

# Quality of Maternal and Newborn Health Care in Ethiopia: A Cross-Sectional Study

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## Research Article

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# Abstract

**Background:** Despite reports of universal access to and modest utilization of maternal and newborn health services in Ethiopia, mothers and newborns continue to die from preventable causes. Studies indicate this could be due to poor quality of care provided in health systems. Evidences show that high quality health care prevents more than half of all maternal deaths. In Ethiopia, there is limited knowledge surrounding the status of the quality of maternal and newborn health care in health facilities. This study aims to assess the quality of maternal and neonatal health care provision at the health facility level in four regions in Ethiopia.

**Methodology:** This study employed a facility-based cross-sectional study design. It included 32 health facilities which were part of the facilities for prototyping maternal and neonatal health quality improvement interventions. Data was collected using a structured questionnaire, key informant interviews and record reviews. Data was entered in Microsoft Excel and exported to STATA for analysis. Descriptive analysis results are presented in texts, tables and graphs. Quality of maternal and neonatal health care was measured by input, process and outputs components. The components were developed by computing scores using standards used to measure the three components of the quality of maternal and neonatal health care.

**Result:** The study was done in a total of 32 health facilities: 5 hospitals and 27 health centers in four regions. The study revealed that the average value of the quality of the maternal and neonatal health care input component among health facilities was 62%, while the quality of the process component was 43%. The quality of the maternal and neonatal health output component was 48%. According to the standard cut-off point for MNH quality of care, only 5 (15.6%), 3 (9.3%) and 3 (10.7%) of health facilities met the expected input, process and output maternal and neonatal health care quality standards, respectively.

**Conclusion:** This study revealed that the majority of health facilities did not meet the national MNH quality of care standards. Focus should be directed towards improving the input, process and output standards of the maternal and neonatal health care quality, with the strongest focus on process improvement.

## Introduction

Worldwide, over 70%, of maternal deaths are caused by pregnancy related complications including hemorrhages, pregnancy related hypertension, sepsis and abortion. Similarly, about 85% of newborn deaths are due to birth prematurity, asphyxia, and neonatal infections (1).

In Ethiopia, notable efforts have been made to improve access to basic and emergency obstetric and newborn care. However, there is inadequate utilization of pregnancy and childbirth care services. Population-level coverage of maternal health services range from 74% for first antenatal care (ANC) visit to 43% for four or more ANC visits, 48% for skilled birth attendants (SBA) and 34% for postnatal care

(PNC) within 2 days after birth. The least progress was made in reducing neonatal mortality which stands at 29 deaths per 1000 live births in 2016 and 2019(2).

Increasing access and utilization of services alone does not guarantee improved maternal and newborn health outcomes (3). Along with expanding coverage of the services improving quality and evidence-based care during critical periods will have the greatest impact on the survival of the mother, the fetus and the newborn (3,4). The World Health Organization (WHO) defines quality of care as “the extent to which health care services provided to individuals and patient populations improve desired health outcomes(5). In order to achieve this, health care must be safe, effective, timely, efficient, equitable and people-centered” (6). Quality of care improvement entails availing skilled birth attendants for every pregnant woman and newborn, and evidence-based care provision including respectful care, creating supportive environment, use of effective clinical and non-clinical interventions, health care infrastructure capacity, health care providers skills and positive attitude (3,4).

In 2016, Ethiopia adapted WHO standards for improving quality of maternal and newborn health care in health facilities and developed health sector transformation in quality (HSTQ)(7) which to facilitate implementation of national quality strategy (NQS). The NQS was developed in 2015 and prioritizes maternal and newborn health as per the health sector transformation plan (HSTP) (8,9) of the country.

Implementing quality of health care in Ethiopia, Institute for Healthcare Improvement (IHI) and Ministry of Health (MoH) have worked to demonstrate how quality improvement (QI) methodologies can be applied in the Ethiopian health care system to accelerate progress of maternal and neonatal health (MNH). A baseline assessment of quality MNH care was done prior to the start of the improvement program. This paper describes the baseline quality of care of MNH in the prototype district facilities in the four regions in Ethiopia.

## Methods

### Study Areas

Ethiopia has very diversified culture and more than 86 indigenous languages. Administratively, it has nine regions and two city administrations, and the four regions which the four prototype districts selected house 85% of the country’s population. Health service delivery is provided through three-tier system as primary, secondary and tertiary level health care. The 2016 Ethiopia Demographic and Health Survey has showed coverage of 62% for first antenatal care visit, 32% for four or more ANC visits, 28% for skilled birth attendants and 17% for postnatal care within 2 days after birth. Pregnancy related maternal mortality ratio was 412 per 100,000 live births and neonatal mortality rate was 29 per 1000 live births(10).

To introduce quality improvement (QI) methods through a district-wide improvement collaborative[1] approach (11), four districts were chosen for the prototype phase of the QI project that began in 2016: Limu bilbilu, Tanqua Abergele, Duguna Fango and Fogera in the Oromia, Tigray, Southern Nations,

Nationalities and Peoples' (SNNP) and Amhara regions, respectively. A total of 121 health posts, 27 health centers and 5 hospitals that were providing MNH care for the population in the four Woredas were included in prototype and clustered into four QI collaborative sites, one for each Woreda[2]. The catchment populations of the collaborative sites were 213,032 in Limu Bilbilu, 115,841 in Tanqua Abergele, 122,316 in Duguna Fango, and 296,842 in Fogera Woredas.

The prototype collaborative sites were purposefully selected in consultation with Ministry of Health of Ethiopia and regional health bureaus (RHBs) based on pre-set criteria. The criteria included high maternal and perinatal deaths, high level of leadership commitment to improve the service, reliability of MNH service data, and no other partner organizations working on quality improvement project in the sites to minimize duplication of efforts. All health facilities under the selected woredas were included in the collaborative.

### **Study Design**

A facility based cross-sectional study was deployed to determine the quality of MNH care. Quality of MNH care was measured using input, process and outcome components. The components were developed using input, process and output MNH quality standards of the WHO and HSTQ for health facilities of Ethiopia MoH. Data were collected in 2016 using face to face interviews and data extraction.

### **Sampling Techniques**

The study included 32 health facilities which were part of the facilities for prototyping maternal and neonatal health quality improvement interventions. All health facility heads and maternity care related department heads were included for the interviews. Data from individual folders were extracted through selecting clients' folders by applying a systematic random sampling method using medical record numbers (MRN) as the sample frame.

### **Data Collection Technique**

The data was collected at the start of the implementation of IHI's project from Sep 2016 to Nov 2016 at the health facilities that aimed to identify critical gaps that hinder the performance and improve the facilities' performance. Structured interviews were conducted to assess availability of resources. Direct observation was also done to complement and verify interview results to cross check the available infrastructures, medical equipment's, supplies, and available services. Before the data collection the data collectors discussed and agreed upon each question. The data collectors were IHI staff and zonal health departments (ZHD)/Woreda health offices (WoHO) MNH and HMIS officers. The collected data were cross-checked for completeness immediately after completion.

### **Data Collection Tools**

The data collection tool had two parts: 1) An interview guide which was used to collect the data from the health facility heads and maternity care related department heads. During the interview, there was cross-

checking of records to confirm the reliability of the data they provided. 2) A data abstraction form which was used to collect the data from the MNH registers and clients' individual folders (medical records). The output data was extracted from the MNH registers, and the process data of clinical bundle and complication management were extracted from the individual folders. During the data extraction data elements were cross-checked among the registers and individual folders; if there is a discrepancy, that element was dropped.

## **Data Analysis**

Data was entered in to an excel database and cleaning was done by running simple frequencies and looking for deviant and incomplete values. The relevant variables for this study were extracted, coded, and exported to STATA version 13 for analysis.

Elements of the input, process, and outcome variable were coded, analyzed and described using average scores.

Further analysis was done based on the operational definition of "satisfactory quality" and "unsatisfactory quality" using the cutoff point of meeting at least 75% of the standards (12). An analysis of the average score of MNH quality of care was done separately for input, process and outcome and then for the overall score.

Input quality components was developed using 29 items related to the infrastructure, supplies and equipment standards. Process quality components was developed using 13 items of the labour, delivery and postnatal care provision and complication management standards. Outcome quality components was measured using four items related to the health seeking behavior standards.

Estimated number of deliveries were used as denominator for calculating the output standards of antenatal care, skilled births and postnatal care. First antenatal care visit was used as the denominator for syphilis test variable.

## **Ethical approval and consent**

The data was collected primary for the improvement purpose in the health facilities, which is part of a broader IHI project evaluation study that was reviewed and approved by Ethiopian Public Health Association (EPHA) Scientific and Ethical Review Committee (Ref: EPHA/OG/5046/17). It was purely program evaluation and was waived by the aforementioned IRB in accordance with Ethiopia ethical guideline (13). Then, a permission was obtained from IHI Ethiopia project office to analyze further the stored data for this manuscript. During the data collection process, informed consent was obtained from all interview subjects and from health facility heads on behalf of mothers for the medical record reviews since not possible to trace them. Confidentiality of the information and their privacy were respected throughout the data collection process and then after. All responses given by the participants have been kept anonymous and confidential using coding system whereby no one has access to the information.

## Footnotes:

[1] Collaborative is a short-term (12 to 18 months) learning system that brings together a large number of teams from health facilities to seek improvement in a focused topic area.

[2] Woreda is equivalent to district.

## Results

### Facility Characteristics

The study was conducted in a total of 32 health facilities: 5 hospitals and 27 health centers. 12 health facilities were in Fogera, Amhara, 8 were in Limu Bilbilu, Oromia, 6 were in Tanqua Abergele, Tigray and 6 were in Duguna Fango, SNNPR. A dedicated labour room, maternity ward, operation theatre and neonatal intensive care unit (NICU) were found to be available in all the five hospitals. All except the operation theatre & NICU were also available at the 27 health centers surveyed.

### Input component

The combined mean score for the infrastructure, availability of equipment/supply, and essential drugs of input component of MNH quality was 62% (Table 1) which is similar to study findings from India (14).

### Infrastructure

Eighty-one percent of the facilities had a functional incinerator and only 66% of the facilities had water available in the compound either in the form of pipe water or hand pump. Less than one third (28%) of the health facilities had all infrastructure inputs available. However, the mean infrastructure availability score was 83.6% (Table 1) which is much higher than equipment/supply and essential drugs availability.

### Equipment & supplies

Only 10 (31%) health facilities had newborn corners in the delivery room. Among the 32 health facilities, only 4 (13%) of them availed towels for drying and wrapping babies in the delivery room. Ninety-one percent of the surveyed health facilities had a complete delivery set in their labour wards. Twelve (38%) and 14 (44%) of them availed artificial manual breathing unit (Ambu) bags and face masks of neonatal sizes 0 and 1, respectively. Oxygen concentrator/oxygen cylinder were availed in 10 (31%) health facilities. Radiant warmers were available in 15 (47%) of the health facilities (Table 1). The mean equipment/supply availability score was 46%, which is low as compared to other input items, infrastructure & essential drugs availability. However, no health facilities had all equipment/supply inputs available at the time of the study.

### Essential drugs

All health facilities availed normal saline in their delivery room. Twenty-three (72%), 10 (31%), and 31 (97%) had Magnesium sulphate ( $MgSO_4$ ), calcium gluconate, and oxytocin in the delivery rooms respectively (Table 1). The mean of essential drugs availability score was 74% (Table 1) and only 3 health facilities with all essential drug inputs available.

**Table 1: Availability of Infrastructure, Equipment/supply and essential drugs to provide quality MNH care in the facility.**

<b>Input Quality items</b>	<b>Number of Health facilities that responded "YES"</b>	<b>% Health facilities (#32)</b>
<b>Infrastructure</b>		
Functional incinerator on the time of visit.	26	81%
Functional placenta pit on the time of visit.	30	94%
Electric power supplies any type.	30	94%
Water availability in the compound either in the form of pipe water or hand pump.	21	66%
<b>Mean Infrastructure availability</b>		<b>83.6%</b>
<b>Health facilities with all infrastructure inputs available</b>	<b>9</b>	<b>28%</b>
<b>Equipment/supply</b>		
Newborn corner in the delivery room.	10	31%
Baby Weighing scales for Newborns with 50 precision.	31	97%
Complete delivery sets (Kidney dish, forceps, gauze swabs, Scissors, pads, cord tie/clips) at least three per facility.	29	91%
Towel for baby drying and wrapping	4	13%
Bulb suction	23	72%
Ambu bag & face masks (neonatal- size 0)	12	38%
Ambu bag & face masks (neonatal- size 1)	14	44%
Oxygen concentrator/Oxygen cylinder	10	31%
Radiant warmer	15	47%
Running water at the delivery room.	9	34%
Soap at the delivery room.	21	66%
<b>Mean Equipment/supply availability</b>		<b>46%</b>
<b>Health facilities with all Equipment/supply inputs available</b>	<b>0</b>	<b>0</b>
<b>Essential drugs</b>		
· Dexamethasone/betamethasone IV	13	41%
· Methyldopa	23	72%
· Hydralazine	24	75%
· Nifedipine	21	66%

· Ampicillin (IV)	26	81%
· Gentamycin (IV)	30	94%
· Metronidazole (IV)	18	56%
· TTC eye ointment	30	94%
· Vitamin K	28	88%
· MgSO <sub>4</sub>	23	72%
· Calcium gluconate	10	31%
· Oxytocin	31	97%
· Normal saline/Ringers lactate	32	100%
<b>Mean of essential drugs availability</b>		<b>74%</b>
<b>Health facilities with all essential drug inputs available</b>	<b>3</b>	<b>9%</b>
<b>Overall Input Mean</b>		<b>62%</b>

## Process component

Process component of the quality of MNH care was assessed by using data extracted from a total of 1,920 medical records in 32 health facilities.

The mean score for overall clinical care process for MNH was 48% (Fig.1). Fifty three percent of mothers were assessed for danger signs at admission to the delivery room. Among the 1,920 cases, only 38% of newborns received vitamin K, and 35% of newborns had skin-to-skin contact with their mothers and breastfed within one hour after delivery (Fig.1). Figure 1 shows that 46% of newborns received TTC eye ointment after delivery and 58% of newborns received an assessment to determine if they needed special care and monitoring.

The mean score for overall complication management was 38%. Only 11% of postpartum hemorrhage cases were managed per protocol. Additionally, 45% of pregnant women with preterm premature rupture of the membrane (PPRoM) who were not in labour were given oral erythromycin. This study also revealed that 63% of women with pre-eclampsia were treated with IV/IM MgSO<sub>4</sub> (Fig.1)

Though all (100%) sick young infants were treated for sepsis/VSD and most (85%) of the asphyxiated neonates were resuscitated (with bag and mask) and survived, kangaroo mother care (KMC) was initiated only for 14% of low birth weight or premature newborns after delivery (Fig. 1).

## Output

Seventy percent of births were attended by skilled health personnel (i.e. midwife, nurse, health officer or doctor) while only 31% of mothers received postnatal care at least once during the early post-partum period (within 48 hours after delivery). The overall outputs mean score was 48% (Fig. 2).

This study also analyzed the performance of input, process and output standards by facility type. Overall, hospitals and health centers, respectively, achieved 79% and 59% of the input, 58% and 41% of process, and 62% and 46% of output standards (Fig 3). No significant difference by facility type.

In this study, analysis was done to determine the proportion of health facilities who met at least 75% of the MNH quality of care standards which were rated as satisfactory. No single health facility met 75% the standards of all the three quality of care components. According to the standard cut-off point for MNH quality of care, only 15.6%, 9.3% and 10.7% of health facilities met the satisfactory level in terms of input, process and output components, respectively (Table 2).

**Table 2: MNH Quality of Care in Health Facilities.**

Quality Component	Health Facility	Number (%) of Health facilities scored $\geq$ 75% (Satisfactory)	Number (%) of Health facilities scored $<$ 75% (Not Satisfactory)	Total
Input	Health centers	2 (7.4)	25 (92.6)	27
	Hospitals	3 (60)	2 (40)	5
	All facilities	5 (15.6)	27 (84.4)	32
Process	Health centers	3 (11.1)	24 (88.9)	27
	Hospitals	0 (0)	5 (100)	5
	All facilities	3 (9.4)	29 (90.6)	32
Output	Health centers	2 (7.7)	24 (92.3)	26
	Hospitals	1 (33.3)	2 (66.7)	3
	All facilities	3 (10.7)	26 (89.7)	29

## Discussion

This study provides evidence on the performance of selected hospitals and health centers in four regions in Ethiopia against the WHO and HSTQ maternal and newborn health quality of care standards. Most of the health facilities are far from meeting the quality standards. No health facility included in this study

met the standards of all three quality of care components. According to the standard cutoff point for MNH quality of care, only 15.6%, 9.3% and 10.7% of health facilities met the satisfactory level quality in terms of input, process and output standards, respectively.

This study has several strengths. The study draws on data from facilities in four most populous agrarian regions of Ethiopia. Using multiple sources of data: interview, chart and register reviews & data collection by senior project staffs, who have prior experience in the subject area were strengths of the study. Moreover, this study addresses broader areas of quality of care as compared to similar previous studies in Ethiopia (15–17).

Although MoH is investing in human resource and infrastructure, the quality of care provided to patients is very poor. When we analyzed the human resources in each health facility, there were a minimum of eight skilled birth attendants (i.e. midwives, nurses, health officers and medical doctors). So, only investing in the health infrastructure and deploying health cadres does not guarantee for quality. Other studies also shows similar findings (12). Moreover, evidences shows access to health care is not enough, and that good quality of care is needed to improve outcomes (18–21).

This result revealed that there was a large variation among the quality of care provided by health facilities in each of the three components(17)(22). Equitable distribution of support in terms of equipment, supply, supportive supervision and clinical mentorship and the geographical location of the health facility may affect their performance. Another study conducted in Bangladesh, India and other areas found much better performance and the range was minimal among the health facilities (14,22,23). Such variation may happen due to the system strength and the attention given to health car provision.

Furthermore, this study finds key elements of inputs that are very necessary in the prevention of maternal and newborn deaths and enhancing the life of mothers and newborns were poorly available (15,24). These are issues that need to be addressed and there must be serious consideration on how to address these shortages as it can compromise the quality of maternal and newborn health care and may lead to maternal and newborn morbidity and mortality. Evidence shows poor-quality care is large barrier to reducing maternal and neonatal mortality, and 60% of deaths from conditions amenable to health care are due to poor-quality care (18).

The process component was assessed for the clinical care given and complication management. The clinical care should be given for every mother and newborn and the complication management should be given to mothers and newborns who experienced health complications. This study reveals that overall clinical care provision and complication management were very low. Specifically, PPH complication management which is the major cause of maternal deaths was very low (1); a study conducted in Kenya shows that PPH complication management is better when we compare it to this study (25). This difference maybe due to the system support to provide quality of care. Moreover, skin-to-skin contact immediately after birth and breastfeeding initiation within one hours was very low in this study; whereas, the study done in Kenya shows that a better care of babies that had skin-to-skin contact and experienced breastfeeding within the first hour and babies received vitamin k (15,25). Those results mean that health

facilities generally provide poor quality care which could be a contributing factor in many maternal and newborn deaths (26).

Maternal and newborn quality of care assessment needs to assess the capacity of health systems as well as the experiences of women (27). However, we haven't included women's experience of care in this assessment and we recommend future studies to include it to be more comprehensive. Purposive selection of the health facilities may limit representativeness. Review of charts instead of direct observation of care may have limited the validity of data. This study also used estimation for denominators of the output quality component and records for the process component as its limitation. Despite those limitations this study determines the quality of MNH care in the health facilities and future research should focus to explore on the reason why the health facilities provide such low level of care.

## **Conclusion**

This study revealed that the majority of health facilities did not meet the national MNH quality standards. Focus should be directed more towards improving the process components of the MNH quality of care. Health care providers and program managers need to work to meet the quality standards by designing a strategy that addresses the gap to provide good quality. There also needs to be a quality of MNH study that assesses both the experience of care and provision of care. This study only examined the quality of care being provided. This potential study should include a higher representation of health facilities and include regions that need special support.

## **List Of Abbreviations**

ANC - Antenatal care

HSTP - Health sector transformation plan

HSTQ - Health sector transformation in quality

IHI- Institute for Healthcare Improvement

MNH - Maternal and neonatal health

MoH - Ministry of Health

MRN - Medical record numbers

NICU - Neonatal intensive care unit

NQS - National quality strategy

PNC - Postnatal care

QI - Quality improvement

RHB - Regional Health Bureaus

SBA - Skilled birth attendants

WHO - World Health Organization

WoHO - Woreda health offices

ZHD - Zonal health departments

## **Declarations**

### **Ethics approval and consent to participate**

The data was collected primary for the improvement purpose in the health facilities, which is part of a broader IHI project evaluation study that was reviewed and approved by Ethiopian Public Health Association (EPHA) Scientific and Ethical Review Committee (Ref: EPHA/OG/5046/17). It was purely program evaluation and was waived by the aforementioned IRB in accordance with Ethiopia ethical guideline (13). Then, a permission was obtained from IHI Ethiopia project office to analyze further the stored data for this manuscript. During the data collection process, informed consent was obtained from all interview subjects and from health facility heads on behalf of mothers for the medical record reviews since not possible to trace them. Confidentiality of the information and their privacy were respected throughout the data collection process and then after. All responses given by the participants have been kept anonymous and confidential using coding system whereby no one has access to the information.

### **Consent to publish**

Not applicable

### **Availability of data and materials**

Data is available in the supplementary file.

### **Competing Interests**

We declare no competing interests.

### **Funding:**

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### **Author Contributions:**

AB and AL developed the study protocol, analyzed the data and wrote the draft manuscript. AS and KS conceptualized the study, contributed to the development of the research questions, reviewed data analytical methods and contributed to manuscript writing. ZM, BB, MA, HA, AK, and HM reviewed and provided substantial revisions to the drafts of the manuscript. All authors reviewed and approved the final version of the manuscript.

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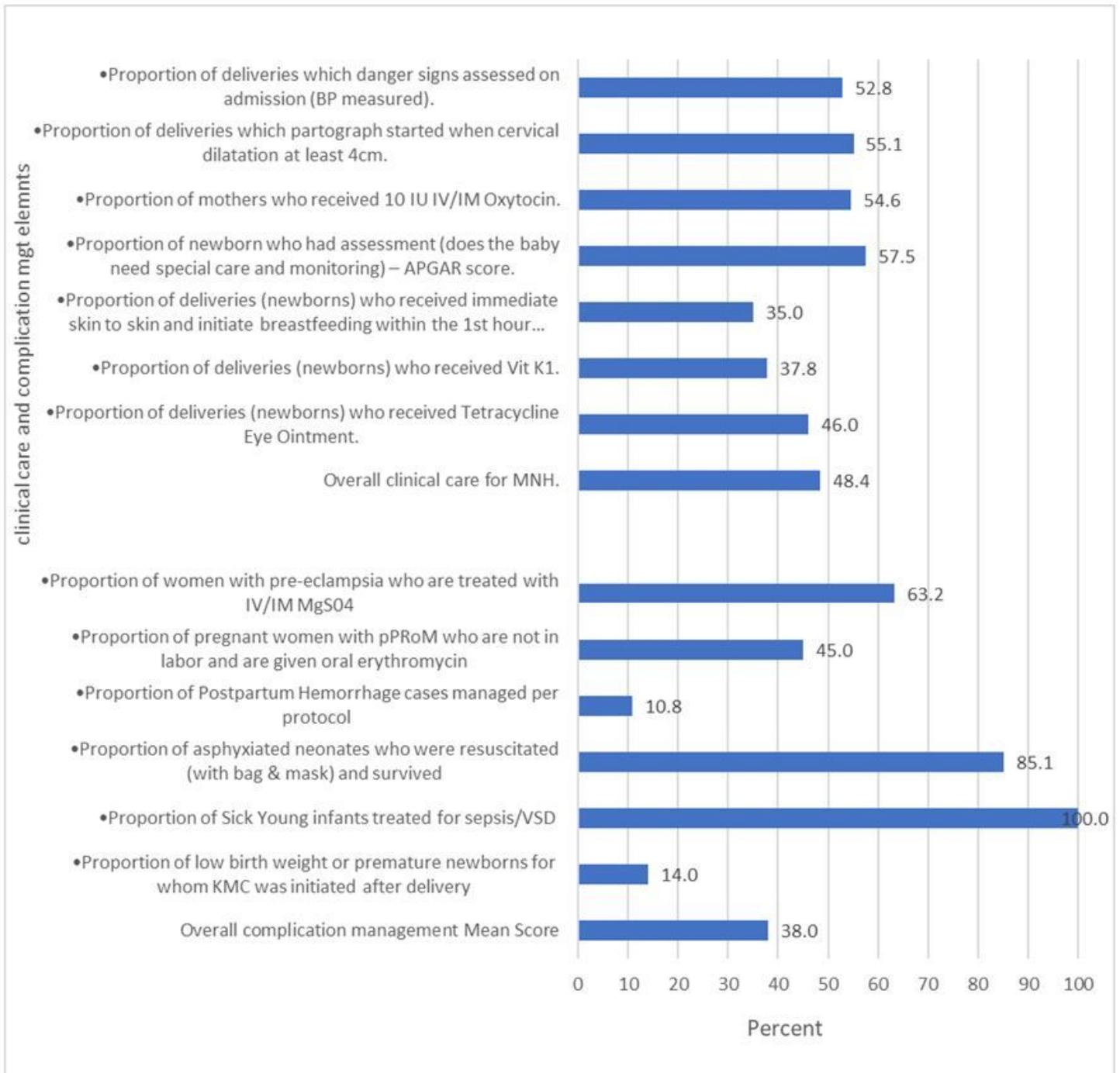
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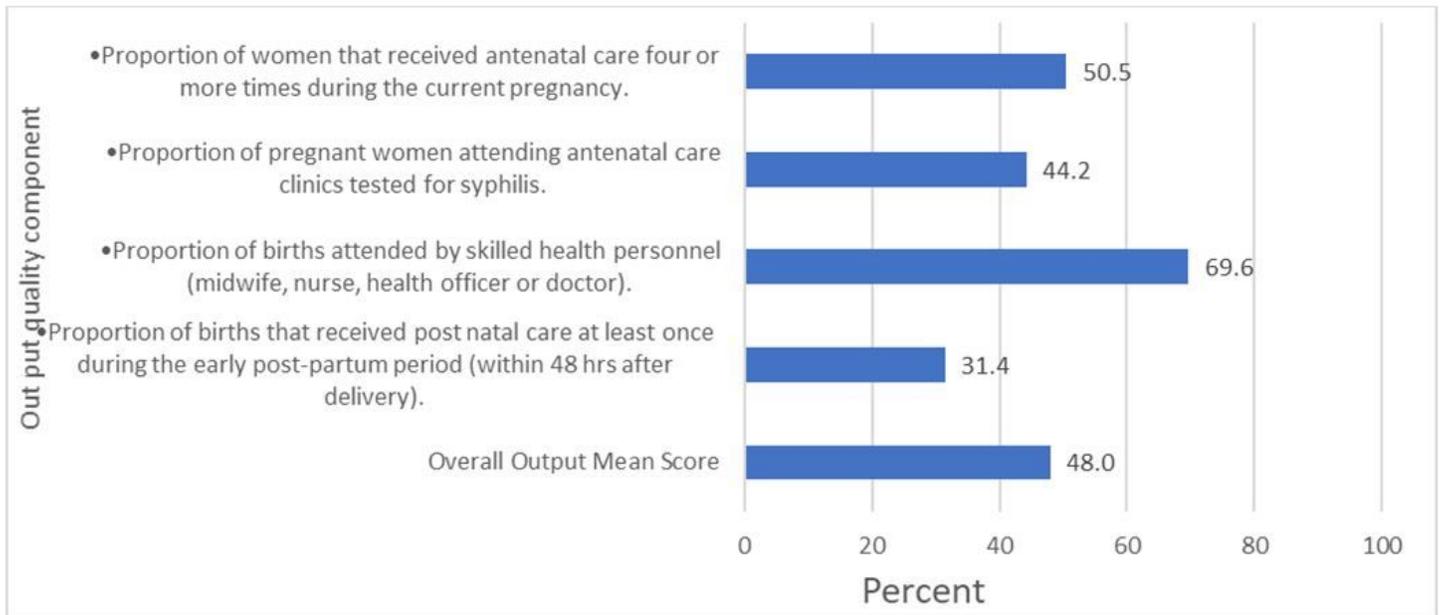
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## Figures



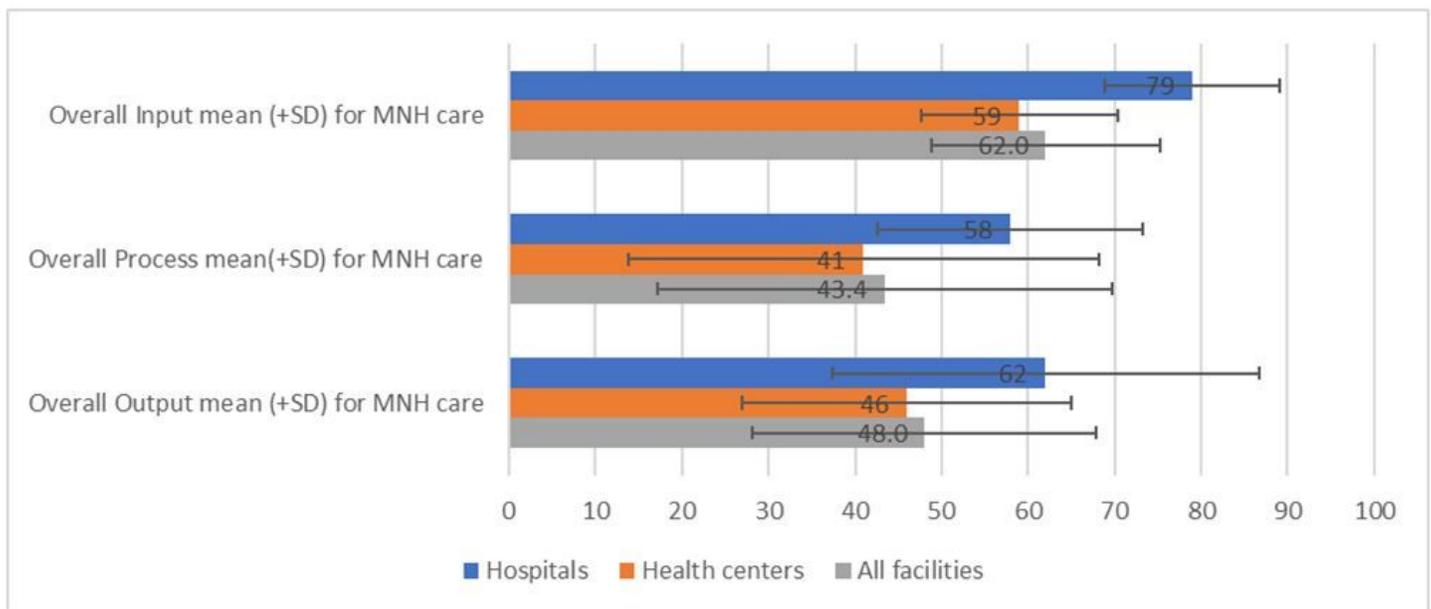
**Figure 1**

Clinical quality of care process and complication management in MNH care in the health facilities surveyed (number of cases for clinical care =1920)



**Figure 2**

Output quality components in MNH care in the health facility



**Figure 3**

Overall input, process and output components in MNH care in the health facility.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [BaselineAssessmentToolHCHosV4AberaBiadgoet.pdf](#)
- [OriginalexceldataexportedtoSTATA.xlsx](#)
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