacuum aspiration (MVA) kits and misoprostol since 2014. However, availability remained low—less than 50 percent availability—in health centres and dispensaries in Meru, Nyamira, and Samburu Counties. At least one of the two items was available in most hospitals. The most notable improvements in performance were observed in Murang'a County, with a 100 percent increase in health centres and dispensaries and a 67 percent increase in hospitals, and in Busia County, with a 44 percent increase in health centres and dispensaries and a 25 percent increase in hospitals.

Figure 11. Trends in availability of MVA kits or misoprostol



Health centres/dispensaries: percentage (range)

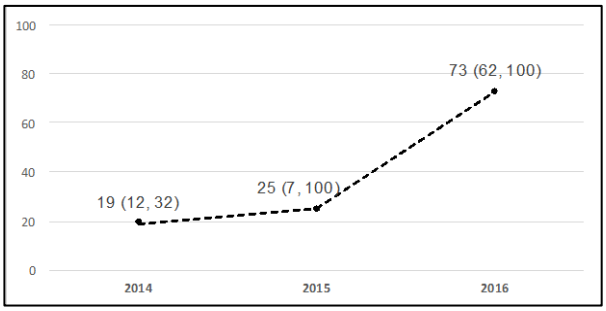


Hospitals: percentage (range)

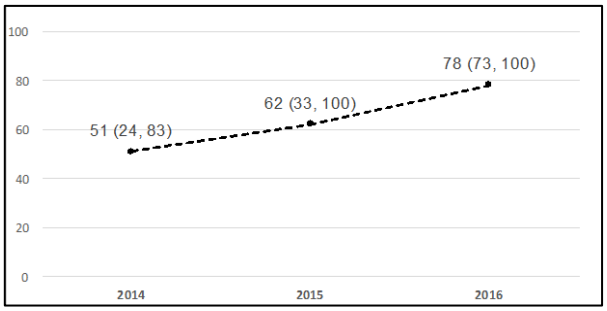
Signal Function 6: Availability of Vacuum Extractors

The availability of vacuum extractors in health centres and dispensaries increased markedly, from 19 percent in 2014 to 73 percent in 2016. Availability also increased in hospitals, with almost 80 percent reporting readiness for this signal function. Availability remained low (less than half) in health centres and dispensaries in Isiolo and Kisumu Counties. Marked improvements in availability were observed in hospitals in Busia (50 percent increase), Kisumu (73 percent increase), Meru (47 percent increase), Murang'a (50 percent increase), and Narok (67 percent increase).

Figure 12. Trends in availability of vacuum extractors



Health centres/dispensaries: percentage (range)

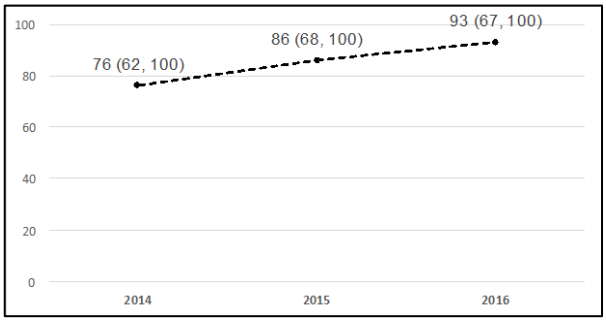


Hospitals: percentage (range)

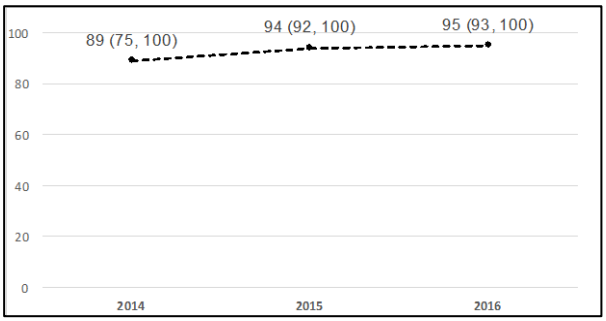
Signal Function 7: Availability of Paediatric-Sized Ambu Bags

In the 2016 assessment, ambu bags for newborn resuscitation were found to be available in more than 90 percent of all health facilities assessed. An exception was Wajir County, where only 67 percent of health centres and dispensaries and 25 percent of hospitals were found to have this essential equipment.

Figure 13. Trends in availability of pediatric-sized ambu bags



Health centres/dispensaries: percentage (range)

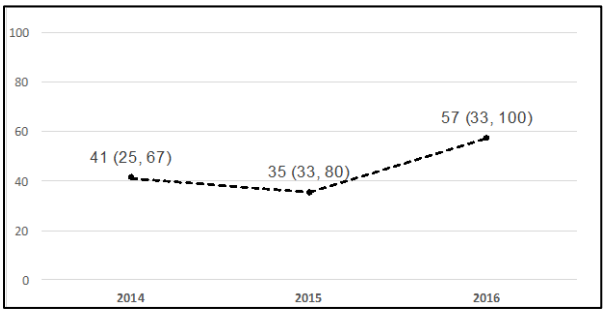


Hospitals: percentage (range)

Signal Function 8: Availability of Caesarean Section Sets

Caesarean section sets were available in only 57 percent of hospitals, representing an improvement from previous assessments. The greatest improvement was observed in Busia County, with an increase in availability of 42 percent. This item was available in less than 30 percent of the hospitals assessed in Nyamira, Trans-Nzoia, and Wajir Counties. Between 2014 and 2015, five counties reported reductions in availability of caesarean section sets.

Figure 14. Trends in availability of caesarean section sets

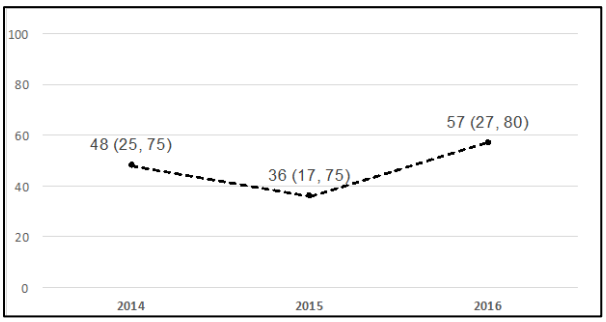


Hospitals: percentage (range)

Signal Function 9: Availability of Blood Transfusion Sets

Blood transfusion sets were available in 57 percent of hospitals assessed, an increase of 9 percent from 2014. Modest improvements in availability were observed in Baringo County, with an increase of 17 percent, and in Tharaka-Nithi County, with an increase of 20 percent.

Figure 15. Trends in availability of blood transfusion sets



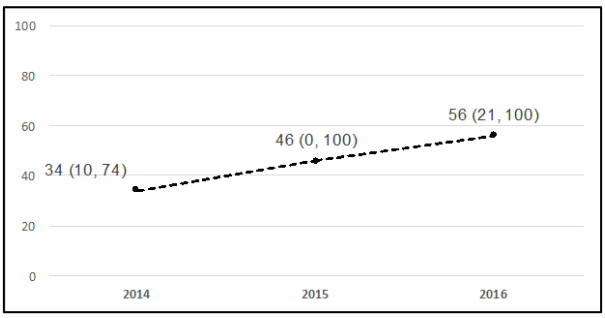
Hospitals: percentage (range)

Availability of National EmONC Guidelines

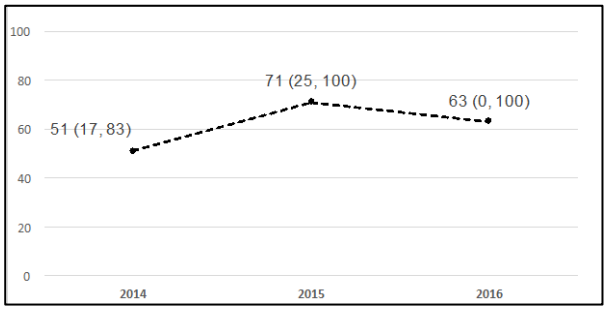
The National Guidelines for Quality Obstetrics and Perinatal Care (Ministry of Public Health and Sanitation and Ministry of Medical Services, 2012) were available as confirmed by the enumerator in 56 percent of health centres and dispensaries, an increase of 22 percent from 2014, and in 63 percent of hospitals, an increase of 12 percent from 2014. In 2016, availability of the guidelines was low in Kisumu (available in only 54 percent of hospitals and 27 percent of health centres and dispensaries), Murang'a (available in only 17 percent of health centres and dispensaries), Nairobi (available in only 33 percent of hospitals and 28 percent of health centres and dispensaries), and Wajir (available in only 38 percent of hospitals and 20 percent of health centres and dispensaries). Notable improvements were observed in

Narok, with increases between 2014 and 2016 of 89 percent in hospitals and 33 percent in health centres and dispensaries.

Figure 16. Trends in availability of national EmONC guidelines



Health centres/dispensaries: percentage (range)

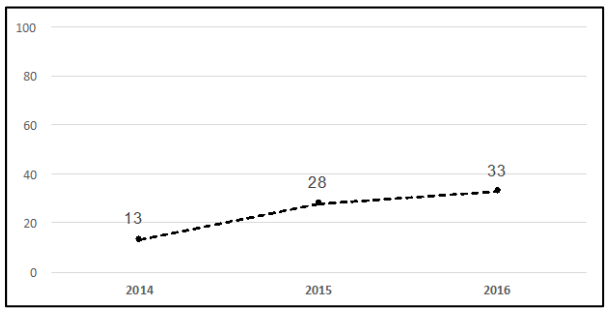


Hospitals: percentage (range)

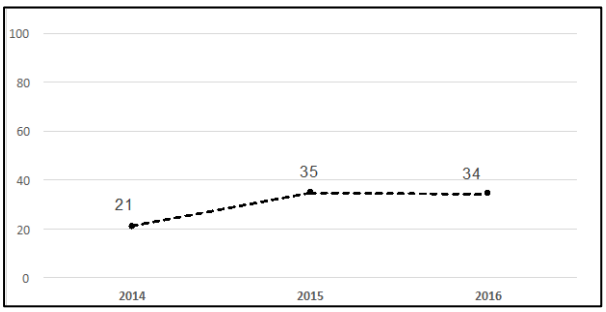
BEmONC Training of Healthcare Workers

In the 2016 assessment, 33 percent of healthcare workers providing services in the maternity and newborn units in health centres and dispensaries had undergone BEmONC training during the 12 months preceding the assessment: an increase of 20 percent from 2014. In hospitals, 34 percent had been trained: an increase of 13 percent from 2014. Most counties recorded only modest improvements in the proportion of trained healthcare workers, with notable increases observed in health centres and dispensaries in Murang'a (50 percent increase) and Narok (68 percent increase) and in hospitals in Narok (44 percent increase) and Trans-Nzoia (58 percent increase).

Figure 17. Trends in proportion of BEmONC-trained healthcare workers



Health centres/dispensaries: percentage



Hospitals: percentage

Kangaroo Mother Care (KMC) Services

An indicator to determine readiness to provide KMC services was introduced in the 2016 assessments. Health facilities were assessed for the availability of a physical location allocated for the provision of KMC. Overall, KMC rooms were identified in 12 percent of health centres and dispensaries (ranging from 0 percent in Kitui, Migori, Murang'a, Nairobi, Narok, and Samburu to 95 percent in Baringo). In comparison, 27 percent of hospitals had a KMC room (ranging from 0 percent of hospitals in Murang'a, Narok, Nyamira and Wajir to 83 percent of those in Baringo County).

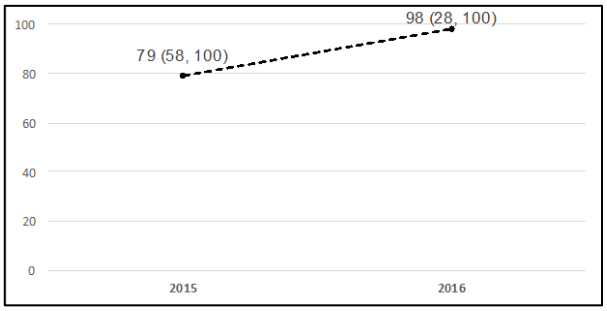
Process of Care

In 2015 and 2016, clinical records relating to deliveries from facilities included in the assessment were reviewed for documentation on the five indicators used to assess process of care provided.

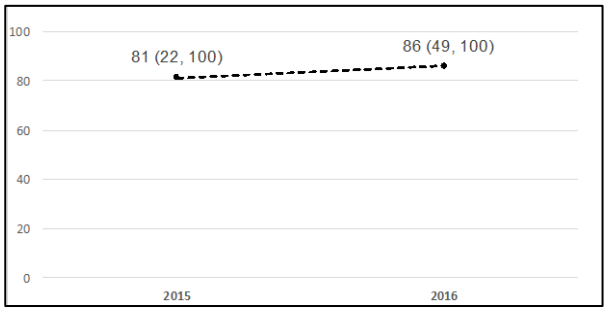
Administration of Oxytocin for AMTSL

The proportion of deliveries in health centres and dispensaries for which oxytocin was administered within one minute of delivery increased from 79 percent in 2015 to 98 percent in 2016. In hospitals, a smaller increase—from 81 percent to 86 percent—was observed. Oxytocin was administered for more than 90 percent of deliveries in health centres and dispensaries in Kisumu, Migori, Narok, Samburu, and Trans-Nzoia. Performance was high in hospitals across all counties, where more than 90 percent of deliveries received oxytocin for AMTSL; exceptions were Busia (83 percent), Kitui (74 percent), Murang'a (76 percent), Nyamira (86 percent), Trans-Nzoia (69 percent), and Wajir (49 percent).

Figure 18. Trends in proportion of clients receiving oxytocin for AMTSL



Health centres/dispensaries: percentage (range)

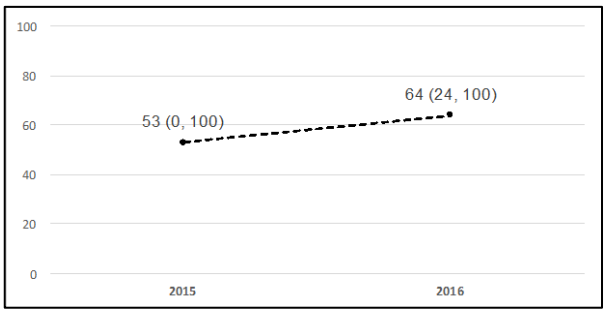


Hospitals: percentage (range)

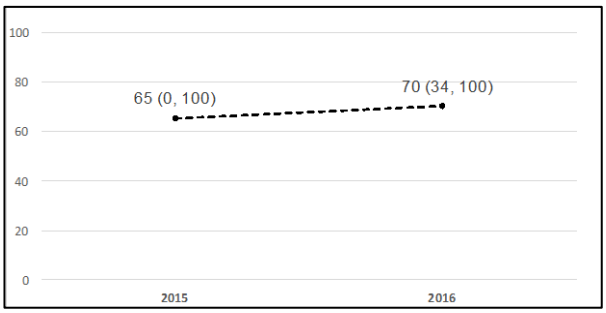
Appropriate Use of Partograph

In 2016, partographs were completed properly and appropriately for less than 50 percent of deliveries in health centres and dispensaries in Busia, Mandera, Nyamira, and Wajir. Performance was highest in Samburu County, where appropriate use was documented in 92 percent of deliveries in health centres and dispensaries and in 90 percent of deliveries in hospitals. Between 2015 and 2016, an overall increase in partograph use was reported both in health centres and dispensaries (53 percent to 64 percent) and in hospitals (65 percent to 70 percent).

Figure 19. Trends in proportion of clients appropriately monitored for labor using partograph



Health centres/dispensaries: percentage (range)



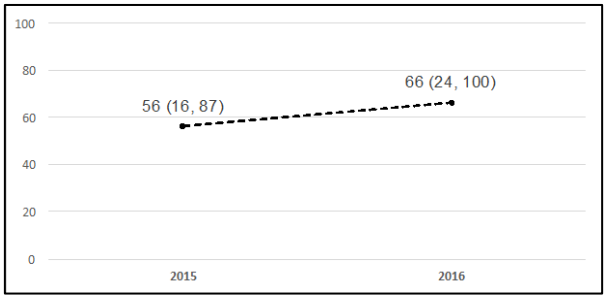
Hospitals: percentage (range)

Monitoring of Blood Pressure

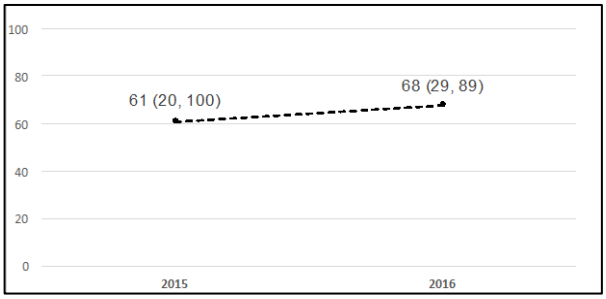
Between 2015 and 2016, monitoring of blood pressure increased from 56 percent to 66 percent of deliveries sampled in health centres and dispensaries, and from 61 percent to 68 percent in hospitals. In 2016, monitoring of blood pressure was low—less than 50 percent of deliveries—in hospitals in only the counties of Murang'a, Wajir, and Nyamira. Performance of this indicator was highest in Samburu and

Tharaka-Nithi, with blood pressure monitoring in more than 80 percent of deliveries conducted in health centres and dispensaries and hospitals.

Figure 20. Trends in proportion of clients with blood pressure appropriately monitored during labor



Health centres/dispensaries: percentage (range)

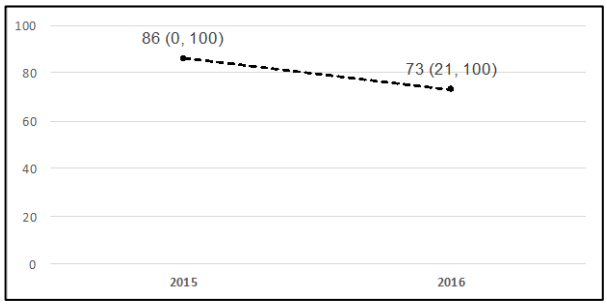


Hospitals: percentage (range)

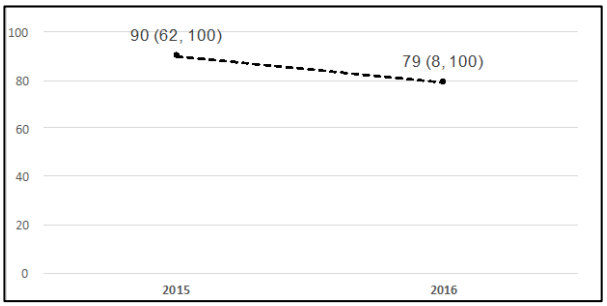
Newborn Resuscitation

Health facilities were assessed for the proportion of newborns with a documented Apgar score below 7 at five minutes for whom resuscitation was conducted. Since this indicator did not apply for all deliveries conducted, many facilities reported few or no observations. Where observations were reported, performance of resuscitation for sick newborns declined in health centres and dispensaries from 86 percent in 2015 to 73 percent in 2016, and in hospitals from 90 percent to 79 percent over the same period.

Figure 21. Trends in proportion of newborns requiring resuscitation appropriately resuscitated



Health centres/dispensaries: percentage (range)



Hospitals: percentage (range)

MPDSR

In 2016, MPDSR committees were reported to be operational in 86 of 148 hospitals (58.1 percent) and in 99 of 380 health centres and dispensaries (26.1 percent). Among 19 maternal mortality records sampled in health centres and dispensaries, all (100 percent) were audited. In hospitals, 193 of 206 (93.6 percent) of maternal mortality records sampled were audited. With the exceptions of Mandera (4 of 9 deaths audited), Migori (11 of 14 deaths audited), Trans-Nzoia (4 of 6 deaths audited), and Wajir (4 of 5 deaths audited), more than 90 percent of maternal mortality records were audited in all counties. In contrast, only 45 of 102 (44 percent) perinatal deaths sampled in health centres and dispensaries were audited, and 364 of 661 (55.1 percent) perinatal deaths sampled in hospitals were audited. Only Narok County was reported to have audited all perinatal mortality records sampled both in health centres and dispensaries and in hospitals.

DISCUSSION

In the three cycles of annual health facility assessments, the proportion of facilities with essential equipment and commodities required to provide basic emergency care for mothers and newborns increased 14-fold in health centres and dispensaries and twofold in hospitals. This improvement was observed even as the number of facilities assessed increased from 449 in 2014 to 528 in 2016. Identifying the causal factors underlying this change was not the focus of this assessment, although it may be argued that timely access by counties and implementing partners to high-quality data that could be used to develop targeted action plans may have played a role.

National and county governments with assistance from development partners have made substantial investments toward achieving these goals, by providing support for training and by supplying commodities and equipment for maternal and newborn care; however, these efforts have been largely fragmented. The positive findings from this series of assessments offer a generic model for achieving change through improved coordination between governments at national and county levels and development partners.

Although these results reflect an encouraging trend, most health facilities remain unable to provide the seven basic signal functions. The situation is more acute in health centres and dispensaries, which attend to most deliveries. WHO guidelines recommend minimum coverage of four BEmONC facilities and one CEmONC facility per 500,000 population (WHO et al., 2009). The availability of basic services may be overestimated if the crude count of number of facilities within a specified geographical region is used to estimate coverage. The quality of services at the primary level also has important implications for the efficient running of the referral system. For example, women and their newborns requiring care are likely to bypass lower-level health facilities, preferring instead to seek care at referral facilities, often at the expense of valuable time during transit and additional costs related to transport.

Although availability of items such as oxytocin, magnesium sulphate, and pediatric ambu bags was observed to be high in most counties, other items such as elbow-length gloves, vacuum extractors, MVA kits, and misoprostol were unavailable in many facilities. All hospitals are expected to provide comprehensive care, including caesarean delivery and blood transfusion. In the 2016 assessment, the availability of caesarean section sets and blood transfusion sets was used as a proxy measure for the availability of these two lifesaving services. The two items were unavailable in more than half of the hospitals assessed. Furthermore, the comparison in performance between 2014 and 2016 showed an overall decrease in the availability of these items. Unravelling the factors underlying this decrease and investment in strengthening systems for commodity management are crucial for county and national governments and development partners seeking to achieve universal access to maternal and newborn health services.

Kangaroo mother care is a relatively low-cost intervention with great potential for reducing neonatal morbidity and mortality amongst preterm babies (Conde-Agudelo, 2016). Apart from Baringo County, the availability of KMC rooms was generally low across the facilities assessed, indicating an opportunity for scale-up. Investments aimed at increasing coverage of KMC should be coupled with the development of appropriate process indicators for M&E derived from routine data sources. An illustrative challenge experienced in this series of assessments was absence of a reliable means for identification of the denominator population (stable low birthweight neonates admitted for care) from available data sources.

Process of care was examined over two assessment cycles using three maternal indicators and one newborn indicator. Improvements were noted between the two assessments for the indicators related to maternal care, complementing the findings of the analyses for the nine EmONC structure indicators. However, performance of newborn resuscitation decreased between the two assessments both in health centres and dispensaries and in hospitals. In recognition of the importance of undertaking systematic reviews of maternal and newborn deaths and stillbirths, the MOH launched national MPDSR guidelines in 2016. In the most recent assessment, tools were expanded to include process indicators on MPDSR. In this initial assessment, slightly more than half of the hospitals assessed and only a quarter of health centres and dispensaries had an operational MPDSR committee. Mortality audits were reported to be high for maternal deaths but low for perinatal deaths. The results of this initial attempt at a more comprehensive examination of the quality of care provided in health facilities should be interpreted with caution, partly because poor care may in fact be the result of poor documentation. Despite the limitations, such data are critical for understanding the proximal determinants of clinical outcomes such as mortality. Future work should focus on refining the validity of data collected on process indicators at health facilities, including provision of support for improved clinical documentation.

Strengths

This series of assessments represents the largest published longitudinal report on the availability of EmONC services. Previously published analyses have been based on individual cross-sectional assessments, often including only a small number of health facilities (Banke-Thomas, et al.). This large sample—with serial data from a common set of health facilities, collected using consistent tools and methods (MEval-PIMA, 2017)—allowed for the precise estimation of indicators and examination of changes in performance over time. The number of counties and inclusion of health facilities offering all levels of care presents a representative depiction of the readiness to provide EmONC services within the counties sampled and at a national level.

In addition, reporting on indicators related to process of care provides informative details that are critical for understanding the local determinants of maternal and newborn outcomes.

Limitations

The observational nature of the analysis limits the ability to attribute causality of changes observed to the scale-up intervention. This analysis was restricted to structure and process indicators. Although mortality may have been a more objective and informative indicator to report, comparing outcomes presents the challenge of adequately accounting for variations in case mix across health facilities and over time. An illustrative example would be a large facility providing high-quality services reporting paradoxically high mortality, because of a disproportionately large number of patients with severely high-risk ailments. Collection of data on demand-side aspects of service delivery—i.e., examining access and use data—and incorporating qualitative inquiries, such as interviews to explore perceptions of healthcare workers and clients about available services, would have enriched the assessment. However, the intention of the scale-up was to develop tools and systems for conducting assessments to inform routine programming, thus limiting the incorporation of otherwise desirable elements that would be included in a formal research study.

RECOMMENDATIONS

Notable improvements were observed in the availability of items required to provide EmONC; however, the target to attain full readiness to provide EmONC is yet to be achieved across all focus counties. The findings of this report provide tangible insights into the scale-up counties' needs and offer a powerful tool for advocacy and rational resource allocation.

Only one of the seven EmONC signal functions relates directly to the newborn, and concerns have been raised regarding the limited responsiveness of EmONC to newborn care (Gabrysch, 2012). Subsequent cycles of assessments should incorporate additional indicators to assess care provided for the other major causes of newborn mortality, such as prematurity and neonatal sepsis. The scale-up coincided with the launch of the free maternity services policy, in 2013. Published reports suggest increased use both of basic maternity services and caesarean delivery under this policy but insufficient corresponding investment in supplies and human resources to address the resulting high demand (Wamalwa, 2015; Ministry of Health, 2015). In the post-Millennium Development Goals era, the role of quality is now widely recognized as a critical component in the journey to achieving the SDGs. This series of EmONC assessments has demonstrated the feasibility of using simple tools to track quality of care in routine settings. There is a need to refine and expand the range of indicators to provide reliable metrics for comprehensively assessing the quality of maternal and newborn health services. Possible additional indicators are capacity to provide services 24 hours a day, 7 days a week and implementation of respectful maternity care.

CONCLUSION

Sustaining the gains achieved over the successive cycles of this scale-up intervention will require commitment from stakeholders at all levels under the leadership of the national and county governments performing the critical role of providing a holistic framework linking service delivery (supply side) to uptake (demand side) to effectively address gaps in the continuum of access, use, and quality, while ensuring coordination among development and implementing partners supporting EmONC and overall maternal and newborn health programming. Other priorities are the integration of assessment tools in routine M&E tools and investment in health systems, including strengthening routine systems for capturing good-quality data on maternal and newborn care and fostering a culture of accountability and data use for decision making at all levels.

REFERENCES

Adam, T., Lim, S.S., Mehta, S., Bhutta, Z.A., Fogstad, H., Mathai, M., Zupan, J., & Darmstadt, G.L. (2005). Cost effectiveness analysis of strategies for maternal and neonatal health in developing countries. *British Medical Journal, 331*(7525), 1107. Retrieved from http://www.bmj.com/content/331/7525/1107

Banke-Thomas, A., Wright, K., Sonoiki, O., Banke-Thomas, O., Ajayi, B., Ilozumba, O., & Akinola, O. (2016). Assessing emergency obstetric care provision in low- and middle-income countries: A systematic review of the application of global guidelines. *Global Health Action, 9*(1), 31880. Retrieved from http://www.tandfonline.com/doi/full/10.3402/gha.v9.31880

Conde-Agudelo, A. & Diaz-Rossello, J.L. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. Cochrane Database Syst Rev. 2016(8):CD002771. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/24752403

Donabedian, A. (1988). The quality of care. How can it be assessed? *Journal of the American Medical Association, 260*(12), 1743–1748. Retrieved from http://jamanetwork.com/journals/jama/article-abstract/374139

Gabrysch, S., Civitelli, G., Edmond, K.M., Mathai, M., Ali, M., Bhutta, Z.A., & Campbell, O.M.R. (2012). New signal functions to measure the ability of health facilities to provide routine and emergency newborn care. *PLoS Medicine, 9*(11), e1001340. Retrieved from http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001340

Kassebaum, N.J., Bertozzi-Villa, A., Coggeshall, M.S., Shackelford, K.A., Steiner, C., Heuton, K.R., … Lozano, R. (2014). Global, regional, and national levels and causes of maternal mortality during 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet, 384*(9947), 980–1004. Retrieved from http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)60696-6/abstract

Lee, A.C., Cousens, S., Darmstadt, G.L., Blencowe, H., Pattinson, R., Moran, N.F., Hofmeyr, G.J., Haws, R.A., Bhutta, S.Z., & Lawn, J.E. (2011). Care during labor and birth for the prevention of intrapartum-related neonatal deaths: A systematic review and Delphi estimation of mortality effect. *BMC Public Health, 11 Suppl 3,* S10. Retrieved from https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-11-S3-S10

MEASURE Evaluation PIMA (MEval-PIMA). (2017). Monitoring and evaluation toolkit for the scale-up of emergency obstetric and newborn care in Kenya. Nairobi, Kenya: MEval-PIMA. Retrieved from https://www.measureevaluation.org/resources/publications/tr-17-150

Ministry of Health, Government of Kenya. (2015). *Status of implementation of free maternity services (FMS) program in the devolved health system in Kenya.* Nairobi, Kenya: Ministry of Health. Retrieved from http://publications.universalhealth2030.org/uploads/free_maternal_health_services_report_feb_2015_final1_doc_.pdf

Ministry of Public Health and Sanitation (MOPHS) and Ministry of Medical Services (MMS). (2012). National guidelines for quality obstetrics and perinatal care. Nairobi, Kenya: MOPHS and MMS.

Retrieved from https://www.k4health.org/toolkits/kenya-health/national-guidelines-quality-obstetrics-and-perinatal-care

Paxton, A., Maine, D., Freedman, L., Fry, D., & Lobis, S. (2005). The evidence for emergency obstetric care. *International Journal of Gynecology and Obstetrics, 88*(2), 181–93. Retrieved from http://onlinelibrary.wiley.com/doi/10.1016/j.ijgo.2004.11.026/abstract;jsessionid=49BAED8E7DB09B89DCEC053BBAF3F825.f04t02

Thaddeus S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine, 38*(8), 1091–110. Retrieved from https://www.researchgate.net/profile/Deborah_Maine/publication/11134243_Too_Far_to_Walk_Maternal_Mortality_in_Context/links/0c9605283b7590b668000000.pdf

United Nations. (n.d.). Goal 3: Ensure health lives and promote well-being for all at all ages [Web page]. Retrieved from http://www.un.org/sustainabledevelopment/health/

United Nations. (2015). Resolution adopted by the General Assembly on 25 September 2015. 70/1. Transforming our world: The 2030 Agenda for Sustainable Development. New York, NY, USA: United Nations. Retrieved from http://www.un.org/sustainabledevelopment/sustainable-development-goals/

United Nations Foundation. (n.d.). Every woman every child [Web page]. Retrieved from http://www.everywomaneverychild.org/

U.S. Agency for International Development (USAID). (2016). *Acting on the call: Ending preventable child and maternal deaths report: A focus on equity*. Washington, DC: USAID. Retrieved from https://www.usaid.gov/sites/default/files/Final-AOTC-file-v2.pdf

Wamalwa, E.W. (2015). Implementation challenges of free maternity services policy in Kenya: The health workers' perspective. *Pan African Medical Journal, 22,* 375. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4796785/

Wang, H., Liddell, C.A., Coates, M.M., Mooney, M.D., Levitz, C.E., Schumacher, A.E., … Murray, C.J.L. (2014). Global, regional, and national levels of neonatal, infant, and under-5 mortality during 1990–2013: A systematic analysis for the Global Burden of Disease Study 2013. *The Lancet, 384*(9947), 957–79. Retrieved from http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)60497-9/abstract

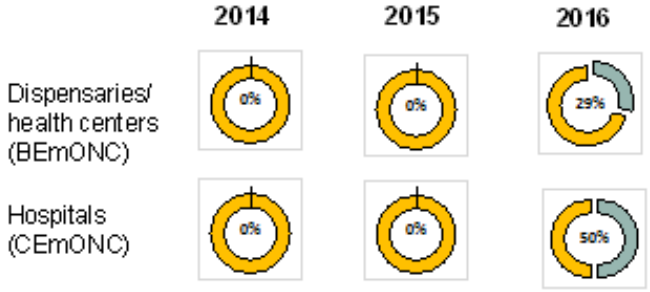
World Health Organization, United Nations Population Fund, United Nations Children's Fund, & Mailman School of Public Health Averting Maternal Death and Disability. (2009). *Monitoring emergency obstetric care: A handbook*. Geneva, Switzerland: World Health Organization. Retrieved from http://www.who.int/reproductivehealth/publications/monitoring/9789241547734/en/

APPENDIX. COUNTY PROFILES

Baringo County

	Dispensaries/ health centers	Hospitals
Total health facilities	223	7
Facilities assessed	21	6
%	9.4	85.7

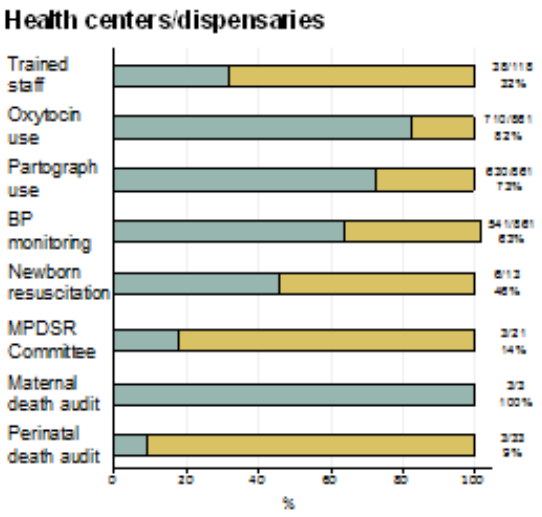
EmONC-ready health facilities

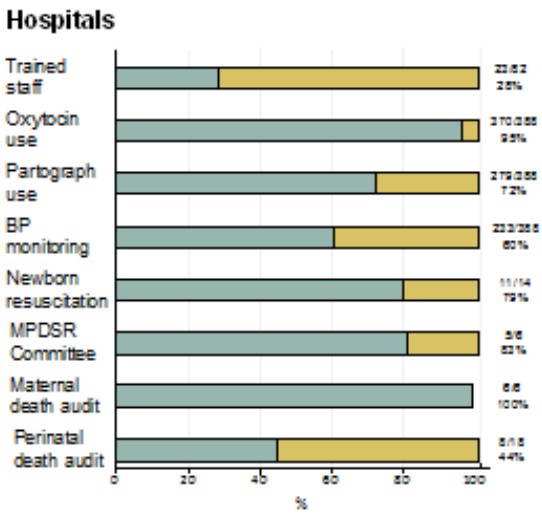


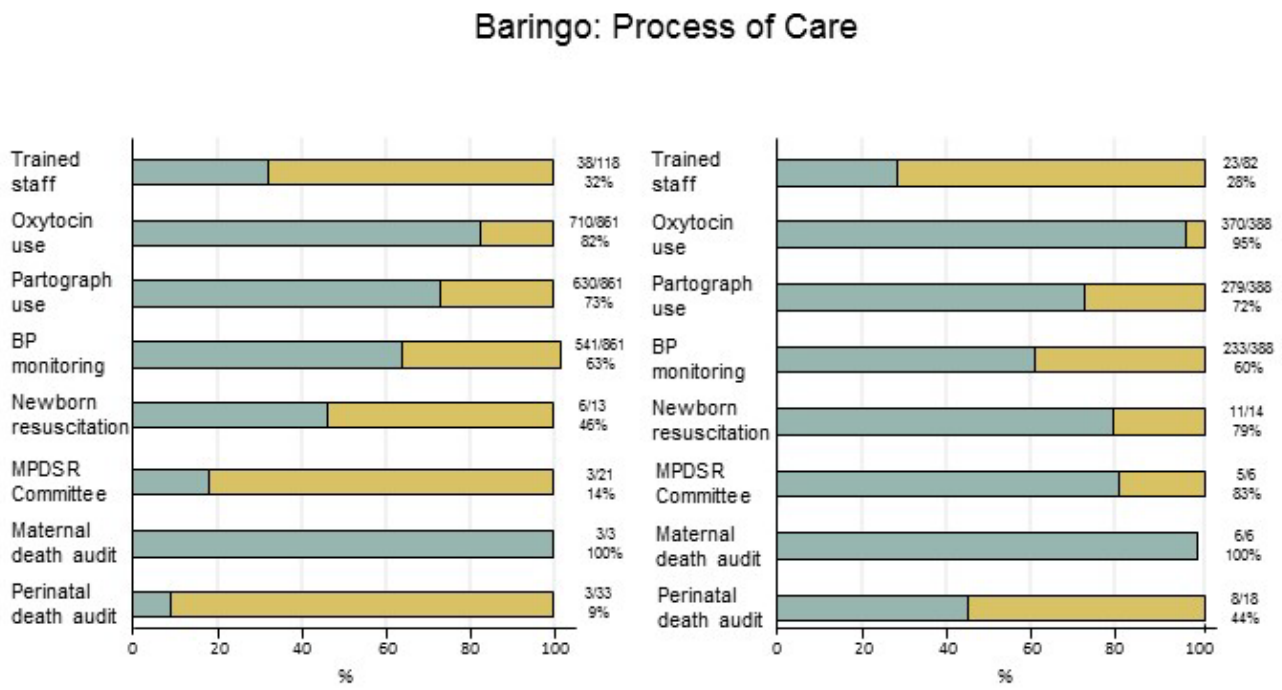
EmONC Signal Functions

Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	14	93	85	60	100	100
Oxytocin	93	57	100	100	100	100
$MgSO_4$	57	7	100	80	17	83
Long gloves	71	7	79	60	0	100
MVA/ Misoprostol	21	100	57	100	100	83
Vacuum	14	30	93	80	100	100
Pediatric Ambubag	93	100	93	100	100	100
Cesarean section set	-	-	-	60	50	50
Transfusion set	-	-	-	60	50	67

Process of care (2016)





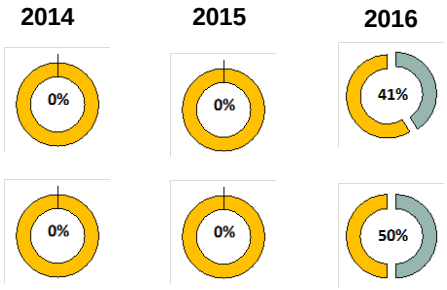


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
KMC (LBW Neonates)	Number of neonates receiving KMC
	Number of admitted stable (not receiving feeding respiratory support) neonates <2000g
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Busia County

	Dispensaries/ health centers	Hospitals
Total health facilities	88	7
Facilities assessed	49	6
%	55.6	85.7

EmONC-ready health facilities (2014 – 2016)

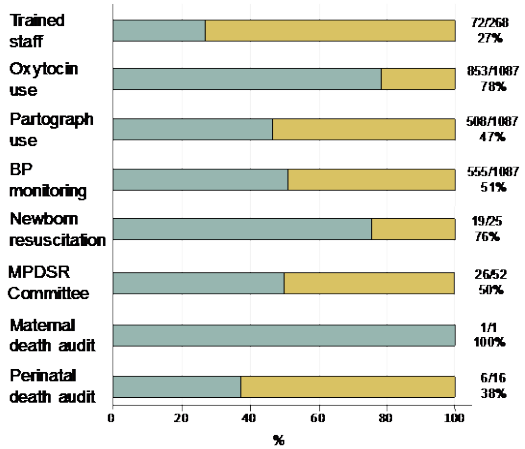


EmONC Signal Functions (2014 – 2016)

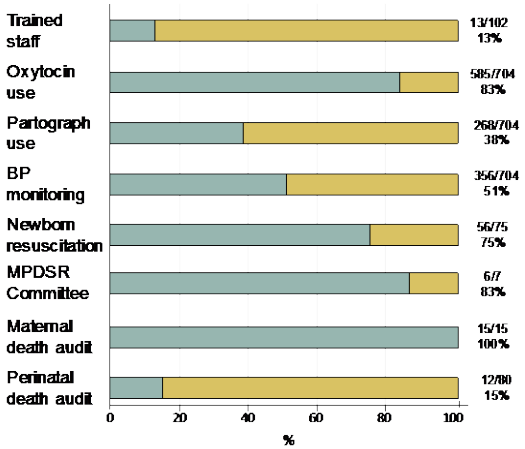
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	11	91	73	50	88	100
Oxytocin	97	20	76	100	50	100
$MgSO_4$	69	36	82	75	86	100
Long gloves	14	23	83	50	25	100
MVA/ Misoprostol	46	27	96	75	50	100
Vacuum	14	23	96	50	38	83
Pediatric Ambubag	60	19	98	100	13	100
Cesarean section set	-	-	-	33	25	67
Transfusion set	-	-	-	75	100	83

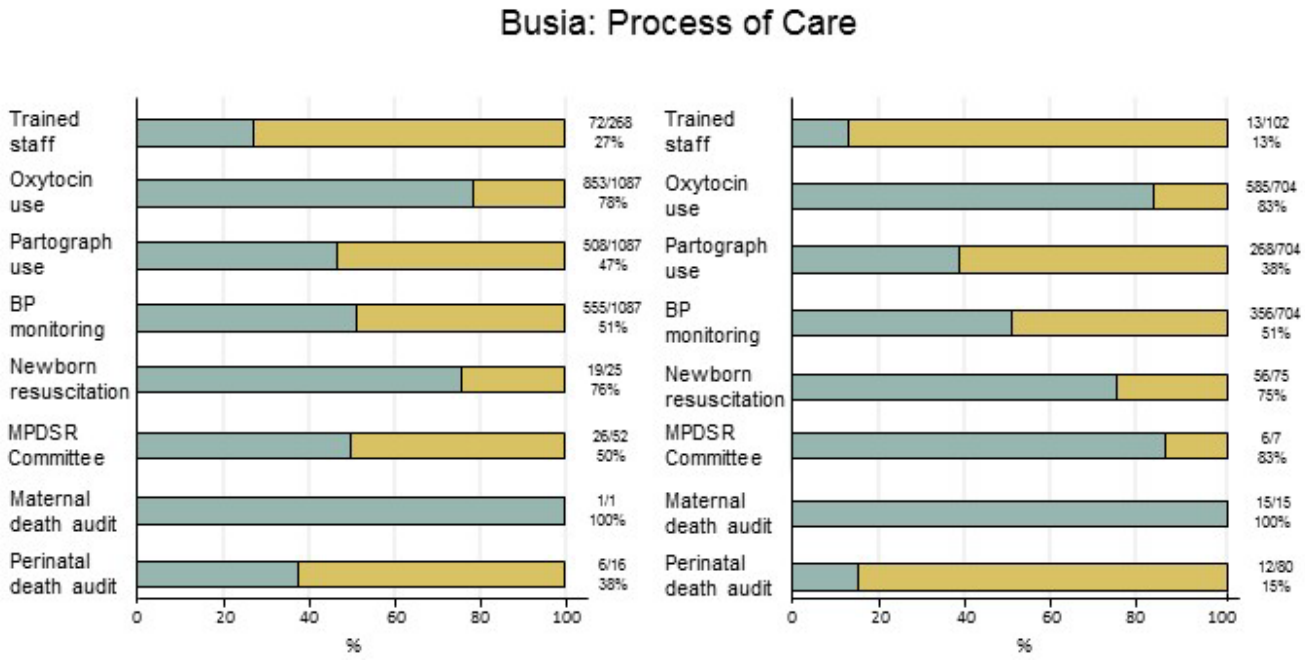
Process of care (2016)

Health centers/dispensaries



Hospitals



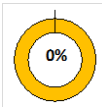
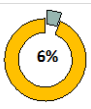


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Isiolo County

	Dispensaries/ health centers	Hospitals
Total health facilities	40	10
Facilities assessed	16	4
%	40.0	40.0

EmONC-ready health facilities (2014 – 2016)

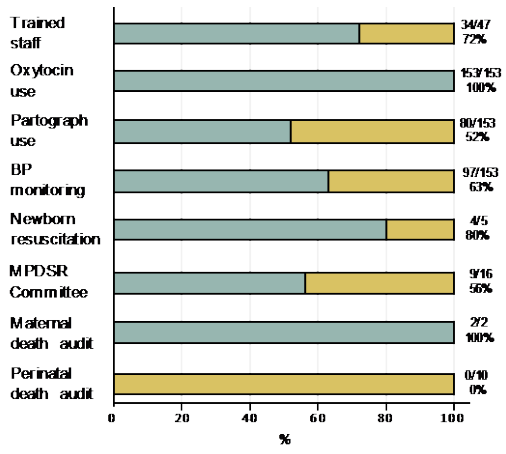
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	No data		
Hospitals (CEmONC)	No data		

EmONC Signal Functions (2014 – 2016)

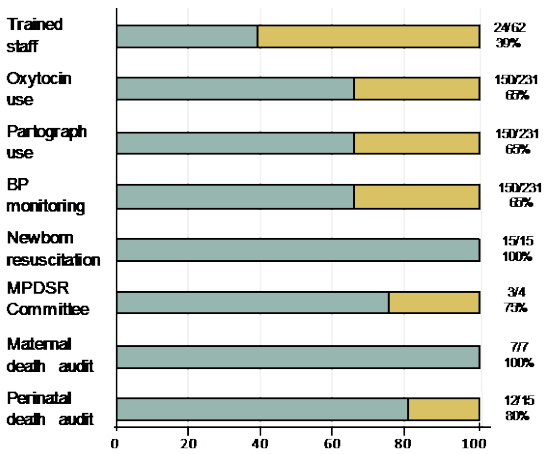
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	-	75	69	-	75	75
Oxytocin	-	100	88	-	100	100
$MgSO_4$	-	75	94	-	100	100
Long gloves	-	13	19	-	50	75
MVA/ Misoprostol	-	31	81	-	100	100
Vacuum	-	19	19	-	50	0
Pediatric Ambubag	-	81	88	-	100	100
Cesarean section set	-	-	-	-	100	75
Transfusion set	-	-	-	-	50	75

Process of care (2016)

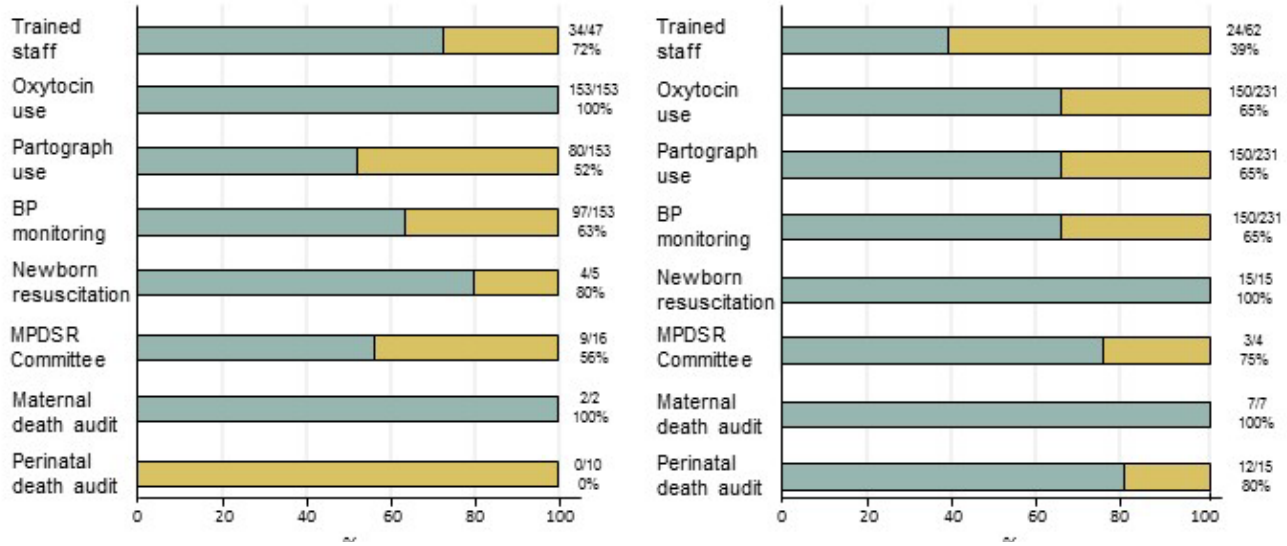
Health centers/dispensaries



Hospitals



Isiolo: Process of Care

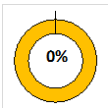
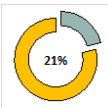
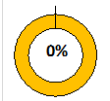
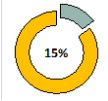


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Kisumu County

	Dispensaries/ health centers	Hospitals
Total health facilities	127	60
Facilities assessed	32	27
%	25.1	45.0

EmONC-ready health facilities (2014 – 2016)

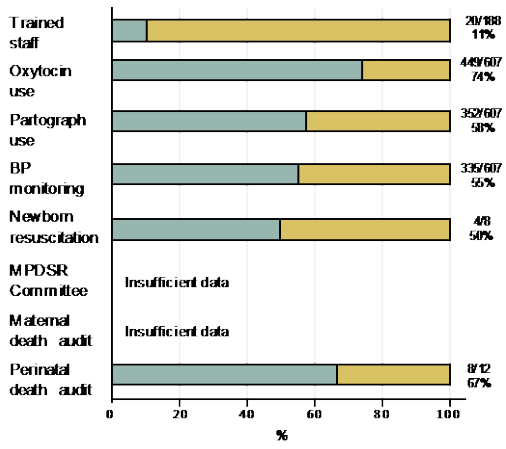
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	No data		
Hospitals (CEmONC)	No data		

EmONC Signal Functions (2014 – 2016)

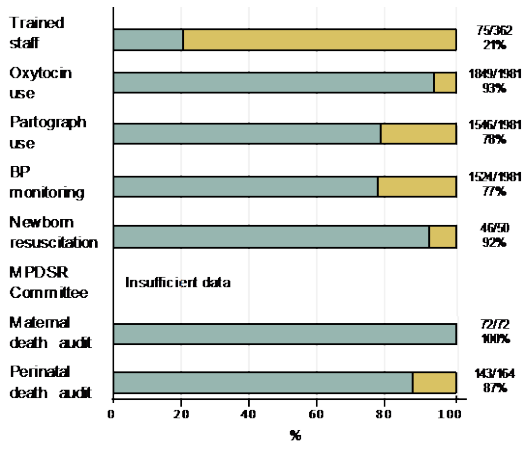
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	-	23	73	-	50	81
Oxytocin	-	88	76	-	100	92
$MgSO_4$	-	50	85	-	100	96
Long gloves	-	15	58	-	25	73
MVA/ Misoprostol	-	31	61	-	75	88
Vacuum	-	4	39	-	0	73
Pediatric Ambubag	-	48	91	-	100	96
Cesarean section set	-	-	-	-	25	50
Transfusion set	-	-	-	-	50	65

Process of care (2016)

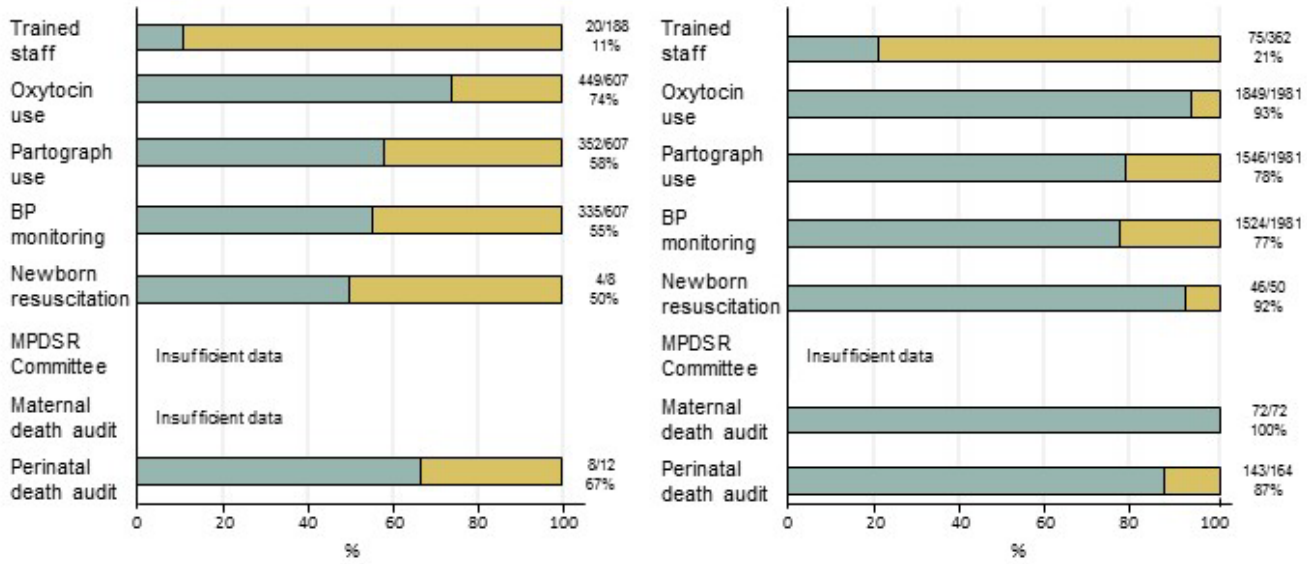
Health centers/dispensaries



Hospitals



Kisumu: Process of Care



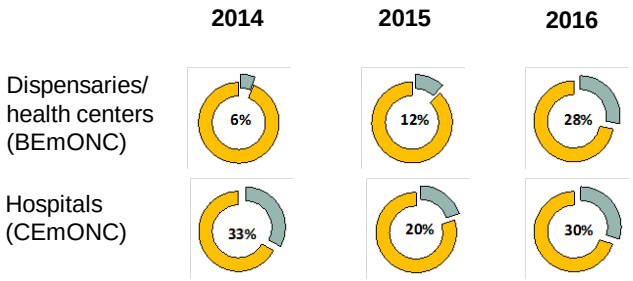
Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
KMC (LBW Neonates)	Number of neonates receiving KMC
	Number of admitted stable (not receiving feeding / respiratory support) neonates <2000g
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

-Only 11% of staff working in maternity / newborn units in health centers / dispensaries trained on BEmONC in preceding 12 months
-Only 21% of staff working in maternity / newborn units in hospitals trained on BEmONC in preceding 12 months
-Performance of key tasks related to EmONC, maternal and perinatal mortality audits high in hospitals but average in health centres/dispensaries
-Unclear if KMC is taking place
-All 8 maternal deaths audited. However, none of the neonatal deaths were audited

Kitui County

	Dispensaries/ health centers	Hospitals
Total health facilities	88	10
Facilities assessed	29	7
%	33.0	70

EmONC-ready health facilities (2014 – 2016)

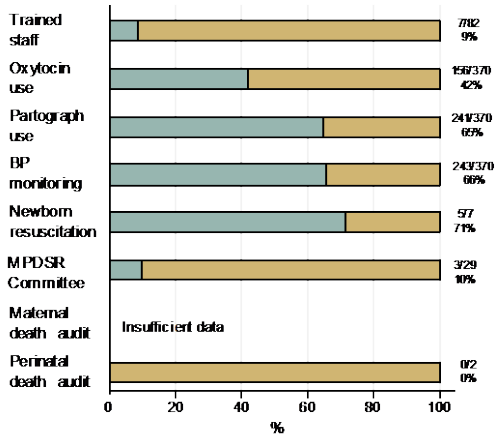


EmONC Signal Functions (2014 – 2016)

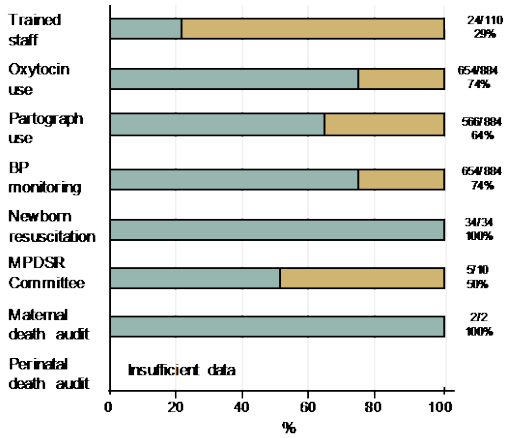
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	41	52	88	100	100	90
Oxytocin	100	100	96	100	100	100
$MgSO_4$	78	88	72	100	100	100
Long gloves	41	60	72	78	90	90
MVA/ Misoprostol	38	40	76	100	100	100
Vacuum	31	28	92	78	70	100
Pediatric Ambubag	84	72	100	78	100	100
Cesarean section set	-	-	-	44	40	50
Transfusion set	-	-	-	33	30	30

Process of care (2016)

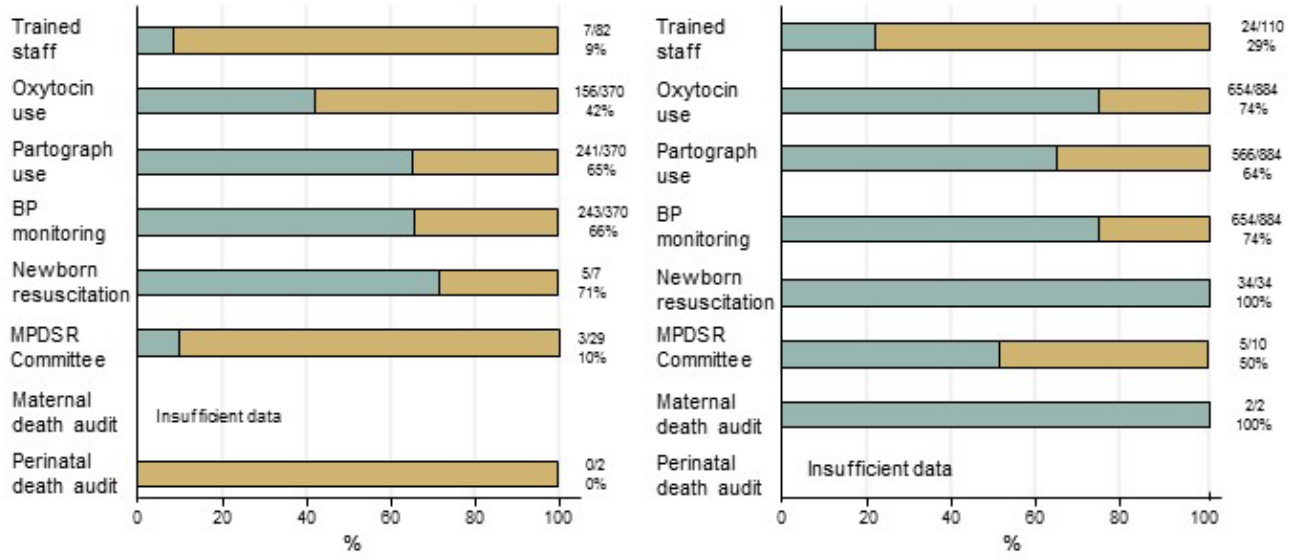
Health centers/dispensaries



Hospitals



Kitui: Process of Care



Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Mandera County

	Dispensaries/ health centers	Hospitals
Total health facilities	78	6
Facilities assessed	29	6
%	37.2	100.0

EmONC-ready health facilities (2014 – 2016)

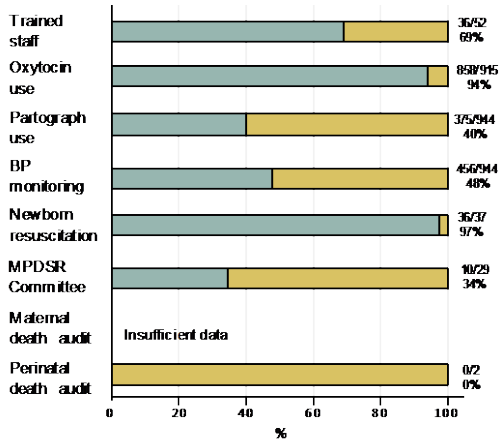
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	9%	No data	14%
Hospitals (CEmONC)	20%	No data	40%

EmONC Signal Functions (2014 – 2016)

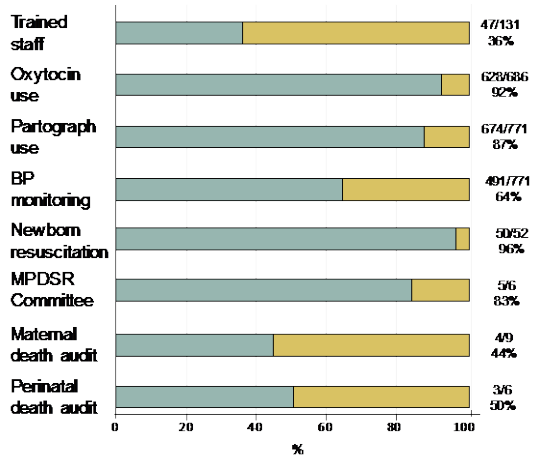
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	96	-	59	100	-	80
Oxytocin	96	-	68	100	-	100
$MgSO_4$	81	-	91	100	-	100
Long gloves	48	-	36	83	-	60
MVA/ Misoprostol	44	-	91	100	-	100
Vacuum	22	-	59	50	-	80
Pediatric Ambubag	52	-	50	83	-	80
Cesarean section set	-	-	-	50	-	60
Transfusion set	-	-	-	83	-	100

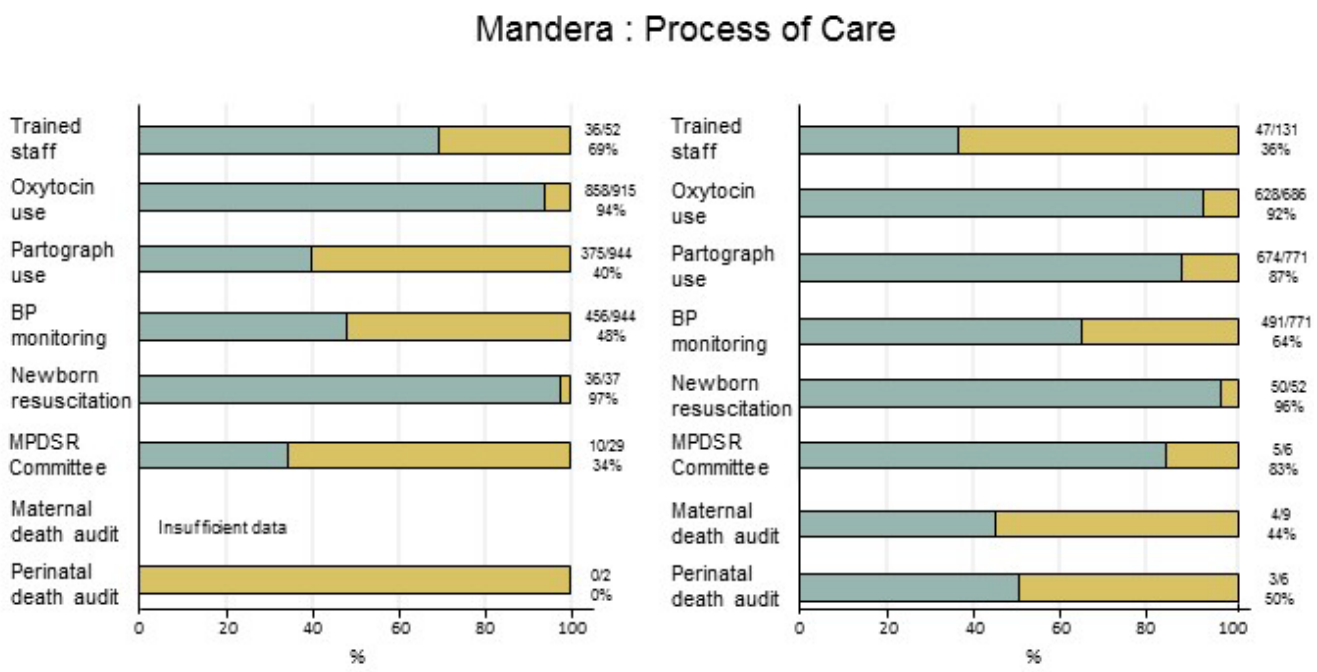
Process of care (2016)

Health centers/dispensaries



Hospitals



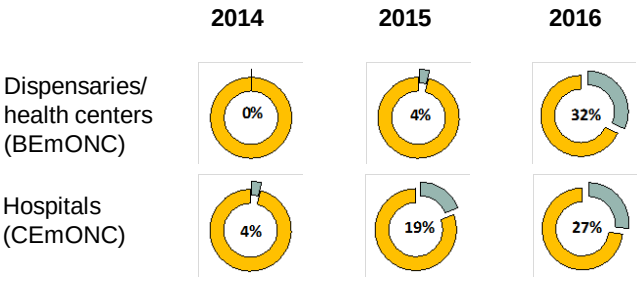


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Meru County

	Dispensaries/ health centers	Hospitals
Total health facilities	396	27
Facilities assessed	27	27
%	7.1	100.0

EmONC-ready health facilities (2014 – 2016)

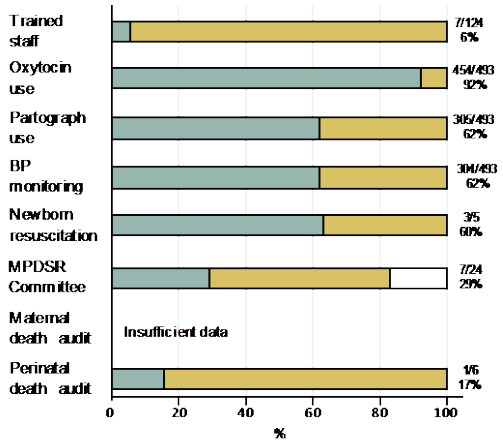


EmONC Signal Functions (2014 – 2016)

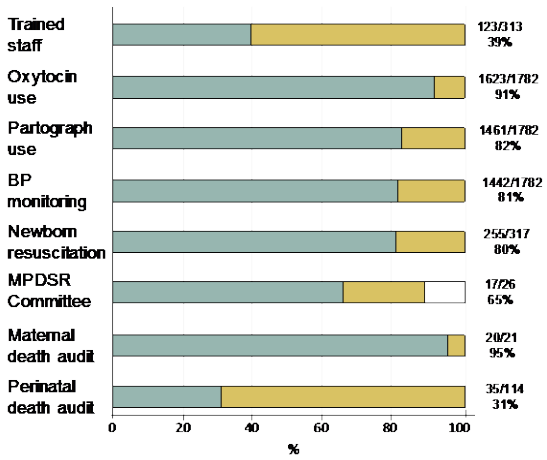
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	32	52	87	44	77	92
Oxytocin	95	96	100	93	92	96
$MgSO_4$	55	70	87	63	81	88
Long gloves	5	43	83	56	69	96
MVA/ Misoprostol	36	30	39	52	54	73
Vacuum	14	26	81	26	73	96
Pediatric Ambubag	73	95	91	81	92	100
Cesarean section set	-	-	-	25	38	36
Transfusion set	-	-	-	41	35	46

Process of care (2016)

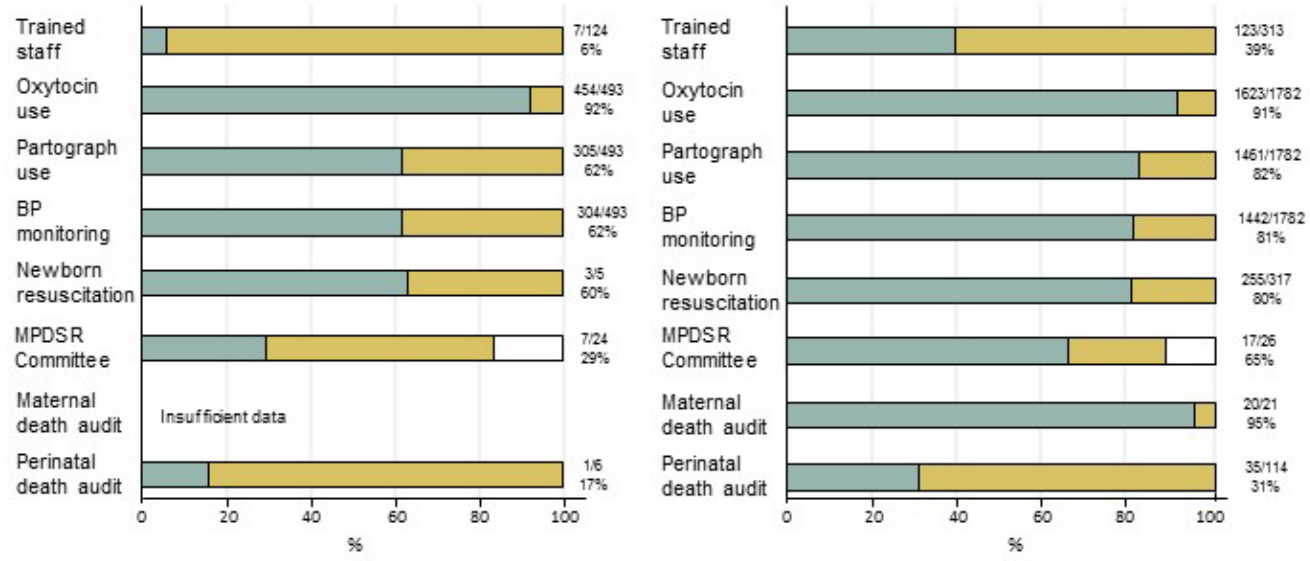
Health centers/dispensaries



Hospitals



Meru: Process of Care

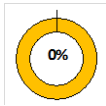
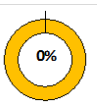
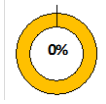
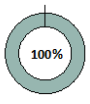


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Migori County

	Dispensaries/ health centers	Hospitals
Total health facilities	166	47
Facilities assessed	2	1
%	1.2	2.1

EmONC-ready health facilities (2014 – 2016)

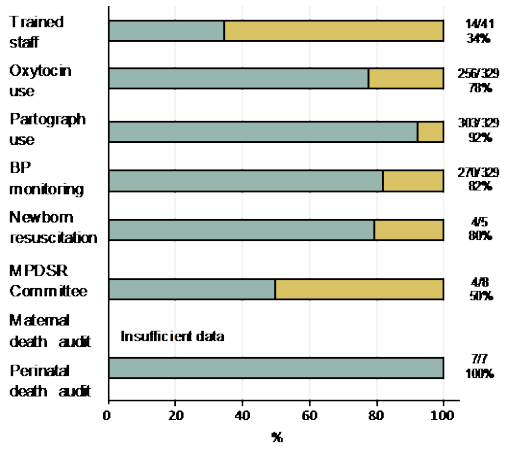
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	No data		
Hospitals (CEmONC)	No data		

EmONC Signal Functions (2014 – 2016)

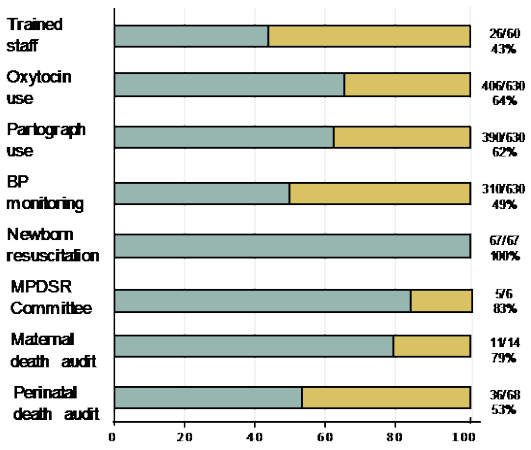
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	-	50	100	-	100	100
Oxytocin	-	100	100	-	100	100
$MgSO_4$	-	100	100	-	100	100
Long gloves	-	0	0	-	0	100
MVA/ Misoprostol	-	50	100	-	100	100
Vacuum	-	50	100	-	100	100
Pediatric Ambubag	-	100	100	-	100	100
Cesarean section set	-	-	-	-	100	100
Transfusion set	-	-	-	-	100	100

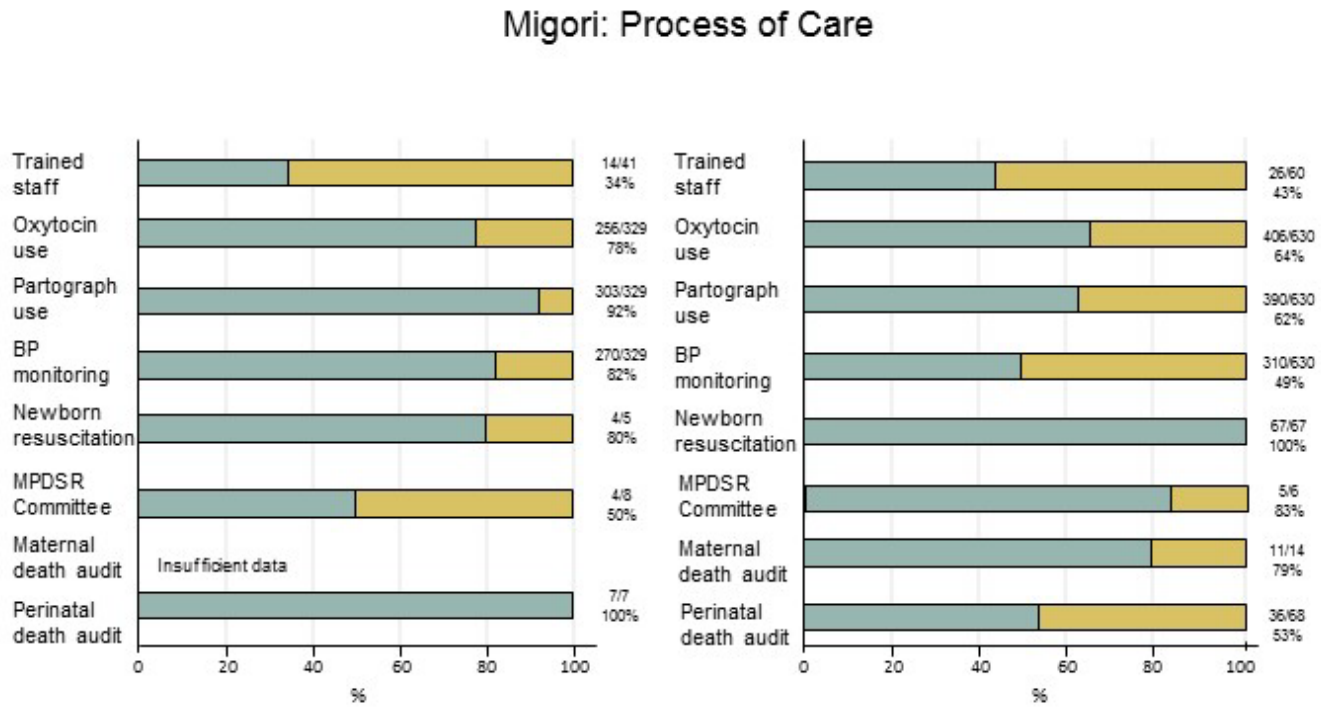
Process of care (2016)

Health centers/dispensaries



Hospitals



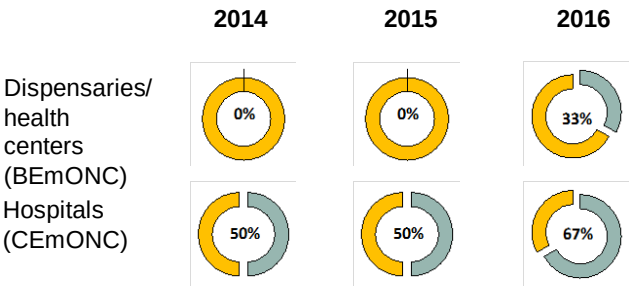


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
KMC (LBW Neonates)	Number of neonates receiving KMC
	Number of admitted stable (not receiving feeding / respiratory support) neonates <2000g
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Murang'a County

	Dispensaries/ health centers	Hospitals
Total health facilities	270	10
Facilities assessed	3	6
%	1.1	60

EmONC-ready health facilities (2014 – 2016)

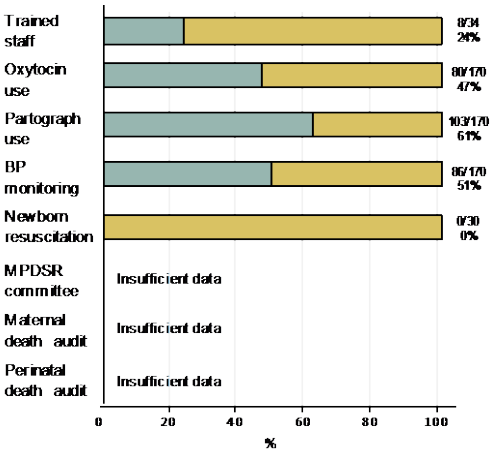


EmONC Signal Functions (2014 – 2016)

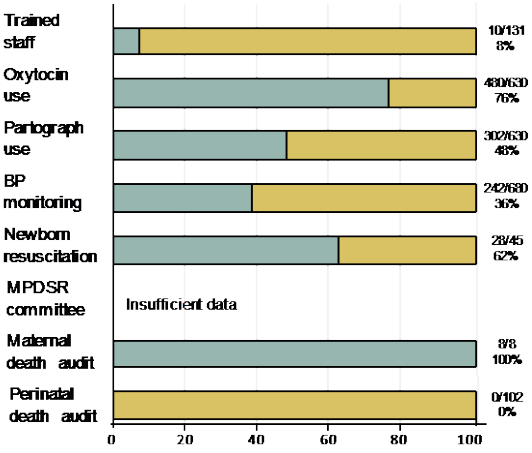
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	0	33	33	100	100	100
Oxytocin	100	100	100	100	100	100
$MgSO_4$	100	100	100	100	100	100
Long gloves	67	67	33	83	67	83
MVA/ Misoprostol	67	100	100	100	100	100
Vacuum	0	100	100	83	83	83
Pediatric Ambubag	100	100	67	100	100	100
Cesarean section set	-	-	-	50	50	33
Transfusion set	-	-	-	50	50	67

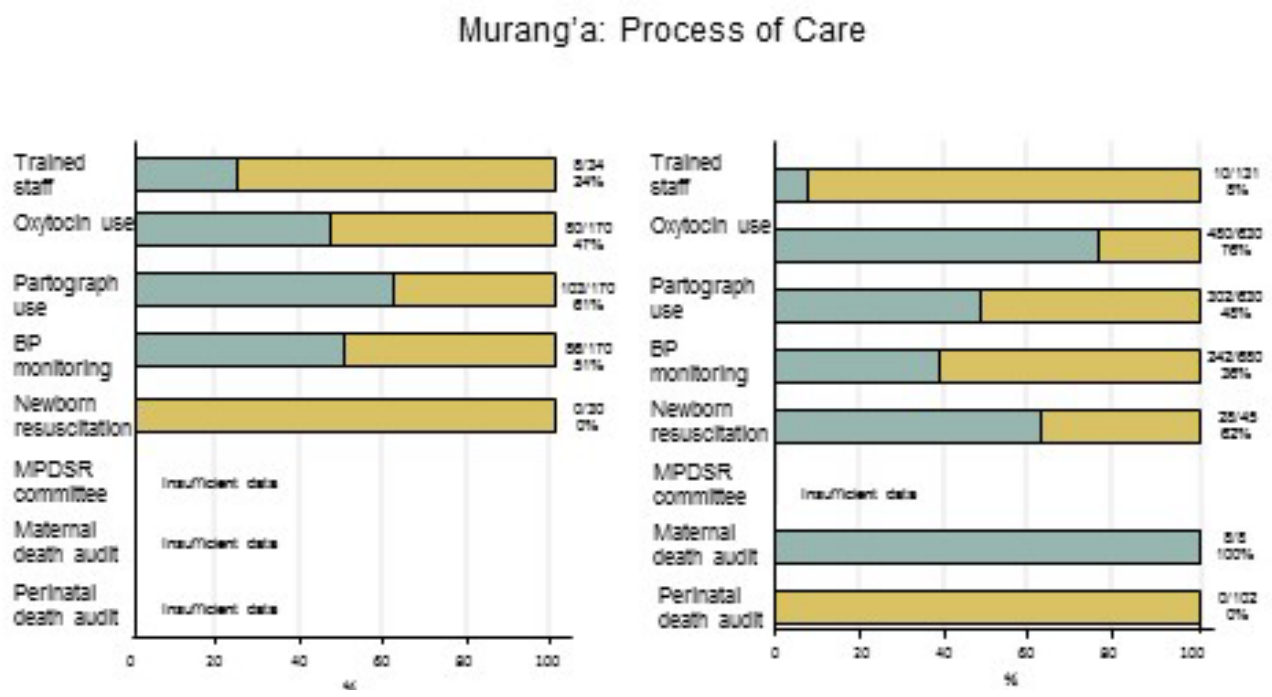
Process of care (2016)

Health centers/dispensaries



Hospitals





Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Nairobi County

	Dispensaries/ health centers	Hospitals
Total health facilities	730	183
Facilities assessed	34	14
%	4.6	7.7

EmONC-ready health facilities (2014 – 2016)

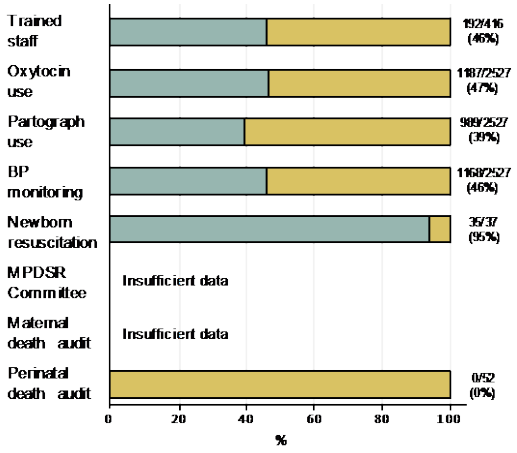
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	33%	No data	44%
Hospitals (CEmONC)	40%	No data	44%

EmONC Signal Functions (2014 – 2016)

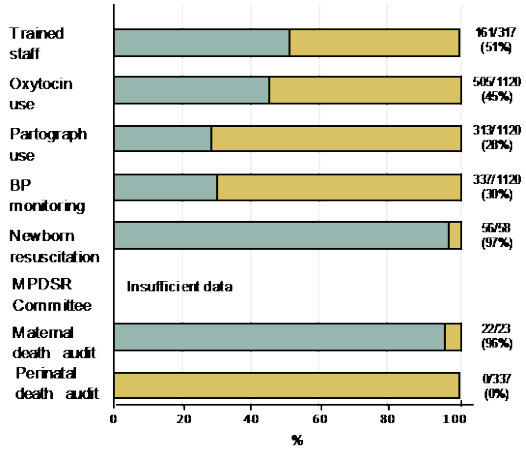
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	50	-	50	67	-	67
Oxytocin	100	-	100	100	-	100
$MgSO_4$	90	-	70	100	-	100
Long gloves	100	-	90	63	-	67
MVA/ Misoprostol	60	-	70	100	-	100
Vacuum	70	-	70	78	-	78
Pediatric Ambubag	100	-	100	100	-	67
Cesarean section set	-	-	-	67	-	67
Transfusion set	-	-	-	80	-	88

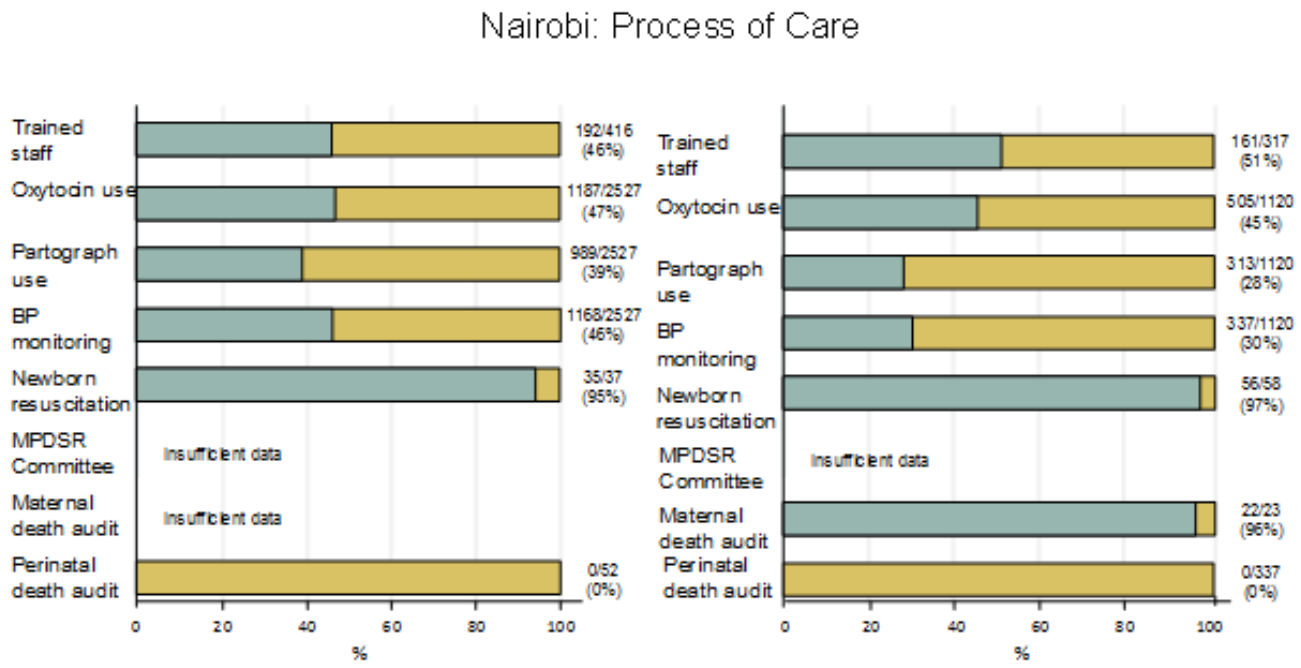
Process of care (2016)

Health centers/dispensaries



Hospitals

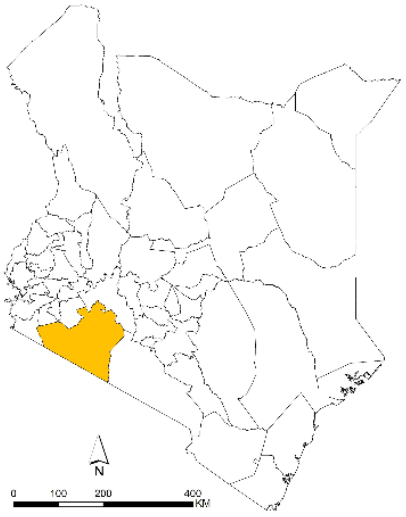




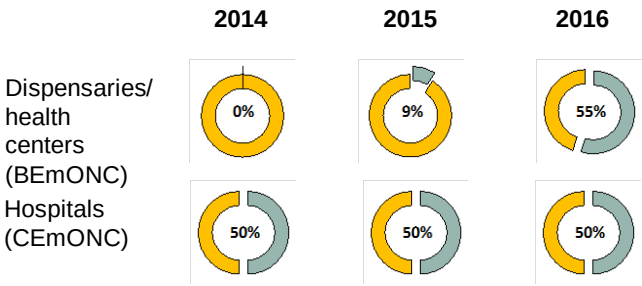
Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Narok County

	Dispensaries/ health centers	Hospitals
Total health facilities	151	9
Facilities assessed	16	2
%	10.6	22.2



EmONC-ready health facilities (2014 – 2016)

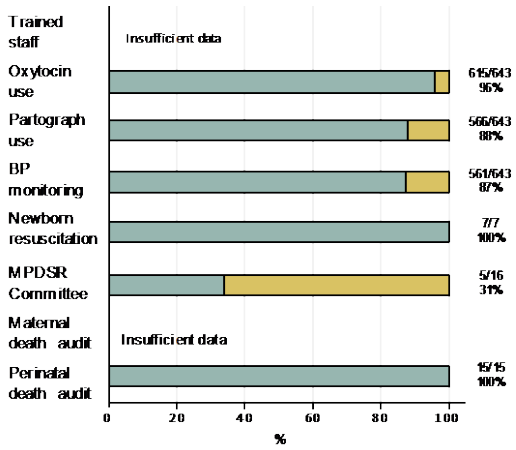


EmONC Signal Functions (2014 – 2016)

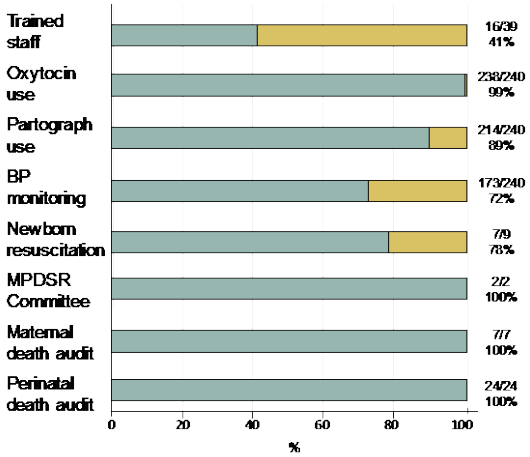
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	0	100	55	50	100	100
Oxytocin	90	100	100	100	100	100
$MgSO_4$	50	100	100	100	100	100
Long gloves	10	45	64	100	50	100
MVA/ Misoprostol	40	72	82	100	100	100
Vacuum	20	18	100	50	100	100
Pediatric Ambubag	80	100	100	100	100	100
Cesarean section set	-	-	-	50	50	50
Transfusion set	-	-	-	50	50	50

Process of care (2016)

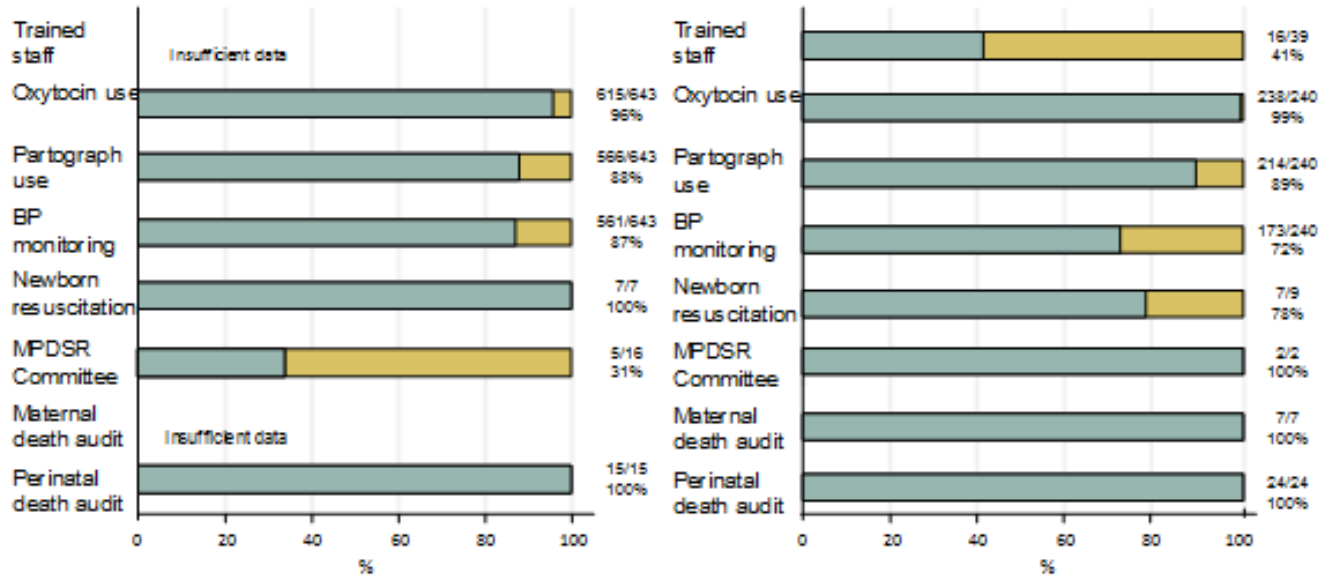
Health centers/dispensaries



Hospitals



Narok: Process of Care



Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Nyamira County

	Dispensaries/ health centers	Hospitals
Total health facilities	125	13
Facilities assessed	47	11
%	37.6	84.6

EmONC-ready health facilities (2014 – 2016)

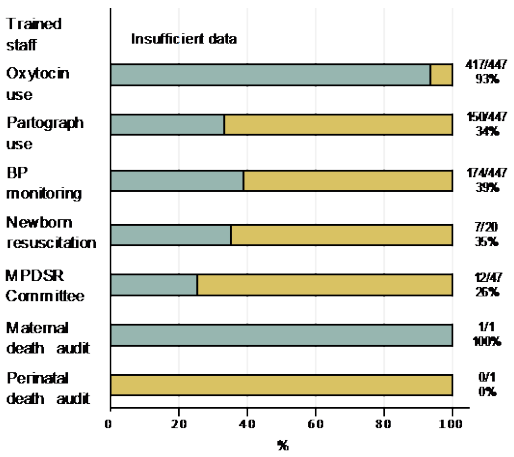
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	0%	No data	4%
Hospitals (CEmONC)	0%	No data	0%

EmONC Signal Functions (2014 – 2016)

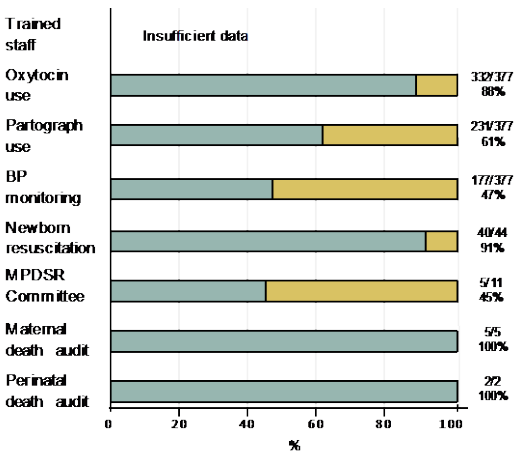
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	35	-	30	50	-	80
Oxytocin	96	-	94	100	-	100
$MgSO_4$	42	-	40	50	-	70
Long gloves	19	-	36	67	-	60
MVA/ Misoprostol	31	-	40	67	-	80
Vacuum	12	-	74	17	-	80
Pediatric Ambubag	85	-	94	83	-	100
Cesarean section set	-	-	-	0	-	20
Transfusion set	-	-	-	17	-	20

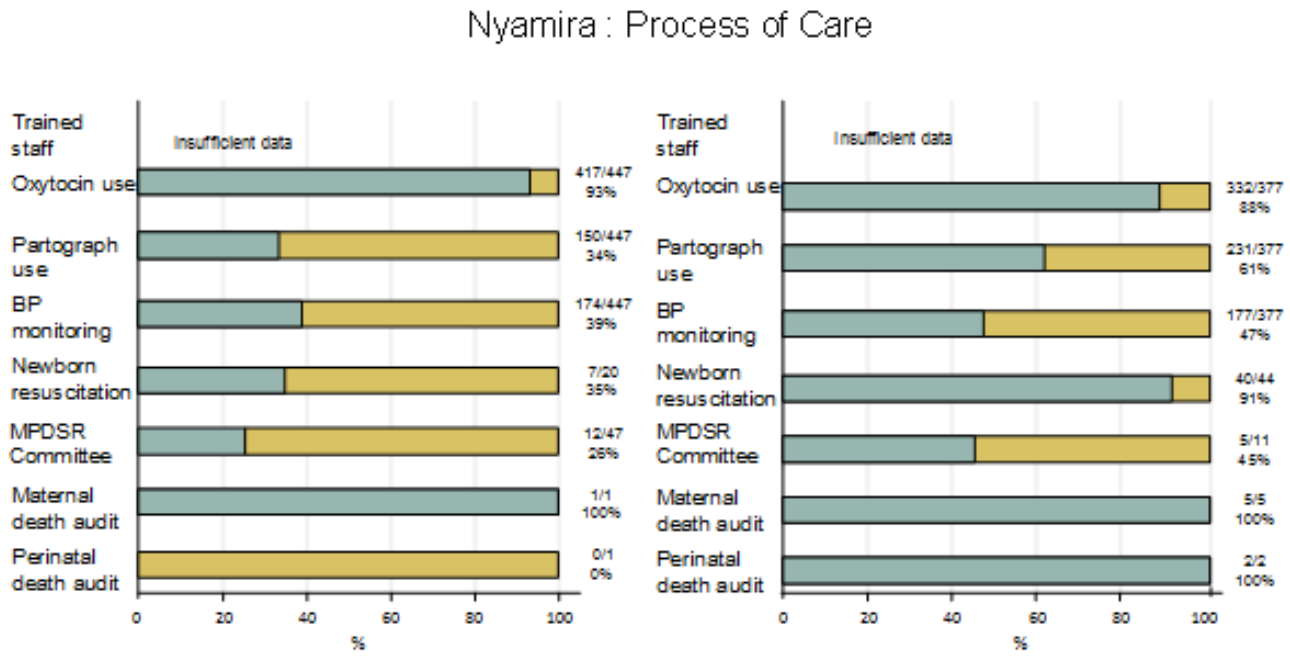
Process of care (2016)

Health centers/dispensaries



Hospitals

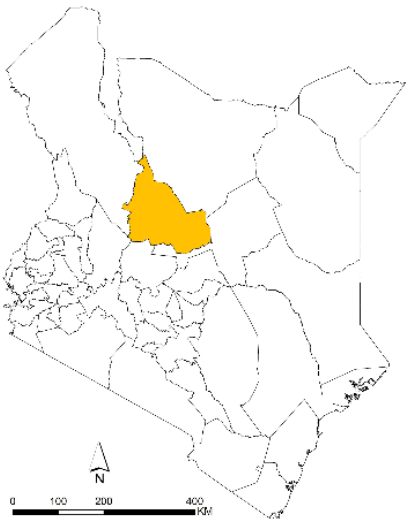




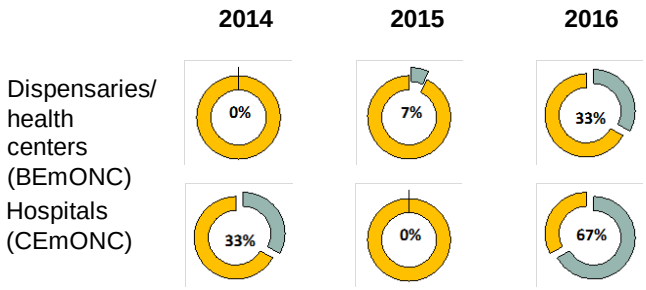
Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Samburu County

	Dispensaries/ health centers	Hospitals
Total health facilities	75	3
Facilities assessed	15	3
%	20.0	100.0



EmONC-ready health facilities (2014 – 2016)

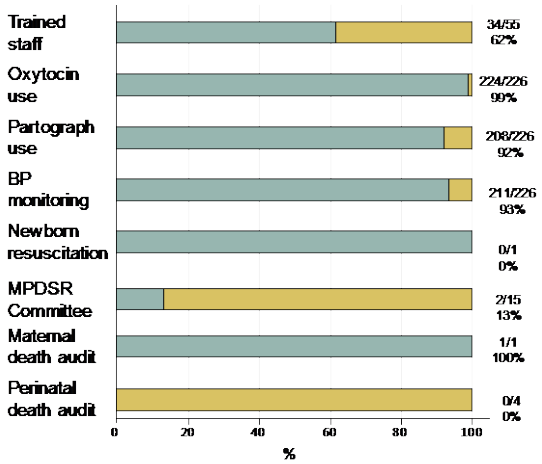


EmONC Signal Functions (2014 – 2016)

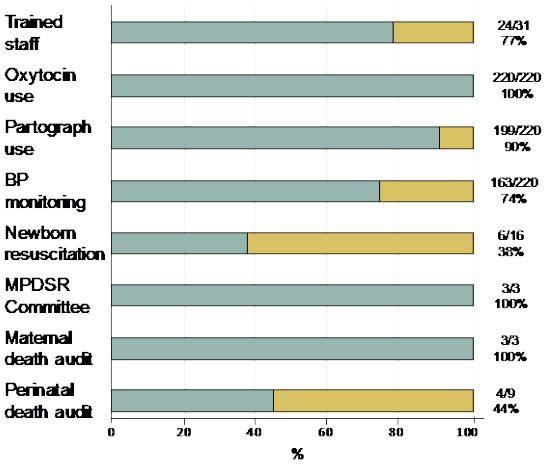
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	27	87	100	67	100	100
Oxytocin	100	100	93	100	100	100
$MgSO_4$	47	53	100	100	100	100
Long gloves	33	53	100	100	100	100
MVA/ Misoprostol	20	20	40	100	100	100
Vacuum	0	7	73	67	33	100
Pediatric Ambubag	73	87	100	100	100	67
Cesarean section set	-	-	-	67	33	67
Transfusion set	-	-	-	67	50	67

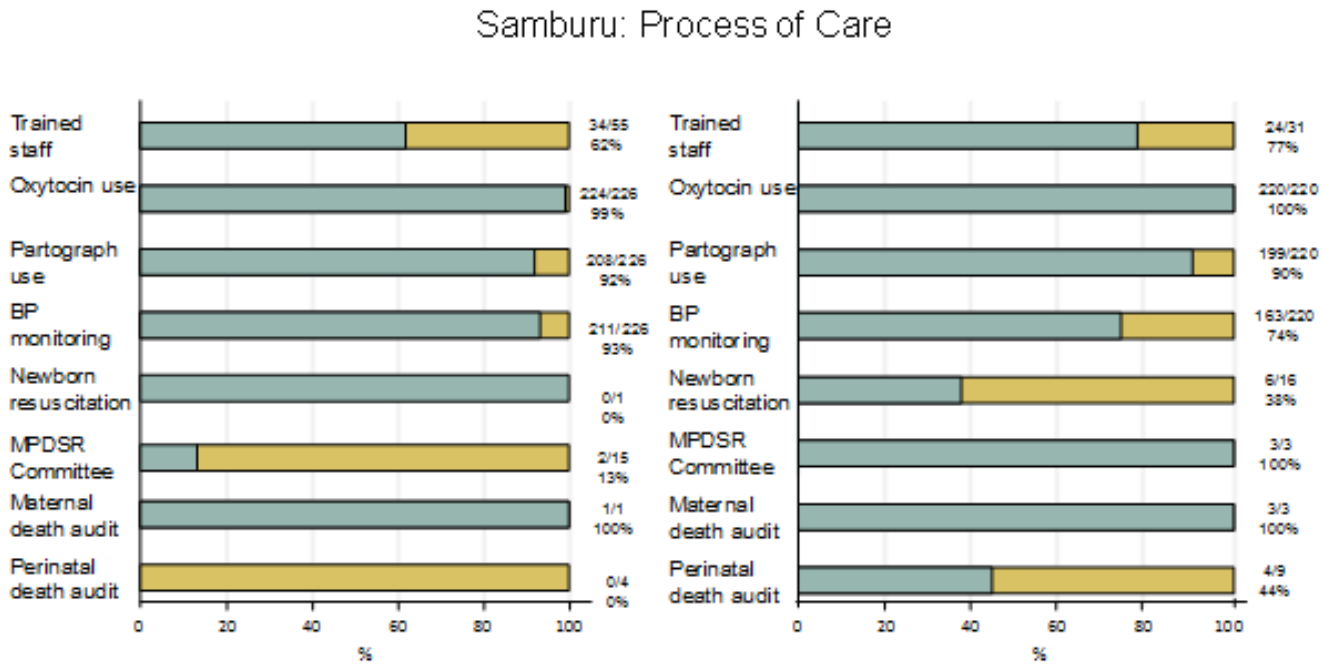
Process of care (2016)

Health centers/dispensaries



Hospitals



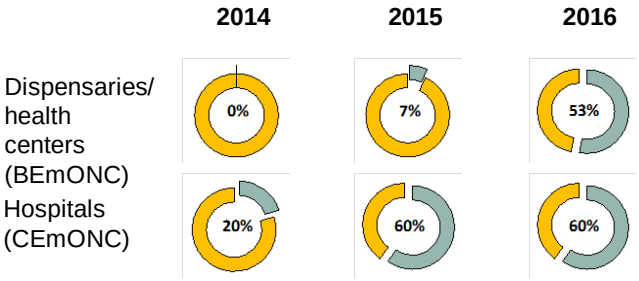


Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Tharaka Nithi County

	Dispensaries/ health centers	Hospitals
Total health facilities	118	9
Facilities assessed	15	5
%	12.7	55.6

EmONC-ready health facilities (2014 – 2016)

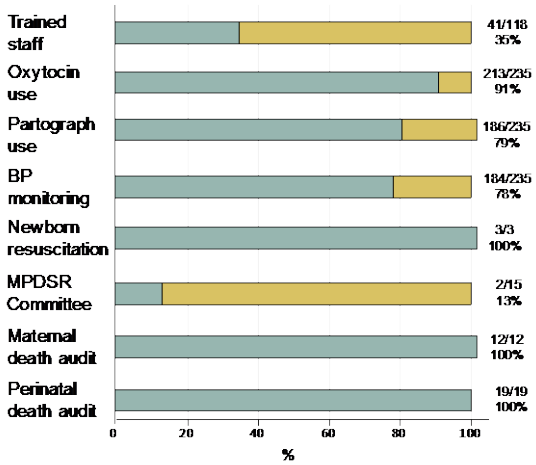


EmONC Signal Functions (2014 – 2016)

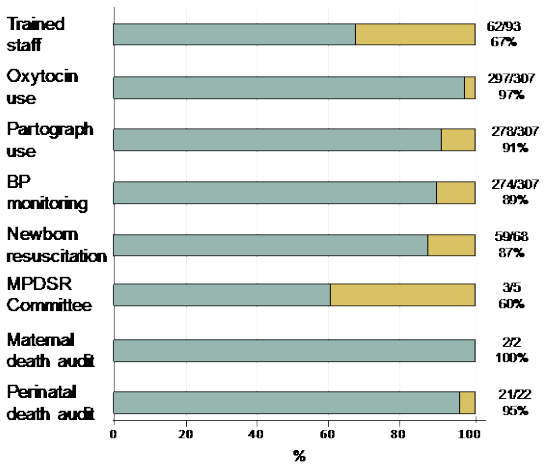
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	8	47	67	86	80	100
Oxytocin	85	93	93	86	100	100
$MgSO_4$	38	80	87	100	100	100
Long gloves	23	73	80	86	100	100
MVA/ Misoprostol	38	60	73	86	100	100
Vacuum	15	20	80	29	100	100
Pediatric Ambubag	92	100	100	100	100	100
Cesarean section set	-	-	-	43	80	60
Transfusion set	-	-	-	43	60	80

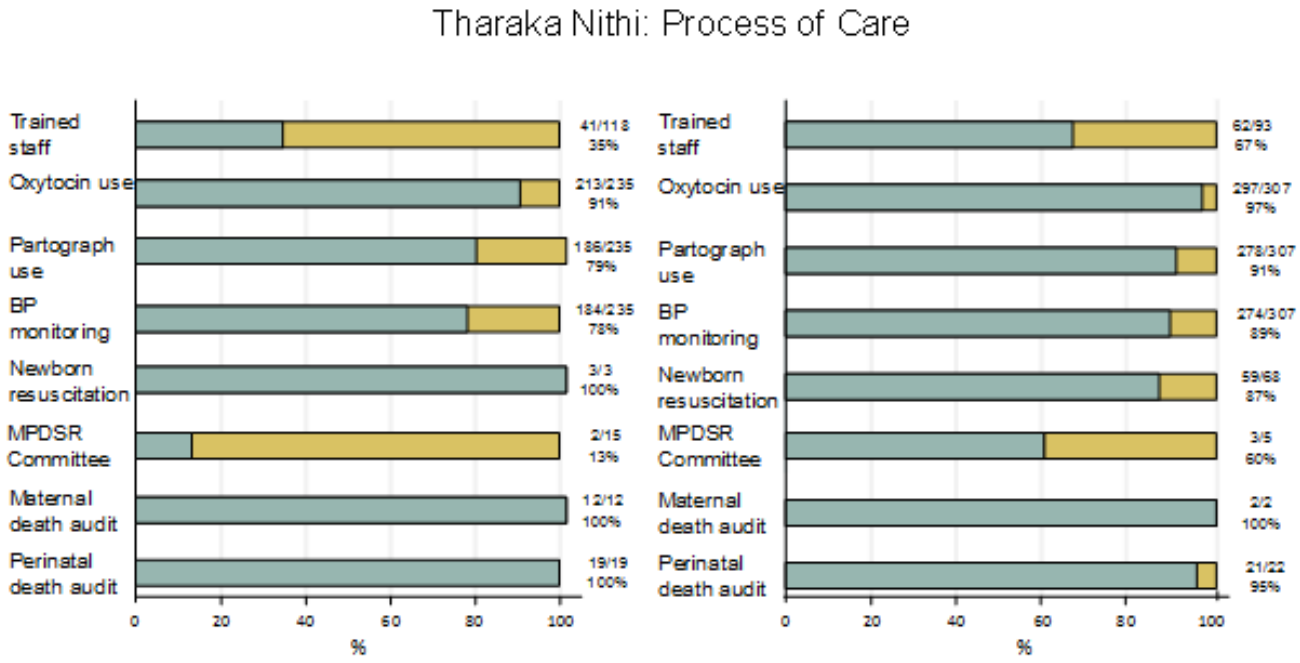
Process of care (2016)

Health centers/dispensaries



Hospitals

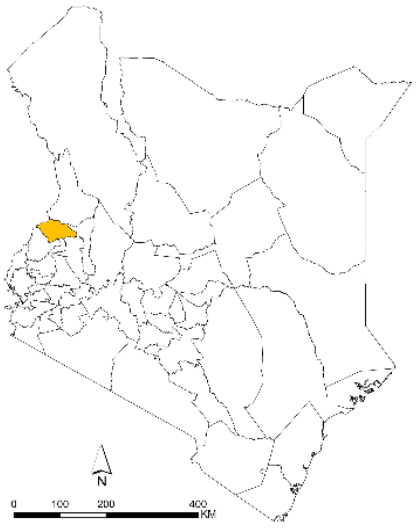




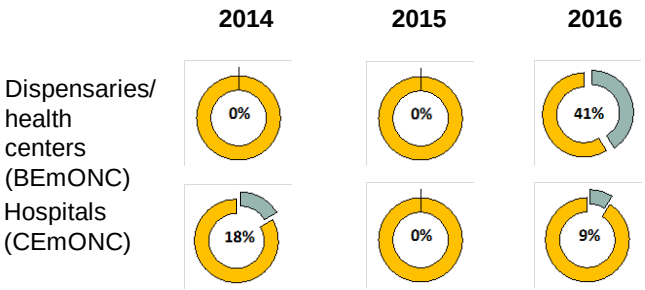
Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Trans Nzoia County

	Dispensaries/ health centers	Hospitals
Total health facilities	129	18
Facilities assessed	20	11
%	15.6	61.1



EmONC-ready health facilities (2014 – 2016)

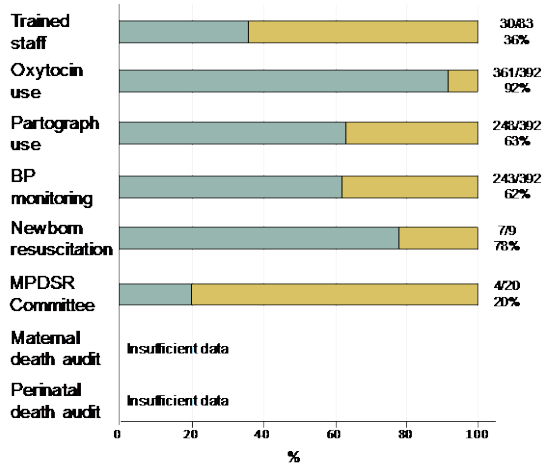


EmONC Signal Functions (2014 – 2016)

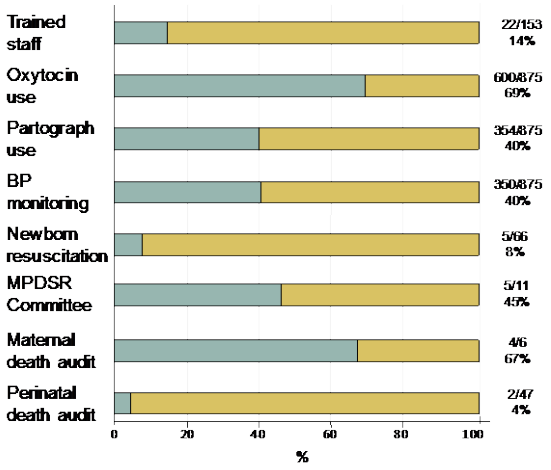
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	57	81	88	88	81	90
Oxytocin	100	100	100	100	100	100
$MgSO_4$	61	88	94	75	90	100
Long gloves	26	29	94	63	45	50
MVA/ Misoprostol	70	76	72	100	82	82
Vacuum	9	13	67	75	45	45
Pediatric Ambubag	74	82	83	100	91	91
Cesarean section set	-	-	-	50	36	27
Transfusion set	-	-	-	75	27	10

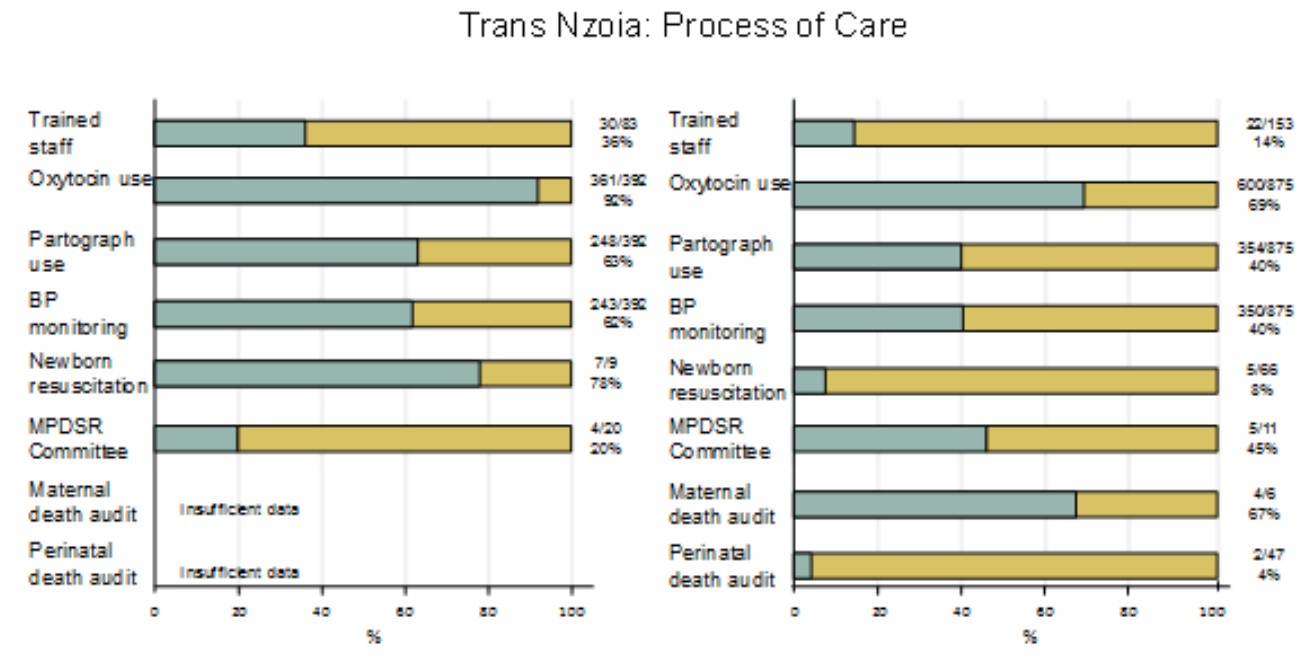
Process of care (2016)

Health centers/dispensaries



Hospitals

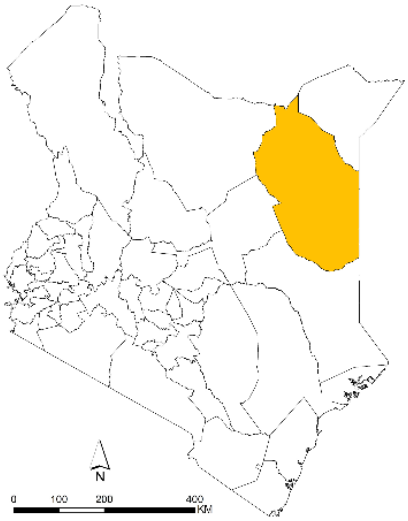




Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

Wajir County

	Dispensaries/ health centers	Hospitals
Total health facilities	124	11
Facilities assessed	15	8
%	12.1	72.7



EmONC-ready health facilities (2014 – 2016)

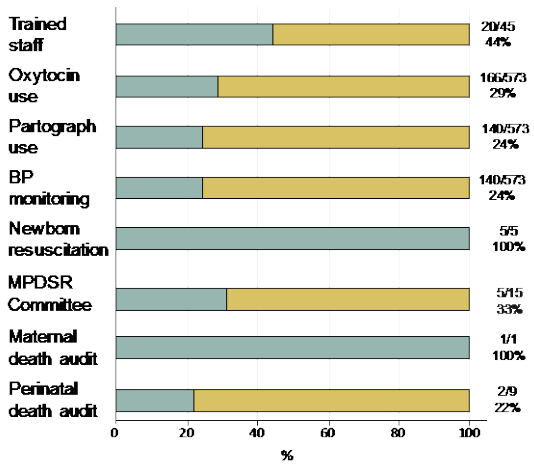
	2014	2015	2016
Dispensaries/ health centers (BEmONC)	7%	No data	53%
Hospitals (CEmONC)	25%	No data	13%

EmONC Signal Functions (2014 – 2016)

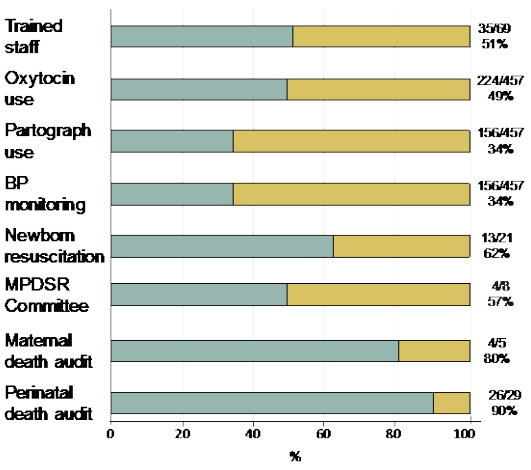
Item	Health centers/dispensaries (% achieved)			Hospitals (% achieved)		
	2014	2015	2016	2014	2015	2016
Injectable antibiotics	87	-	100	100	-	100
Oxytocin	100	-	100	100	-	100
$MgSO_4$	80	-	100	88	-	88
Long gloves	33	-	80	50	-	88
MVA/ Misoprostol	53	-	93	100	-	100
Vacuum	20	-	86	25	-	57
Pediatric Ambubag	73	-	67	75	-	25
Cesarean section set	-	-	-	25	-	75
Transfusion set	-	-	-	50	-	14

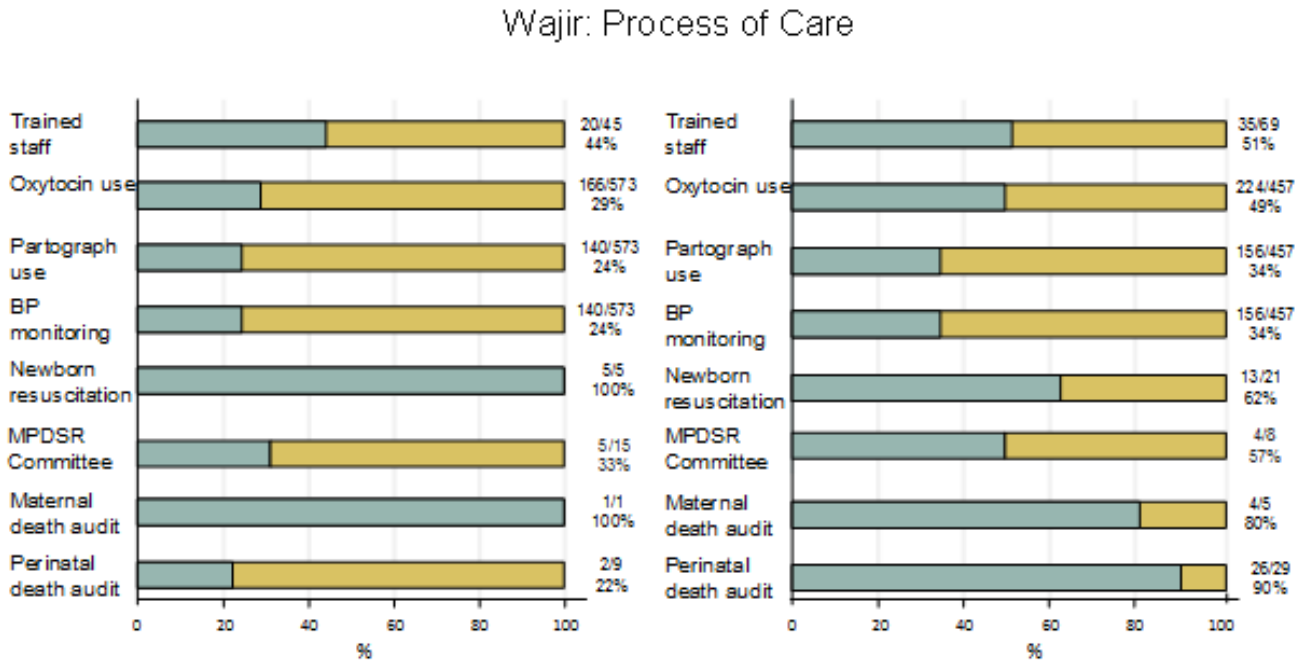
Process of care (2016)

Health centers/dispensaries



Hospitals





Indicator	Numerator/Denominator
Training	Number trained in EmONC in preceding 12 months
	Total number of staff over preceding 3 months
Oxytocin Use	Number of deliveries with documented use of oxytocin for AMTSL
	Total number of deliveries sampled over preceding 3 months
Partograph Use	Number of deliveries with appropriate partograph use
	Total number of deliveries sampled over preceding 3 months
BP Monitoring	Number of deliveries with 4hly documented BP
	Total number of deliveries sampled over preceding 3 months
Newborn Resuscitation	Number of newborns with documented evidence of resuscitation
	Number of sampled newborns delivered with 5min APGAR<7 or slow/irregular respiration/pulse<60/min over preceding 3 months
MPDSR Committee	Hospital has a functional MPDSR committee (convenes monthly)
	n/a
Maternal Death Audit	Number of maternal deaths audited
	Number of maternal deaths recorded in preceding 12 months
Perinatal Death Audit	Number of perinatal deaths (28 wks gestation – day 7 of life) audited
	Number of perinatal deaths recorded over preceding 3 months

MEASURE Evaluation
University of North Carolina at Chapel Hill
400 Meadowmont Village Circle, 3rd Floor
Chapel Hill, North Carolina 27517
Phone: +1-919-445-9359 • measure@unc.edu

www.measureevaluation.org

MEASURE Evaluation PIMA is funded by the United States Agency for International Development (USAID) through associate award AID-623-LA-12-00001 and is implemented by the Carolina Population Center at the University of North Carolina at Chapel Hill, in partnership with ICF International; Management Sciences for Health; Palladium; and Tulane University. The views expressed in this publication do not necessarily reflect the views of USAID or the United States government.
TR-17-195

USAID
FROM THE AMERICAN PEOPLE

MEASURE
Evaluation PIMA