

BMJ Open Length of stay in health facilities after childbirth and associated maternal and neonatal factors in Ethiopia: a cross-sectional study from a national survey

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ABSTRACT

Objective This study aimed to assess the length of stay in health facilities after childbirth and associated maternal and neonatal factors in Ethiopia.

Design A cross-sectional study.

Setting Ethiopia.

Participants 2260 mothers who participated in the 2016 Ethiopian Demographic and Health Survey were included in the study.

Outcome Length of stay in health facilities after childbirth was the outcome variable of the study.

Result In Ethiopia, the mean duration of postpartum stay for mothers in health facilities was 21.96 (19.97–23.94) hours. Nine hundred and sixty-eight (34.80%) women remained in health institutions for ≥ 24 hours after delivery. Gestational age, birth weight and mode of delivery were significantly associated with length of stay. Gestational age was found to be inversely associated with length of stay. Mothers who had a vaginal delivery were 8.89% (adjusted HR (AHR) 8.89, 95% CI (4.28 to 18.46), $p < 0.001$) more likely to discharge earlier from health facilities after delivery, compared with those who had a caesarian section. Women with larger size neonates during birth were 19% (AHR=0.81, 95% CI (0.67 to 0.96), $p = 0.019$) more likely to stay longer in health facilities than women with average size neonates. Women with a smaller size neonate during birth were 16% (AHR=0.84, 95% CI (0.70 to 0.99), $p = 0.040$) more likely to stay longer at a health facility, compared with those with an average size neonate.

Conclusion A small percentage of Ethiopian mothers stayed in health facilities for 24 hours or more after delivery. Encouraging mothers to stay in health facilities for the recommended period after childbirth can play a significant role in reducing maternal and neonatal deaths.

INTRODUCTION

The unequal distribution of maternal and neonatal mortality around the world is an indicator of the inequalities that exist between high-income and low-income countries in terms of quality and accessibility of healthcare. Worldwide, 800 mothers die every day from complications of pregnancy and childbirth. More than two-thirds (68%) of these deaths occur in sub-Saharan African countries.¹

Strengths and limitations of this study

- This study used a large sample size, which increased the power of the study.
- The study used data extracted from a nationally representative survey; thus the findings are generalisable.
- It was impossible to include variables that could be obtained by reviewing medical charts.
- The participants' responses could be affected by recall bias.

According to the Ethiopian Demographic and Health Survey (EDHS), the maternal mortality ratio (MMR) in Ethiopia is 412 per 100 000 live births.² This figure is lower than that of the MMR in sub-Saharan African countries (533 per 100 000 live births), but much higher than the global average MMR (211 per 100 000 live births).¹ There were 2.4 million newborn deaths in 2019, representing 47% of the under-5 mortality rate.³ That same year, the neonatal mortality rate in Ethiopia was 30 per 1000 live births, making it one of the highest in the world.^{3,4}

A postpartum period is a period that begins after the expulsion of the placenta and extends over the next 6 weeks.⁵ It is a time when more than 60% of maternal mortality occurs and is marked by tremendous changes in the lives of mothers and newborns.⁶ In particular, the first 24 hours after birth are associated with 45% of maternal and one-third of neonatal deaths.^{3,6} Therefore, the WHO recommends that mothers with their newborns should remain in health facilities for at least 24 hours after birth.⁷ The rationale for this recommendation is to place mothers and newborns in an environment that can provide emergency care when needed, as the causes of poor health outcomes are often unpredictable.⁸ As long as health facilities can provide adequate and high-quality services,

women are expected to stay long enough to benefit from the postnatal services.

The concept of an appropriate length of stay after birth remained controversial for decades, and scholars failed to reach a consensus. Both 'too short' and 'too long' postpartum length of stay continues to be problematic for nations. In developing countries, a significant proportion of mothers die because it is a challenge for the existing health system to keep them in health facilities for 24 hours after birth.⁸ On contrary, extended postpartum length of stay in high-income countries remains a problem as it can lead to nosocomial infections, patient dissatisfaction and higher costs.⁸ Studies in developed countries have shown that mothers spend an unnecessarily long time in medical facilities than WHO recommendation and the most frequently used threshold of 48 and 96 hours for vaginal and caesarean section deliveries, respectively.^{9–12}

Over the past decade, Ethiopia has made promising improvements in terms of maternal and neonatal health. The 2019 mini-EDHS showed that institutional deliveries increased from 6% in 2005 to 48% in 2019, the percentage of mothers checked within 2 days of delivery was increased from 5% in 2005 to 34% in 2019, and postnatal examinations of newborns increased from 13% in 2016 to 37% in 2019.^{2 4 13} These accomplishments would not be true if it were not for the hard work of health extension workers. A health extension programme is a cost-efficient strategy that was adopted and launched by the Ethiopian government in 2003. It has two main goals; (a) ensuring universal coverage of primary health-care and (b) reducing maternal and child morbidity and mortality. Once the programme began, health extension workers were dispatched to the community to provide preventive health services.¹⁴ According to mini-EDHS, 4% of births in the country were accompanied by health extension workers. Furthermore, 1.5% of mothers and 1.4% of newborns receive their first postnatal examination by health extension workers.⁴

Previous studies showed that place of delivery,^{8 15} mode of delivery,^{8 15} multiple births,^{8 16} birth weight,^{8 16} survival status of index child,⁸ woman's age,^{8 15–17} educational level,^{8 15} marital status,⁸ birth order,⁸ wantedness of pregnancy,⁸ religion,¹⁵ parity,^{15–17} complications during pregnancy,¹⁵ number of antenatal care visits,¹⁵ place of residence,¹⁵ gestational age^{16 17} could affect the maternal length of stay in health facilities after they gave birth.

Although there have been numerous studies on the use of postnatal care in Ethiopia, there is no evidence on the length of stay in health facilities after birth. Therefore, the objective of this study was to determine the length of stay in health facilities after delivery and the associated factors in Ethiopian mothers.

METHODS

Study design and setting

A cross-sectional study was carried out in Ethiopia. Ethiopia is one of the East African countries with an estimated

population of 115 000 000.¹⁸ Currently, the country is made up of 10 regions and 2 city administrations.

Data source and study participants

The data used for this study was obtained from the 2016 EDHS, the fourth survey conducted in the country. The EDHS used a two-stage cluster sampling technique to select representative samples. In the first step, the enumeration areas were selected proportionally and in the second step, the households in the selected enumeration areas were systematically selected. All women who were between the ages of 15–49 and reside in the selected households were eligible to participate. Of 16 583 eligible female participants, 15 683 of them were interviewed; which resulted in a response rate of 94.6%. Detailed information about EDHS is available at <http://dhsprogram.com/publications/indexcfm>.

Of the 7193 mothers who gave birth 5 years before the survey, 2798 of them gave birth in various health facilities, the rest at home. From those mothers who gave birth in health facilities, 2666 of them had complete information on their socio-demographic characteristics, obstetrical history and the number of days they spent in health institutions. Forty-six (1.73%) women stayed in health facilities for more than 8 days. Therefore, the data collected from those mothers were deliberately excluded because they were outliers and could be resulted from reporting errors.¹⁵ The estimated mean length of hospital stay is highly unlikely affected due to the exclusion of these women. Finally, data from 2620 women were analysed for the study.¹⁹ To increase the representativeness of the findings, EDHS used a weighted sample size. In this study, the actual sample sizes were unweighted counts while the percentages were weighted percentages.

Study variables

The outcome variable of this study was a length of stay in health institutions after childbirth. In EDHS, women who gave birth in health facilities were asked 'How long after (NAME) was delivered did you stay there?'. The responses were recorded in hours (if less than a day), days (if less than a week) and weeks (if less than a month).² Therefore, we transformed these responses into hours to calculate the mean length of stay.

The independent variables were socio-demographic related factors (maternal age, educational level, marital status and place of residence) and obstetric-related factors (place of delivery, caesarean section delivery, tone of pregnancy, birth weight, birth order, wantedness of pregnancy, parity, complications during a previous pregnancy, antenatal care utilisation and gestational age).

Data analysis

Since EDHS uses sample weighting and two-stage cluster sampling, the data were analysed using Stata V.14 survey data analysis. Descriptive statistics (frequencies (%) and mean) were used to describe the results. We stratified the length of stay based on WHO recommendation (length

Table 1 Socio-demographic characteristics of study participants (n=2620)

Variable	LOS <24 hours, N (%)	LOS ≥24 hours, N (%)
Age		
15–19	102 (4.91)	55 (7.12)
20–24	377 (24.09)	237 (23.96)
25–29	512 (32.40)	268 (28.94)
30–34	336 (19.03)	203 (20.90)
35–39	235 (13.85)	145 (13.67)
40–44	74 (4.73)	47 (3.72)
45–49	16 (1.00)	13 (1.69)
Place of residence		
Urban	758 (33.94)	469 (33.49)
Rural	894 (66.06)	499 (66.51)
Educational level		
No education	607 (42.44)	327 (35.10)
Primary	607 (34.90)	339 (39.60)
Secondary	281 (15.39)	169 (12.77)
Higher	157 (7.28)	133 (12.54)
Marital status		
Not married	186 (8.15)	98 (9.05)
Married	1466 (91.85)	870 (90.95)

LOS, length of stay.

of stay <24 hours and length of stay ≥24 hours) and showed the distribution of the background variables in each category. Cox proportional hazard model was used to identify factors associated with the risk of discharge after birth. The length of stay is a time variable; it varies among individuals and censoring events exist.¹⁵ Variables with p value <0.2 in crude Cox regression were entered into the final model. Those variables with a p value <0.05 in multiple cox regression analysis were considered as the predictor of maternal length of stay in health facilities after giving birth. We used a global test to assess whether the variables fulfil the assumptions of Cox proportional hazard regression.

Patient and public involvement

It was not possible to involve patients or the public in the design, or conduct, or reporting, or dissemination plans of our research.

RESULT

Socio-demographic characteristics of the study participants

Seven hundred and eighty (29.77%) of the study participants were found between 25 and 29 years old. One thousand three hundred and ninety-three (66.22%) of the women lived in rural areas and 934 (39.89%) of the women had no education. Approximately 90% of the women were married at the time of the survey¹⁹ (table 1).

Obstetrics characteristics of the study participants

Ninety-five per cent of mothers gave birth in government health facilities. Approximately 91% of the mothers had at least one antenatal care visit during their pregnancy. Regarding complications from the previous pregnancy, about 9% of mothers reported that they had some type of pregnancy complications during the previous pregnancies. Almost 43% of the mothers reported their children were of average birth weight, and 97.17% of the women said that they gave birth in the ninth month of pregnancy. About 2% of the mothers had multiple tone pregnancies while about 7% of the mothers delivered by caesarean section¹⁹ (table 2).

Length of stay in health facilities after birth and associated factors

Nine hundred and sixty-eight (34.80%) of the women spent ≥24 hours in health facilities after giving birth. Of these, 754 (82.40%) had a spontaneous vaginal delivery, while 214 (17.60%) of them had a caesarean section. In Ethiopia, the mean duration of postpartum stay for mothers in health facilities was 21.96 (19.97–23.94) hours.¹⁹

During crude cox regression analysis, educational level, gestational age, parity, place of delivery, number of antenatal care visits, birth weight and caesarean delivery were associated with the dependent variable and were entered into the final model for analysis.

In the final Cox regression model, gestational age, birth weight and caesarean section delivery were found to be significantly associated with the outcome variable. Women who gave birth before 10 months of gestation were more likely to stay in health facilities longer than women who gave birth in the 10th month of pregnancy. Women with larger than an average size neonate were 19% (adjusted HR (AHR)=0.81, 95% CI (0.67 to 0.96), p=0.019) more likely to stay longer at health facilities compared with those with an average size neonate. Also, women with less than an average size neonate were 16% (AHR=0.84, 95% CI (0.70 to 0.99), p=0.040) more likely to stay at health facilities longer compared with those with an average size neonate. Women who had a vaginal delivery were 8.89% (AHR=8.89, 95% CI (4.28 to 18.46), p<0.001) more likely to discharge earlier from a health facility, compared with those who had a caesarian section¹⁹ (table 3).

DISCUSSION

Our study was conducted to determine the length of stay of maternal stay in health facilities after delivery and associated factors. We have found that Ethiopian mothers on average stayed in health facilities almost for 22 hours after birth. We also found that gestational age, birth weight and caesarean section delivery were the determinants of length of stay in health facilities after birth.

Our study showed that mothers in Ethiopia on average spent less than 24 hours in health facilities after giving birth. This finding was shorter than the WHO

Table 2 Obstetric characteristics of study participants (n=2620)

Variable	LOS <24 hours, N (%)	LOS ≥24 hours, N (%)
Place of delivery		
Government health facility	1529 (96.06)	837 (93.28)
Private health facility	123 (3.94)	131 (6.72)
Birth order		
<3	860 (51.94)	570 (58.22)
<5	428 (25.63)	180 (18.33)
<8	271 (16.09)	160 (16.55)
≥8	93 (6.34)	58 (6.90)
Antenatal care visits during pregnancy		
No	102 (8.11)	67 (11.16)
Yes	1550 (91.89)	901 (88.84)
Previous pregnancy complications		
No	1502 (90.06)	871 (91.95)
Yes	150 (9.04)	97 (8.05)
Size of the child at birth		
Larger than average	534 (31.11)	371 (40.11)
Average	781 (46.20)	368 (35.85)
Less than average	337 (22.69)	229 (24.04)
Gestational age (months)		
7	7 (0.14)	10 (1.06)
8	21 (1.01)	27 (2.84)
9	1613 (98.12)	926 (95.39)
10	11 (0.73)	5 (0.72)
Tone of pregnancy		
Single	1630 (98.41)	940 (97.29)
Multiple	22 (1.59)	28 (2.71)
Delivered by caesarean section		
No	1631 (98.69)	754 (82.40)
Yes	21 (1.31)	214 (17.60)
Planned pregnancy		
No	367 (25.64)	177 (22.17)
Yes	1285 (74.36)	791 (77.83)
Parity		
<4	1107 (65.75)	677 (69.71)
<7	379 (22.60)	196 (20.69)
≥7	166 (11.65)	95 (9.60)

LOS, length of stay.

recommendation and the results of other studies.²⁰ The existing poor quality of maternal and neonatal healthcare in the country could be responsible for the shorter length of stay.²¹

In our study, women who gave birth before the 10th month of pregnancy had a longer length of stay and the effect size of gestational age decreases as the length of

pregnancy increases. This finding was in agreement with other studies. Previously conducted studies have shown that the shorter the gestational age, the longer length of stay in health institutions.^{16 17 22} This is reasonable since neonates born early face various health problems and require prolonged medical care to survive.^{23 24} Furthermore, premature births could be due to poor maternal health, which could lead to long-term admission of the mother to health centres.^{25 26}

Our study showed that women with both larger and smaller size newborns at birth stayed in health facilities for a longer period than those women who had average size newborns. Previously conducted similar studies indicated that low birth weight was a predictor of longer length of stay in health facilities.^{8 16 17} A study conducted in 92 countries showed that women who had low birth weight neonates (<2500 g) spent a longer period in health facilities than those mothers who had neonates with normal birth weight.⁸ Studies in Italy also showed that women with low birth weight neonates had a longer length of stay compared with their counterparts.^{16 17} This could be because low birth weight neonates face various health complications during and after birth, as the most common causes of low birth weight are preterm birth and intrauterine growth restriction.²⁷ However, macrosomic neonates could also face numerous health complications and may require extended hospitalisation. Studies have shown that macrosomic neonates are at risk of developing hypoglycaemic, dyspnoea, birth asphyxia and trauma.^{28 29}

In our study, women with spontaneous vaginal delivery were nine times more likely to leave health facilities earlier than those with caesarean section delivery. Similar findings were already reported by other studies.^{8 15} Intuitively, women with caesarean delivery require a prolonged length of stay due to various complications.^{30–35}

Previous studies showed inconclusive evidence regarding the association between the place of delivery and length of stay. A study carried out in 92 countries showed that those mothers who gave birth in private health facilities had a shorter length of stay.⁸ By contrast, a study conducted in India showed that mothers who gave birth in private health facilities stayed longer than mothers who gave birth in public health facilities.¹⁵ In our study, place of delivery was not related to the length of stay. This could be because the length of stay after birth could be affected by national norms and health system.⁸

Our study had strengths and limitations. The strengths of our study were the use of a national survey, which increase the representativeness of the results. Additionally, EDHS is one of the national surveys of acceptable quality. As limitation, our findings could be influenced by recall bias since the study participants were mothers who gave birth 5 years before the survey. The other limitation was that the survey relied on the mother's opinion to measure birth weight and gestational age rather than confirming it from medical records.³⁶ Moreover, EDHS did not assess key obstetrical and neonatal factors that could be extracted from the review of medical records.

Table 3 Factors associated with length of stay in health facilities after birth

Variable	CHR (95% CI)	AHR (95% CI)	P value
Educational level			
No education	Ref	Ref	
Primary	0.84 (0.71 to 0.99)	0.84 (0.7 to 1.0)	0.056
Secondary	1 (0.81 to 1.23)	0.99 (0.79 to 1.23)	0.961
Higher	0.62 (0.46 to 0.84)	0.8 (0.58 to 1.09)	0.160
Gestational age			
7	0.13 (0.02 to 0.7)	0.13 (0.03 to 0.55)	0.005
8	0.49 (0.17 to 1.43)	0.33 (0.14 to 0.76)	0.010
9	0.91 (0.38 to 2.21)	0.48 (0.28 to 0.85)	0.011
10	Ref	Ref	
Parity			
<4	0.88 (0.73 to 1.07)	1.04 (0.83 to 1.3)	0.729
<7	0.94 (0.73 to 1.21)	0.97 (0.76 to 1.25)	0.828
≥7	Ref	Ref	
Place of delivery			
Public health facility	1.38 (0.95 to 2.02)	0.98 (0.69 to 1.4)	0.924
Private health facility	Ref	Ref	
Antenatal care visits			
Yes	1.26 (0.92 to 1.71)	1.34 (0.97 to 1.87)	0.076
No	Ref	Ref	
Birth weight			
Larger than average	0.77 (0.65 to 0.93)	0.81 (0.67 to 0.96)	0.019
Less than average	0.85 (0.71 to 1.02)	0.84 (0.70 to 0.99)	0.040
Average	Ref	Ref	
Planned pregnancy			
Yes	0.89 (0.74 to 1.08)	0.88 (0.73 to 1.05)	0.159
No	Ref	Ref	
Caesarean section delivery			
Yes	Ref	Ref	
No	9.15 (4.53 to 18.49)	8.89 (4.28 to 18.46)	<0.001

AHR, adjusted HR; CHR, crude HR.

We were also unable to assess differences in health facility-related (infrastructure and providers) characteristics during the study. All of these factors can have a major impact on the length of stay in health centres after birth.

CONCLUSION

The first 24 hours after childbirth provide a golden opportunity to tackle most maternal and neonatal morbidities and mortalities. In Ethiopia, mothers on average stayed in health facilities for approximately 22 hours after delivery. This is shorter than the WHO recommendation and the results of other studies. Gestational age, birth weight and caesarean section delivery were the identified determinants of length of stay in health facilities after childbirth. In addition to promoting institutional delivery,

mothers should be encouraged to stay in health facilities for an intended period after childbirth. Further studies should investigate the relationship between the length of stay and key maternal, neonatal, obstetrical and facility-related characteristics, as these variables are not available at EDHS.

Contributors YBB came up with the research idea and was involved in all stages of the research. GAL prepared the manuscript while NS was responsible for conducting of the analysis and interpretation of the findings. All authors read and approved the final manuscript. YBB is acting as the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The 2016 EDHS study was approved by the Federal Democratic Republic of Ethiopia Ministry of Science and Technology and the Institutional Review Board of ICF International. The reference number for the ethical committee was not attached because the data was extracted from a national survey and we could not access it. The study participants gave written informed consent to participate in the study before taking part. Participants' confidentiality was ensured by using of password protected computers.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. The dataset supporting the conclusion of this study is available at <https://dhsprogram.com/data/available-datasets.cfm>.

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