

Outcome of Cesarean Deliveries and Determining Factors, at Felege Meles Health Center, Addis Ababa, Ethiopia: Retrospective Study Design

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Abstract

Background: In Ethiopia, death related to pregnant mother and neonatal morbidity and mortality are among the highest in the world. This is attributed to, among major three delays contributing for maternal mortality, lack of service access predisposing them to delay reaching health facilities. Despite the good progress of modern obstetrics and gynecology service, while there is improvement, still there is death of pregnant mother and, neonate remains a big problem.

Improving surgical service Access is necessary to avert and reduce maternal and neonatal mortality. In Ethiopia, 2016 data shows only 3 percent of facilities; predominantly hospitals provided caesarean delivery services. Currently, CEMONC Health centers one of major PHCU facilities, designed and constructed at districts where the community living improves access. Cesarean delivery at districts aimed to reduce maternal and neonatal deaths ensue due to delay in reaching health facilities. Despite the interventions, there is no data shows maternal or neonatal outcomes at CEMONC Health centers

Objective: The aim of this study was to assess Neonatal outcome of cesarean deliveries and determining factors, in Felege Meles Health center, Addis Ababa Ethiopia.

Methods: Facility based two-year retrospective descriptive cross-sectional study design was employed and data collected from January 2017 to January, 2019 at Felege Meles Health center, Addis Ababa Ethiopia. A total of 465 mothers who delivered by cesarean delivery from January 2017 to January, 2019 and complete data were included in the study. Data were extracted using structured data collection format and cleaned, and entered into Epi data software version 3.1 and exported into SPSS version 26 for further descriptive analysis.

Result: Among 1583 deliveries in the two years of retrospective data, a total of 465 mothers were delivered by cesarean section, giving cesarean delivery rate 29%. The leading indication for cesarean delivery was CPD followed by fetal distress. Among the total cesarean delivery, 09 neonates were died, giving the proportion of neonate mortality rate 5.6 per 1000 live births. Independent risk factors found to be statistically associated with cesarean section were Spinal anesthesia (AOR = 15.6, 95% CI: 6.12, 40.0), un-booked ANC (AOR = 3.5, 95% CI: 1.24, 10.33) and maternal age 35 years and above (AOR = 3.2, 95% CI: 1.47, 6.85).

Conclusion: The study finding shows zero maternal mortality, CEMONC health center task sharing has impacts on reduction of maternal mortality while the neonatal mortality following cesarean delivery was 5.6 per 1000 live births and the main cause of neonatal death was birth asphyxia. Despite the fact that, cesarean delivery rate in this study was above the WHO recommendation. Age 19 - 29, Residency and Spinal Anesthesia had an association with adverse neonatal outcome following cesarean delivery.

Keywords: Cesarean Section Rate; CEMONC Health Center; IESO, Cross Sectional; Task Shift and Addis Ababa Ethiopia

Introduction

Globally in 2017, about 295 000 women died during and following pregnancy and childbirth. Every day, approximately 810 women died from preventable causes related to pregnancy and childbirth. Maternal mortality in low income countries was 462 per 100 000 live births versus 11 per 100 000 live births in high income countries. The vast majority of these deaths (94%) occurred in low-resource settings, and most could have been prevented. Maternal mortality is unacceptably high and Ethiopia is among the leading in the world. Different stakeholders report different figures regarding maternal mortality in Ethiopia. WHO 2016 report estimates, Ethiopian MMR 353 deaths per 100,000 live births while in 2017 estimated as 401 deaths per 100,000 live births accounting for nearly 14,000 maternal deaths per year and 38 maternal deaths per day. According to the 2016 Ethiopian Demographic and Health Survey (EDHS) report, Maternal mortality in Ethiopia is estimate to be 412/100,000 live births. A wealth of evidence shows that poor socio-economic conditions, dysfunctional health care system, and poor quality of care are fueling the disparities in maternal mortality [1].

Globally, 2.4 million children died in the first month of life in 2019 - approximately 6,700 neonatal deaths every day Ethiopian Mini DHS 2019 report shows Neonatal Mortality 33 per thousand live births. This is below the target listed on HSTPII [2].

In Ethiopia, 2016 EMOC Assessment result shows The stillbirth rate in EmONC facilities was high (39 per 1,000 deliveries) and the very early or pre-discharge neonatal death rate was 6 per 1,000 live births [4].

The Lancet Commission on Global Surgery estimates that 5 billion people lack access to safe, affordable surgery. In 2009, nearly 4.6 million people were reported to be without access to emergency surgical treatment in the US, which has been worsened by waves of rural critical access hospital closures, creating “surgical deserts” in many parts of the country. in most of sub Saharan Africa, there are surgical services mostly available in referral facilities, but the resources are limited, quality of care is heterogeneous, and distance to the facility is frequently a real barrier for people living in rural regions and maternal morbidity and mortality remain very high [6].

In Ethiopia, The institutional delivery rate was 66 percent in 2016, indicating one third of deliveries continue to be at home. Only 14 percent of expected deliveries took place in EmONC facilities among which only 3 percent of facilities, predominantly hospitals, provided caesarean delivery services which means most facilities were not ready to adequately treat obstetric emergencies [7,8].

Caesarean section (C/S) is a surgical intervention designed to prevent or treat life threatening maternal or fetal complications A Caesarean section is often performed when a vaginal delivery would put the baby’s or mother’s life or health in danger s [9].

Ethiopian Ministry of Health (EMOH) has applied different approaches to reduce maternal and newborn morbidity and mortality, among which improve access to and strengthen facility-based maternal and newborn services is one such approach, and is also a major issue of concern in Health Sector Transformation Plan II 2015/16 - 2019/20 of Ethiopia [11].

Ethiopia’s health service is structured into a three-tier system: primary, secondary and tertiary levels of care. The primary level of care (PHCU) includes primary hospitals, health centers (HCs) and health posts (HPs). Health Centers is defined as Primary health care unit constructed for aim to address preventive, curative and rehabilitative health care services for community of 25,000 populations in rural and 40,000 populations in urban society respectively. Currently, community health service demands are increasing with population growth with our limited number of hospitals that Establishing and sustaining surgical services at health center level is innovative idea for Ethiopia as it changes the working culture on already established setup [4,7,8].

In Ethiopia, around 4000 health centers are available, from them, 420 Operating theater blocks had been innovated on prior health centers providing the basic services among which limited numbers of Operating Theater Blocks are providing emergency surgical ser-

vices. Addis Ababa health bureau data of 2022 shows, In Addis Ababa city administration, there are 121 districts (woredas) among which 101 health centers are available. Currently, there are 23 Health centers in Addis Ababa started Operation services. Major reason why OR Blocks not fully functioning mentioned as: gaps in leadership and governance, lack of budget for equipment's and supplies and limited number of human resources especially trained Integrated Emergency surgical officers [13].

Establishing Operating Theater Blocks at health centers level expected to share the surgical and Anesthesia burdens from tertiary and general hospitals as a mechanism to bring Access of surgical services at district level attributed to reduction of morbid complications for both mothers and newborns by enabling timely surgical interventions, avoid delay in reaching health facility, bring down unnecessary referrals from health centers and finally can improve client satisfactions.

CEmONC Task shared to health center level gives a room for specialized, tertiary, general and primary hospitals to deal with major elective and complicated cases that will also enable them to shorten waiting lists for surgeries and surgical backlogs in return will help the facilities to become center of excellence in teaching medical and Para-medical students and do research [10].

Ethiopia is well-known by high maternal, perinatal and infant mortality rates and traumas relate morbidity and mortality. Therefore, reduction of the morbidities and deaths in our country will require a shift in the strategy that will ensure that majority of emergencies and births are attended by appropriately trained and skilled healthcare professionals including nurses, midwives, health officers and doctors able to prevent, detect and manage obstetric complications and surgical emergencies [13]. An integrated emergency surgical officers are professionals capable of handling common emergency obstetrical gynecological and emergency general surgical procedures after a 3 years intensive training on integrated emergency surgery [14].

Though the safety of caesarean section has improved, to date the morbidity rates are still high compared to the vaginal delivery. According to world health organization caesarean section rate in any population should lie within the range of 5 - 15%, [15].

Hence, evidence on magnitude, indication and maternal and fetal outcome of cesarean section at health center level is not available in Ethiopia. to assess Neonatal outcome of cesarean deliveries and determining factors, in Felege Meles Health center, Addis Ababa Ethiopia.

Methods and Materials

Study setting

The study was conducted at Felege Meles Health Center located in Addis Ababa, Addis Ketema sub city. The service has been operating since January 2013. The Health Center provides services for more than 33,182 residents of in the catchment areas of sub city, out of catchment sub city and out of Addis; surrounding Oromia special zones at outpatient and inpatients. The health center provides inpatient service with 16 beds, and 02 delivery couches. Cesarean section services are the main surgical procedure done at the health center. There are three integrated emergency surgical professional specialist, two General practitioner, three anesthetics, ten midwives, thirty nurses, 7 lab technicians, fourteen health officers and eighty three administrative staffs.

Study design

Facility based retrospective cross-sectional survey was conducted from January 2017 to January, 2019 at Felege Meles Health center. A total 1583 mothers are delivered during the period and 465 women were delivered by cesarean section.

Inclusion criteria

- All cesarean section performed after period of viability (28 weeks) including elective, emergency, and primary cases are included in the study.

Exclusion criteria

- Charts with incomplete information.
- Cesarean section done before or after the specified period of study.

Study participants, sample size and sampling procedure

- All women who delivered by caesarean section between January 2017 to January, 2019 at Felege Meles Health center were the population under the study.
- All caesarean deliveries including elective, emergency, and primary cases are included in the study.
- The charts of all 465 mothers who gave birth by caesarean section during the retrospective period were reviewed.

Data collection tool and procedure

Data were collected using pre-tested structured questionnaire using chart review method. The questionnaire consists of socio-demographic variables, obstetric history and outcomes of cesarean section.

Mothers' information including age, parity, gestational age, antenatal care, and fetal condition at admission, Information was obtained from operation theatre, and labor ward records. The questionnaire was prepared in English. Two BSc midwifery as data collector and one health officer as supervisors were recruited for the study. Two days intensive training regarding the objective of the study, confidentiality of information, and techniques to conduct interview was given to data collectors and supervisors. To address the ethical issues, the data collectors were recruited among the permanent employees of the respective health center.

Operational definition

- Maternal death: defined as death of the mother during hospitalization.
- Early neonatal death: defined as death of the infant within 7 days of delivery.
- Cesarean section rates were calculated by dividing the total number of Cesarean section by the total number of deliveries excluding stillbirths.
- Out of sub city: defined as clients residence who are out of Addis Ketema sub city.
- Out of Addis Ababa: clients who are residing nearby Oromia special zone.
- CEMONC Health Center: defined as health center providing cesarean delivery and Blood Transfusion services in addition to other basic emergency obstetric care services.

Data processing and analysis

Data were entered into Epi-data version 3.1 and exported to SPSS version 26 for further analysis. Data cleaning was done by running descriptive statistics, including frequency, tables, figures, Measures of central tendency, measures of dispersion and proportions were computed to summarize the study variables. Bivariate analysis was used to examine association between dependent and independent variable. A 95% CI and P-value of < 0.05 were considered to be statistically significant. In addition adjusted odds ratio were computed

to assess the effect of each independent variable on the outcome variables multivariate logistic analysis was carried out and fit to the final model.

Ethical clearanc

Ethical clearance was obtained from institutional review board of St. Paul millennium Hospital and Millennium medical, Public health department. Permission from Felege Meles health center was obtained before activities started. Permission to enter the faci lity, to consult with employees, and to review registers and patient records was requested at the beginning of data collection. Data collec-tors were accompanied by an official letter from Felege Meles health center.

Result

Result socio-demographic, reproductive and clinical characteristics of respondents

There were 1583 deliveries and four hundred sixty five (465) pregnant women had been delivered by a cesarean section. The pro-portion of cesarean section delivery was higher among Addis Ketema sub city residents, which was 65.2%. A majority of cesarean section (71.4%) were in the age between 19 and 29 years of age. The mean age of pregnant women who undergo cesarean section delivery was 29.5 years (+ 2.2) (Table 1).

S.No	Variable	Frequency	Percent	
1	Age	< 18	6	1.3
		19 – 29	353	75.9
		30 -39	103	22.2
		> 40	4	0.9
2	Residency	Within sub city	300	64.5
		Out of sub city	92	19.8
		Out of Addis Ababa	73	15.7
3	Gravidity	Primi	268	57.6
		Multi gravid	182	39.1
		Grand multi	15	3.2
4	ANC status	UnBooked	65	14.0
		Booked	400	86.0
5	Type of surgery	Emergency	365	78.5
		Elective	100	21.5
6	Type of Anesthesia	Spinal	433	93.1
		General	32	6.9

Table 1: Reproductive history of mothers who underwent cesarean section from January 2017 to January 2019 Felege Meles Health center Addis Ababa, Ethiopia, 2014.

Two hundred eight two out of four hundred sixty five (40.1%) of the study subjects were in their first pregnancy (60.6%) followed by Multi gravid (37.8%) and grand multi gravid (1.5%). Among the study subjects, one hundred forty four (91.3%) mothers had ante-

natal care service register or they were booked. while Seventy seven (16.6%) of mothers were had primary previous cesarean section. Among the total mothers who underwent cesarean section, majority (79.8%) of these women had emergency procedure. More than half (96.3%) of cesarean section were made by spinal anesthesia and the remaining were general anesthesia.

Rate and neonatal outcomes of cesarean section

Among 1583 deliveries a total of 456 mothers were delivered by cesarean section, giving cesarean section rate 29%. Among the total deliveries (1583), only nine (1.9%) neonates were died, giving the overall neonatal mortality rate of the hospital as 5.6 per 1000 live births. Birth asphyxia was the major responsible causes of neonatal deaths accounting 55.5%. Of the total mothers who conduct cesarean section procedure; the leading indications of admission for cesarean section delivery were cephalo pelvic disproportionation (26.7%), none reassuring fetal heart rate pattern (18.3%) previous primary scar (16.6%) arrest cervical disorder (12.3%) ante partum hemorrhage (3.4%).

Fetal outcome

Nearly all fetuses (98.8%) had a positive fetal heart beat at the time of admission, and majority (81.9%) of them presented with the vertex. Three-fourth of newborn babies (74.2%) had normal birth weight (2500 - 4000 gm). Higher than two-third of (87.5%) fetus had normal Apgar score. Among the total deliveries, 248 (53.3%) newborns were males. There were 9 (1.9%) neonatal deaths following cesarean section. The causes of neonatal mortality were birth asphyxia and meconium aspiration syndrome 5, 4 respectively (Figure 1 and 2).

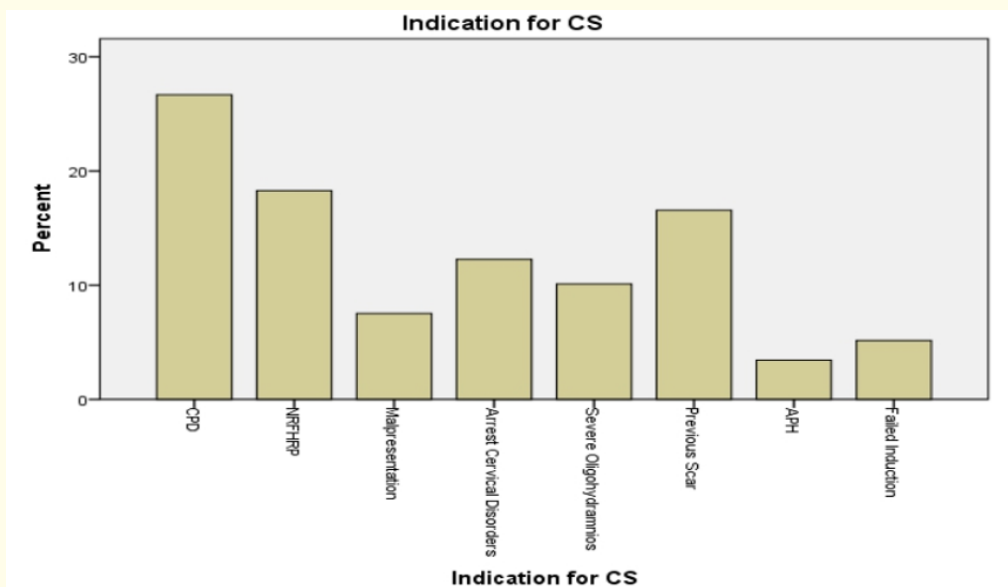


Figure 1: Bar graph.

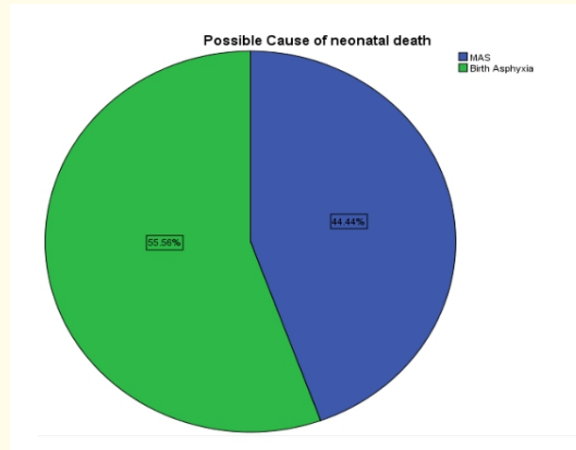


Figure 2: Possible Cause of neonatal mortality.

Determinant factors of CS

- The multivariable logistic regression analysis result showed that mothers who were in the age group between 19 - 29 has 4.7 times more likely have bad fetal outcome as compared to age range less than eighteen (AOR = 3.1, 95% CI: 1.44, 14.48). Mothers who are in the sub city were 2.1 times more likely to have neonatal death after cesarean delivery compared to those residing out of sub city and out of Addis Ababa (AOR = 2.3, 95% CI: 1.47, 6.85). Mothers who underwent cesarean section with Spinal anesthesia were 2.7 times more likely to have neonatal death as compared to general anesthesia (AOR = 3.7, 95% CI: 6.11, 29.95)
- The other variables like procedure type, and fetal weight were not found to have association with Neonatal death (Table 2).

S.No	Variable	Aor(95%Ci)	P- Value
1	Age		
	19 - 29	3.1	.027
	30 -39	6.4	.996
	>40	2.4	.67
2	Residency		
	Within sub city	2.1	.046
	Out of sub city	1.33	.322
	Out of Addis	4.1	.123
3	Type of anesthesia		
	Spinal anesthesia	3.7	.001
	General anesthesia	4.7	0.76
4	Type of procedure		
	Emergency	4.6	.109
	Elective	3.5	0.23
5	Birth weight		
	<2500	.077	.077
	2500 - 4000	.605	.480

Table 2

Discussion

Despite Cesarean section is an essential component of comprehensive obstetric and newborn care for reducing maternal and neonatal mortality, there is a lack of data regarding Cesarean section rates, its indications and outcomes at CEmONC health center level Addis Ababa, Ethiopia.

From January 2017 to January, 2019, there was a total of 1583 deliveries and 465 pregnant women delivered by a cesarean section giving an overall cesarean section rate 29%. WHO Recommended cesarean section rate to be within the range of 5-15% and interpreted as should not exceed 15% because has no additional benefit for the newborns or the mothers. On the other hand, a rate of less than 5% would reflect the difficulty in surgical access [16].

This report is comparable to study done in Nairobi Public Hospitals 29%, Ethiopia, Bahirdar City public health facilities 27.5% and systematic review done in Ethiopia which accounts 29.55% [17]. Our study result shows prevalence of cesarean section is higher when compared to that of Rwanda which is 21.05% [18]. The study result shows lower overall prevalence of cesarean section as comparing to that of private health facilities in Bahirdar which is 56.3% [16]. This discrepancy might be due to 35% of clients are out of catchment sub city and from nearby Oromia region whom are secondary referred from hospitals due to lacks of bed for induction and direct elective cesarean deliveries.

The mean age of the 1583 mothers who delivered during the study period was 29 ± 2.20 years. The mean age at first birth among the women who delivered through cesarean section in this study was 29 years. This finding is comparable to a previous study in Ghana that found the mean age for nulliparous to be 27.3 years, but higher than the median age at first birth in Ghana which is 21.4 years [19]. Again this study result is higher when compared to study done in Jimma Shenen Gibe Hospital accounting 27.8. years [19]. This could indicate that nulliparous tend to undergo more cesarean section probably due to more difficult labors.

Residence, in majority of studies and specifically study done in at Negest Elene Mohammed memorial general hospital in Ho-sanna Town, south west of Ethiopia rural residence associated with adverse neonatal outcomes[20] which is different from our study findings which shows adverse neonatal outcomes association with in Sub-city then followed out of sub city and out of Addis. This is might be also due to delay in seeking service behavior in the catchment and out of catchment area for that matter laboring mothers present late as the service is nearest to them needs further studies before justifications.

Our study shows the leading indications of admission for cesarean section delivery were cephalo pelvic disproportionation and none reassuring fetal heart rate pattern which is consistence with study done in Dessie and Meta-analysis done in Ethiopia shows Cephalopelvic disproportion was the most common indication of Cesarean section followed by non-reassuring fetal heart rate pattern [21]. The study is different from study done in Jimma shenen Gibe hospital which is none reassuring followed by previous scar [23]. This might be due to correctly identify and made decision by health professional.

The finding in this study is inconsistent with Study done in Egypt 2019 and 2021 on elective and emergency cesarean sections [22,23], shows that, Spinal Anesthesia is safest; associated with good maternal and Neonatal outcomes which concluded "GA may be considered the fastest anesthesia procedure in emergency situations, as it eliminates the risk of a failed regional block. In the meantime, the danger to mother or fetus is higher. Thus we recommend regional anesthesia wherever possible due to better outcome regarding APGAR score and LOS." [23].

A Systematic reviews and Meta-analysis done by Iranian in 2021 shows that spinal anesthesia is associated with good maternal and neonatal outcome. Which also stated that severe intra operative hypotension was common in spinal anesthesia [24].

Another study done in Ethiopia also stated that the vasodilation and venous pooling effects of the local anesthetic drugs used for regional anesthesia resulted in severe hypotension.[25] Hypotension was treated with intravenous fluids, phenylephrine and ephedrine[26,27]

The spinal anesthesia association with neonatal death in our case might be due to undermined, not treated spinal hypotension in case of fetal distress, compromise the fetomaternal circulation and emergency case handling practice for referral in mothers with deep none reassuring fetal heart rate pattern needs further prospective study before conclusion.

Conclusion

Absence of maternal mortality in our study finding shows CEMONC at health center task sharing has its own impacts on reduction of maternal mortality which is interesting and needs further studies at remaining another same service providing health facilities. Cesarean delivery rate in this study finding was found to be 29.9% and higher as compared to world health organization recommended range, which is because of secondary referrals from hospitals due to lacks of bed shows sharing burden from tertiary units.

Age 19 - 29, Residency and Spinal Anesthesia have association with adverse neonatal outcome following cesarean delivery. The neonatal mortality following cesarean delivery was 5.6 per 1000 live births which may to attribute birth asphyxia. As Access for Obstetric care intervention has shown no maternal mortalities we recommend Neonatal Care ICU Needs to be considered for improvements of neonatal survivals at CEMONC health facilities. From our findings, Maternal delay for seeking care while the services available at nearby needs to be improved in communication with health extension care workers and ANC care providers while Skills of anesthesia care providers and management of hypotension at time of spinal anesthesia provision needs further studies.

Conflict of Interest

No conflict of interest.

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