

A TEN-YEARS RETROSPECTIVE REVIEW OF STILLBIRTHS AT A TEACHING HOSPITAL IN NORTHERN ETHIOPIA

Gebrekiros Gebremichael Meles¹, Yibrah Berhe², Zewde Abraha³, Wegen Beyene⁴, Yonas Moges¹,
Mache Tsadik¹, Tsadkan Gebremeskel Haile⁵, Gebreslassie Gebremariam Berhe⁶, Yemane Amare⁷,
Awol Yemane², Hale Teka², Liya Mamo¹, Medhanie Gebreslassie², Kidanemariam Alem¹,
Kebede Embaye¹, Haftom Temesgen Abebe¹

ABSTRACT

BACKGROUND: The stillbirth rate is one of the key maternal and child healthcare indicators. Despite numerous efforts by international organizations to lower stillbirth rates, low- and middle-income countries—especially Ethiopia—continue to face formidable challenges in understanding the magnitude and underlying contributing factors. Therefore, this study aimed to estimate the stillbirth rate, contributing factors, and trends among mothers who delivered at Ayder Comprehensive Specialized Hospital, Northern Ethiopia.

METHODS: A retrospective study was conducted at Ayder Comprehensive Specialized Hospital, located in Tigray, Northern Ethiopia. A checklist was prepared to extract information from the birth records of mothers who gave birth at the hospital from July 2011 to August 2021. Data were collected using an open data kit (ODK) tool. Binary logistic regression analysis was used to identify factors associated with stillbirth, and an odds ratio with a 95% confidence interval was used to assess the strength of the association. A p-value <0.05 was set as the level of significance.

RESULTS: There were 51.3 stillbirths per 1,000 live births (95% CI: 48.7–54.0) during the study period. Maternal age of 36–50 years (AOR=1.97, 95% CI: 1.56–2.48), unstable maternal health status (AOR=100.1, 95% CI: 71.38–140.38), male sex (AOR=1.25, 95% CI: 1.09–1.44), low and very low birth weights (AOR=29.77, 95% CI: 24.46–36.25), and singleton birth (AOR=0.43, 95% CI: 0.32–0.58) were independently associated with stillbirth.

CONCLUSION: The stillbirth rate was alarmingly high in this study, indicating that immediate attention is needed. Interventions addressing low birth weight, advanced maternal age, and maternal health status should be prioritized in efforts to lower the burden of stillbirth.

KEYWORDS: Stillbirth, Ethiopia, factors

(The Ethiopian Journal of Reproductive Health; 2025; 17; 8-16)

1 School of Public Health, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

2 School of Medicine, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

3 School of Nursing, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

4 Department of Medical Biochemistry & Molecular Biology Department, School of Medicine, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

5 School of Pharmacy, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

6 Department of Medical Laboratory Science, School of Medicine, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

7 Biomedical Sciences, School of Medicine, College of Health Sciences, Mekelle University, Mekelle, Ethiopia

BACKGROUND

The stillbirth rate (SBR) is defined as the number of babies born with no signs of life at 28 weeks or more of gestation per 1,000 total births^{1,2}. In 2021, an estimated 1.9 million babies were stillborn at 28 weeks of pregnancy or later, with a global stillbirth rate of 13.9 per 1,000 total births³. Stillbirth is among the key indicators of the quality of health services provided during pregnancy and childbirth⁴. The United Nations Every Newborn Action Plan (ENAP) set a target of 12 stillbirths per 1,000 births by 2030 and 10 stillbirths per 1,000 births by 2035⁵. The global average stillbirth rate declined to 13.9 per 1,000 in 2021—a 35% reduction from 2000³.

Globally, one baby is stillborn every 16 seconds—nearly 2 million a year—of which three in four cases occur in sub-Saharan Africa or Southern Asia. Most stillbirths are preventable through life-saving interventions and high-quality healthcare⁶. Progress in sub-Saharan Africa (SSA) and Southern Asia remains slow, accounting for nearly 77% of stillbirths in 2021⁷.

Ethiopia has significantly reduced key health indicators, including maternal and child mortality, due to improved access to maternal health services. Despite these achievements, Ethiopia remains among the highest contributors to stillbirths in SSA⁸. It ranks fifth among the top ten countries with the highest stillbirth rates globally^{9, 10} and third in East Africa, where progress in reducing stillbirths remains limited¹¹. Despite this high burden, stillbirth has received less policy and programmatic attention compared to maternal and neonatal deaths.

Limited access to obstetric care and inadequate healthcare services during antenatal care, labor, and delivery contribute to maternal infections and complications, including antepartum vaginal bleeding, pregnancy-related hypertension, and congenital anomalies¹³. Sociodemographic factors such as age, parity, religion, residence, and healthcare access are also reported as risk factors for stillbirth. Approximately 40% of all stillbirths that

occur during labor and delivery can be prevented by improving the quality of care during childbirth, including routine monitoring and timely access to emergency obstetric care when needed¹⁴.

Like other low-income countries, Ethiopia's stillbirth rate has not received adequate attention despite the national target to reduce it to 12 per 1,000 births by 2030. Therefore, assessing the burden and determinants of stillbirth in healthcare settings is crucial for designing preventive interventions. This study aimed to assess the burden, trends, and associated factors of stillbirth among women who gave birth at Ayder Comprehensive Specialized Hospital, Northern Ethiopia.

PATIENTS AND METHODS

Study area and setting

The study was conducted at Ayder Comprehensive Specialized Hospital, located in Mekelle, the capital city of Tigray, Ethiopia. It is one of the tertiary hospitals in the country, serving as a teaching hospital for over 4,000 medical and health science students and as a referral center for approximately 10 million people in Northern Ethiopia from Tigray, parts of Afar, and Amhara regions¹⁵. The hospital has more than 500 inpatient beds, 30 emergency beds, 46 intensive care unit beds, 15 burn unit beds, 10 operation theatre beds, and a dialysis unit with a capacity for 12 patients at a time. The hospital provides services to more than 300,000 patients annually¹⁶.

Study design

A retrospective cross-sectional study design was employed.

Population and sampling

All mothers who delivered at Ayder Comprehensive Specialized Hospital constituted the source population, and all mothers who delivered at the hospital between July 1, 2011, and August 31, 2021, were included as the study population.

Data collection and quality control

A data collection tool was developed to extract information from the hospital's delivery logbook. The checklist was designed in the Open Data Kit (ODK) format. Training was provided to data collectors and supervisors for three days. Data were collected by nurses and midwives. Pretesting was conducted at another hospital not included in the study to ensure tool validity. A double data entry of 5% of records was performed by different collectors to check consistency. The research team rigorously reviewed the data for logical inconsistencies and incompleteness, and extensive data cleaning was conducted to address outliers.

Study variables

Dependent variable: Stillbirth

Independent variables:

- Maternal characteristics: age and health status
- Stillbirth characteristics: sex, birth weight, and number of children

Operational definitions

- Stillbirth: A fetus born dead after 28 weeks of gestation with a birth weight of >1,000 g during the antepartum or intrapartum period (WHO, 2016).
- Maternal condition: Status of the mother immediately after delivery, classified as stable or unstable.

Data management and analysis

The research team implemented secure data storage and backup procedures to ensure data integrity. Standardized protocols were developed for variable naming, coding, and formatting. Comprehensive documentation, including metadata and coding schemes, was maintained.

After electronic data collection, the dataset was exported to Stata version 17 for cleaning and analysis. Outliers and missing values were addressed. The stillbirth rate was presented as a proportion and rate with a 95% confidence interval (CI), using a significance level of $p < 0.05$. Trend analysis was performed using line graphs with 95% CI error bars to illustrate stillbirth rates per 1,000 live births from 2012–2020.

Cross-tabulations were used to assess crude associations between stillbirth and independent variables. Bivariate and multivariable logistic regressions identified independent determinants of stillbirth, reporting crude (COR) and adjusted odds ratios (AOR) with 95% CIs. Multicollinearity was checked using the variance inflation factor (VIF), with all values near 1. Model fit was evaluated with the Hosmer–Lemeshow test ($\chi^2 = 10.78$, $p = 0.095$), and discriminatory accuracy was assessed using the receiver operating characteristic (ROC) curve (AUC=75.87%), confirming good model fit.

Ethics approval and consent to participate

Mekelle University, the College of Health Sciences, Ayder Comprehensive Specialized Hospital, and their respective departments approved the study. Anonymous data were extracted to ensure confidentiality. As the data were obtained from delivery registries, it was not possible to obtain individual informed consent from participants. However, permission was obtained from the hospital administrators as custodians of the data.

Results

Stillbirth rate and characteristics

Among the delivered during the study period at Ayder Comprehensive Specialized Hospital, about 5% (95% C. I: 4.3% - 4.8%) were stillborn, resulting in a stillbirth rate of 51.3 per 1000 births (95% CI: 48.7-54.0).

The mean ($\pm$ SD) age of the mothers with stillborn delivery during the study period was 26.7 ± 5.3 years, and the minimum age of the mothers at delivery was 14 years. Males constituted more than half (55.7%) of the stillbirths. The majority (71.2%) of stillbirths were delivered vaginally, followed by cesarean delivery (24.7%) and operative vaginal delivery (4.1%). With respect to maternal status after stillbirth, the majority of the mothers (86.8%) were stable, but the remaining 11.6% and 1.6% were unstable and died, respectively.

Among the total stillbirths recorded in the hospital, most (94.3%) were singletons, followed by twins (5.6%) and triplets (0.07%). On the other hand,

47.9% of the stillborn infants had normal birth weights, and 23.9% had low birth weights, followed by very low birth weights (22.7%) and macrosomic weights (5.5%).

Obstetric complications

Obstetric complications such as preeclampsia, eclampsia, antepartum hemorrhage, and other complications were recorded in only 287 mothers who delivered a stillborn. Among those, preeclampsia and eclampsia accounted for 31.7% and 16.4% of the obstetric complications, respectively. Similarly, congenital malformations (35.7%) were the most

common problems associated with stillbirth, followed by low birth weight (33.3%) and premature birth (21.2%).

Trend of stillbirths

Among the stillbirths recorded in the hospital from July 1st 2011 to August 31st 2021, 14.6% occurred in 2018, and 5.3% occurred in 2019. SBR trend analysis was performed from 2012-2020 for uniformity by removing incomplete data from 2011-2021. Accordingly, the SBR rapidly decreased from 2012-2014 but steadily increased and then decreased from 2015-2020 (Fig. 1).

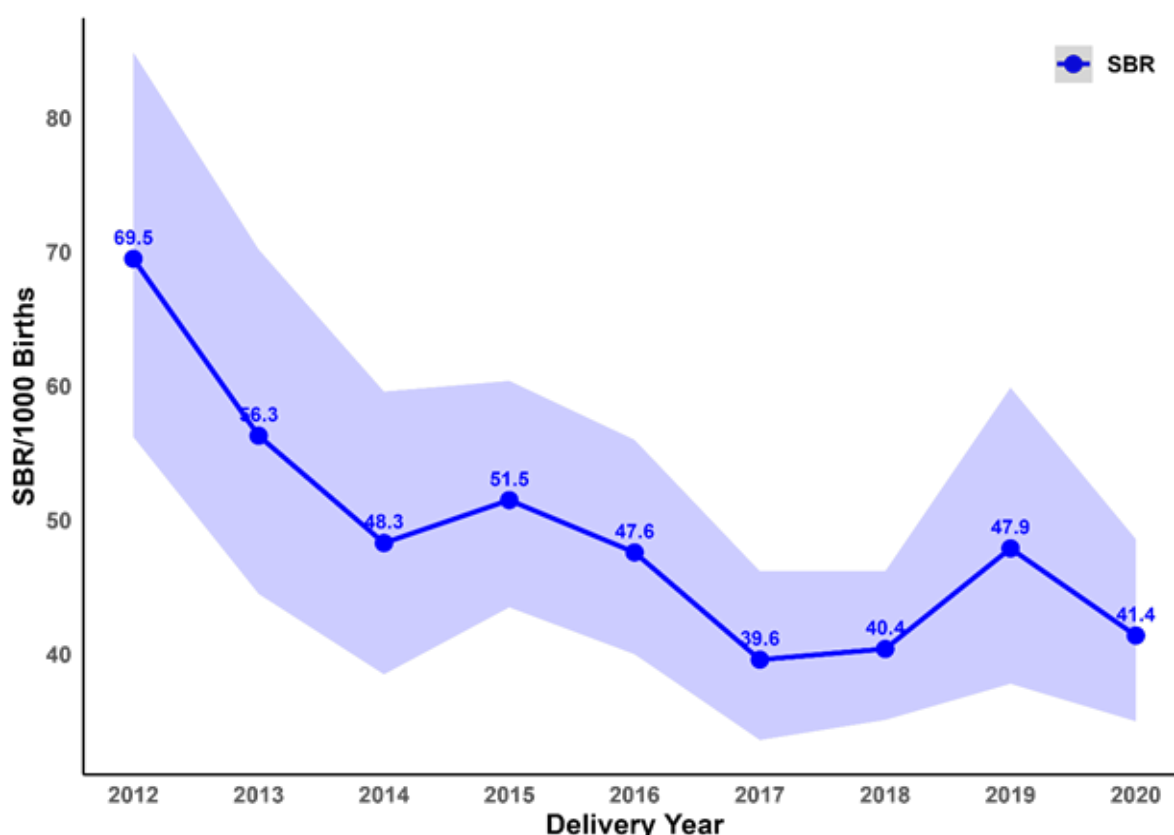


Figure 1: Trend of stillbirth rates at Ayder Comprehensive Specialized Hospital, 2012-2020, Mekelle, Tigray

Factors associated with stillborn delivery

To identify the factors statistically associated with stillbirth, bivariate binary logistic regression was fitted for each variable, and then a multiple binary logistic regression model was fitted. As a result, maternal age (36-50), maternal health status, sex of the stillbirth, birthweight, and number of children were significantly associated with stillbirth according to both bivariate and multiple logistic regressions (Table 1).

Stillbirths born to mothers aged 36-50 years had two times greater odds of stillbirth than mothers aged less than 25 years did after controlling for the effects of the other variables (AOR=1.97, 95% CI: 1.56-2.48). Similarly, mothers who were unstable

during or after delivery were associated with a greater likelihood of stillbirth than stable mothers were (AOR=100.1, 95% CI: 71.38-140.38).

On the other hand, with respect to stillbirth status characteristics, male stillbirths had 25% greater odds of stillbirth than female stillbirths did (AOR=1.25, 95% CI: 1.09-1.44). Moreover, stillbirths who had low (AOR=4.57, 95% CI: 3.87-5.41) and very low (AOR=29.77, 95% CI: 24.46-36.25) birthweights had approximately five-, and thirty-times greater odds of stillbirth, respectively, than stillbirths with normal birthweights. In contrast, singleton deliveries had approximately 57% lower odds of stillbirth delivery in the final model (AOR=0.43, 95% CI: 0.32-0.58).

Table 1: Bivariate and multivariable logistic regression outputs for factors associated with stillbirth in Ayder Comprehensive Specialized Hospital, July 2011-August 2021, Mekelle, Tigray

Variables	Stillbirth		COR (95%CI)	AOR (95%CI)
	Yes	No		
Age category of mother (n=26,432)				
<25 years	567	11543	1	1
26-35	623	12003	1.1(0.9-1.2)	1.08 (0.9-1.3)
36-50	154	1542	2.0(1.7-2.5)	1.97 (1.6-2.5) ***
Maternal health status (n= 25,334)				
Stable	1083	24027	1	1
Unstable	165	59	62(45.8-84.0)	100.1 (71.4-140.4) ***
Sex of the stillbirth (n=26,203)				
Male	556	11796	1.1(1.01-1.3)	1.25 (1.09-1.4) **
Female	700	13151	1	1
Birthweight (n= 26,168)				
Normal Birthweight	2623	305	1	1
Low birth weight	20114	611	3.8(3.3-4.4)	4.6 (3.9-5.4) ***
Very low birth weight	427	289	22.3(18.8-26.4)	29.8(24.5-36.3) ***
Overweight	1729	70	1.3(1.0-1.7)	1.1 (0.8-1.5)
Number of kids (n= 26,808)				
Singleton	24190	1298	1	2.5(1.8-3.5) **
Twin/Triplet	1242	78	1.2(0.9-1.5)	1

** Statistically significant P value<0.001

*** Statistically significant P value<0.0001

DISCUSSION

The prevalence of stillbirth in this study was 5.13%, resulting in a stillbirth rate (SBR) of 51.3 per 1,000 live births (95% CI: 48.7–54.0). Maternal age (36–50 years), maternal health status, sex of the stillbirth, birthweight, and number of children were significantly associated with stillbirth in this study. The SBR observed here was substantially higher than both the national and global stillbirth rate estimates for 2019 and far above the target proposed by the Every Newborn Action Plan to reduce preventable stillbirths to below 12 per 1,000 births by 2030^{6, 17, 18}. Although Ethiopia's National Health Care Quality Strategy (2016–2020) prioritized maternal, stillbirth, and child health with an ambitious goal of reducing the stillbirth rate to 10 per 1,000 births by 2020¹⁹, the rate in this study was five times higher than that national target. The actual rate could be even higher, as this study did not include stillbirths that occurred at home. This alarming figure could be attributed to several factors, such as poor quality of care during pregnancy and childbirth, lack of investment in preventive interventions and workforce capacity, limited social recognition of stillbirths as a major public health burden, and insufficient national and global leadership to address the issue⁶.

The prevalence of stillbirth in this study was also higher than that reported in similar studies conducted in Southeast Ethiopia¹⁷. This discrepancy may reflect variations in health-seeking behavior, access to care, and maternal lifestyle across different regions. However, this study complements earlier findings from the same institution, where a decreasing trend in SBR was observed, though rates remained above national and global targets^{18, 19}. In contrast, our findings are notably higher than those reported from Northwest Ethiopia (2.3%; 95% CI: 1.8–3.0%)²¹ and systematic reviews in Ethiopia (3.69%; 95% CI: 27.3–47.8)²². Differences in study duration, data quality, healthcare infrastructure, and sample size could explain these variations. Compared with other African studies, the SBR reported here also exceeded that of a Nigerian

study (3.8%)²³, possibly due to differences in socioeconomic conditions, maternal healthcare quality, and governmental commitment to achieving global goals²⁴.

Multivariable analysis showed that mothers aged 36–50 years had nearly twice the odds of experiencing stillbirth compared with those aged below 25 years, after controlling for confounding variables. This finding aligns with studies from Ethiopia²⁸, the Amhara region²⁹, and Nigeria⁹, all of which identified advanced maternal age as a significant risk factor for stillbirth. The biological explanation may relate to age-related obstetric complications and chronic maternal conditions that compromise placental function and fetal well-being.

Regarding fetal factors, male stillbirths had 25% higher odds compared to females, a finding consistent with other studies^{30–32}. Male fetuses are associated with higher risks of complications such as placental abruption, gestational diabetes mellitus, macrosomia, prolonged labor, cord prolapse, and true umbilical cord knots³¹, all of which increase the likelihood of adverse outcomes.

Low and very low birth weights were also strongly associated with stillbirth. In this study, these infants had approximately five- and thirty-fold higher odds of stillbirth, respectively, compared with those of normal birth weight. This result is consistent with findings from Hiwot Fana Specialized University Hospital in Eastern Ethiopia (AOR=2.42, 95% CI: 1.23–4.76)⁶ and from Southwestern Ethiopia, where neonates weighing ≥ 2.5 kg were 73% less likely to be stillborn (AOR=0.27, 95% CI: 0.14–0.53)³³. This underscores the importance of addressing intrauterine growth restriction and maternal factors contributing to low birth weight.

Interestingly, singleton deliveries had lower odds of stillbirth in this study, consistent with the findings of a case-control study in Southern China³⁴. Multiple pregnancies tend to carry higher risks of complications such as preterm birth, growth restriction, and intrapartum distress, all of which increase the likelihood of stillbirth.

Although this study analyzed a large dataset from delivery registries, it is important to note that the actual stillbirth rate may be underestimated due to incomplete recordkeeping. Furthermore, the range of variables available for analysis was limited because some key sociodemographic and obstetric factors were not captured in the registries.

CONCLUSIONS

The prevalence of stillbirth in this study was alarmingly high. Advanced maternal age (36–50 years), unstable maternal health status, male sex, low and very low birth weights, and singleton delivery were significantly associated with stillbirth. These findings highlight the urgent need to strengthen antenatal care, improve intrapartum monitoring, and enhance the quality of labor and delivery services to reduce this preventable yet neglected burden on families and society.

Abbreviations

SBR: Stillbirth rate

SSA: Sub-Saharan Africa

ENAP: United Nations Every Newly Born Action Plan

Competing interests

The authors report no conflicts of interest.

Funding statement

No specific funding was used for this particular study.

Authors' contributions

GGM, HT, and YB initiated and drafted the study; ZA, MT, GGB and YA drafted the introduction section; KA, KE and LM participated in designing the methods and results; and WB, YM, and TG drafted the discussion and conclusion sections. AY, HT and MG contributed to reviewing the manuscript and its design. All the authors critically reviewed the manuscript.

Acknowledgments

We are grateful to Mekelle University, College of Health Sciences Ayder Comprehensive Specialized Hospital, for allowing us to obtain access to the delivery data. We are also highly indebted to the data collectors for their incredible contributions to this study.

Corresponding author

Gebrekiros Gebremichael Meles

Email: gebrekiros.meles@mu.edu.et

REFERENCES

1. WHO. Global health observatory data. 2022; <https://www.who.int/data/gho>
2. Berhie KA, Gebresilassie HG. Logistic regression analysis on the determinants of stillbirth in Ethiopia. [Internet. *Matern Heal Neonatol Perinatol* 2016;2(1):1-10.
3. UNICEF. Never Forgotten: The situation of still birth around the globe. 2023.
4. Admasu K, Haile-Mariam A, Bailey P. Indicators for availability, utilization, and quality of emergency obstetric care in Ethiopia, 2008. *Int J Gynecol Obstet.* 2011;115(1):101-5.
5. Bernis L, Kinney MV, Stones W, ten Hoop-Bender P, Vivio D, Leisher SH, et al. Stillbirths: ending preventable deaths by 2030. *Lancet Glob Health.* 2016;387(10019):703-16.
6. Hug L, You D, Blencowe H, et al; UN Interagency Group for Child Mortality Estimation and Its Core Stillbirth Estimation Group. Global, regional, and national estimates and trends in stillbirths from 2000 to 2019: a systematic assessment. *Lancet.* 2021;398(10302):772-785. doi:10.1016/S0140-6736(21)01112-0).
7. UNIGME. A neglected tragedy: the global burden of stillbirths. New York: United Nations Children's Fund. 2020.
8. Jena BH, Biks GA, Gelaye KA, Gete YK. Magnitude and trend of perinatal mortality and its relationship with interpregnancy interval in Ethiopia: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2020;20(1):1-13.
9. Anyichie NE, Nwagu EN. Prevalence and maternal sociodemographic factors associated with stillbirth in health facilities in Anambra, south-east Nigeria. *Afr Health Sci.* 2019;19(4):3055-62.
10. Goldenberg RL, Muhe L, Saleem S, Dhaded S, Goudar SS, Patterson J, et al. Criteria for assigning cause of death for stillbirths and neonatal deaths in research studies in low-middle income countries. *J Matern Neonatal Med.* 2019;32(11):1915-23.
11. Lindtjørn B, Mitike D, Zidda Z, Yaya Y. Reducing stillbirths in Ethiopia: Results of an intervention programme. *PLoS One.* 2018;13(5):1-11.
12. Berhan Y, Berhan A. Perinatal mortality trends in Ethiopia. *Ethiop J Health Sci* 2014;24:29-40
13. Welegebriel TK, Dadi TL, Mihrete KM. Determinants of stillbirth in Bonga General and Mizan Tepi University Teaching Hospitals southwestern Ethiopia. A case-control study. *BMC Res Notes.* 2017;10(1):1-5.
14. Blencowe H CS, Jassir FB, Say L, Chou D, Mathers C, et al. National, regional, and worldwide estimates of stillbirth rates in 2015, with trends from 2000: A systematic analysis. *Lancet Glob Health.* 2016;4(2):e98-108.
15. <https://ayder.info/index.php/about-us>, accessed on Nov.23, 2023 [
16. <https://ayder.info/index.php/about-us?view=article&id=69:background&catid=47> [
17. Mengistu S, Debella A, Mulatu T, Mesfin F. Stillbirth and Associated Factors Among Women Who Gave Birth at Hiwot Fana Specialized University. 2022;10(May):1-7. .
18. WHO report on Stillbirth. Accessed on December 30 2023: https://www.who.int/health-topics/stillbirth#tab=tab_1
19. WHO Africa region News report. Fewer maternal deaths and stillbirths in Ethiopia : improving quality of care is paying off. (March 2019). Available from: <https://www.afro.who.int/news/fewer-maternal-deaths-and-stillbirths-ethiopia-improving-quality-care-paying>.
20. Gilano G, Hailegebreal S, Seboka BT. Determinants and spatial distribution of institutional delivery in Ethiopia : evidence from Ethiopian Mini Demographic and Health Surveys 2019. *Arch Public Heal* [Internet]. *BioMed Central*; 2022;1-12. Available from: <https://doi.org/10.1186/s13690-022-00825-2>.
21. Chan GJ, Goddard FGB, Hunegnaw BM, Mohammed Y, Hunegnaw M. Estimates of Stillbirths , Neonatal Mortality , and Medically Vulnerable Live Births in Amhara , Ethiopia. 2022;5(6):1-11. .
22. Jena BH, Biks GA, Gelaye KA, Gete YK. Magnitude and trend of perinatal mortality and its relationship with interpregnancy interval in Ethiopia: A systematic review and meta-analysis. *BMC Pregnancy Childbirth.* *BMC Pregnancy and Childbirth*; 2020;20(1):1-13. .
23. Anyichie NE, Nwagu EN. Prevalence and maternal sociodemographic factors associated with stillbirth in health facilities in Anambra, south-east Nigeria. *Afr Health Sci.* 2019;19(4):3055-62. .
24. Berhan Y, Berhan A. Perinatal mortality trends in Ethiopia. *Ethiop J Health Sci.* 2014;24:29-40. .
25. Gwako GN, Were F, Obimbo MM, Kinuthia J, Gachuno OW, Gichangi PB. Association between utilization and quality of antenatal care with stillbirths in four tertiary hospitals in a low-income urban setting. 2023;100(4):676-83.
26. Tesema GA, Gezie LD, Nigatu SG. Spatial distribution of stillbirth and associated factors in Ethiopia : a spatial and multilevel analysis. 2020; .

27. Goba GK, Legesse AY, Whelan A, Divelbess K, Cavanaugh E, Mohammednur SA, et al. Prevalence of Stillbirth in Ayder Comprehensive Specialized Hospital, North Ethiopia: a Descriptive Retrospective Study. *Ethiop J Reprod Heal*. 2019;11(3):26–32. .
28. Berhie KA, Gebresilassie HG. Logistic regression analysis on the determinants of stillbirth in Ethiopia. *Matern Heal Neonatol Perinatol* [Internet]. Maternal Health, Neonatology and Perinatology; 2016;2(1):1–10. Available from: <http://dx.doi.org/10.1186/s40748-016-0038-5>.
29. Lakew D, Tesfaye D, Mekonnen H. Determinants of stillbirth among women deliveries at Amhara region, Ethiopia. *BMC Pregnancy Childbirth*. *BMC Pregnancy and Childbirth*; 2017;17(1):1–7. .
30. Hadar E, Melamed N, Sharon-Weiner M, Hazan S, Rabinerson D, Glezerman M, Yoge Y. The association between stillbirth and fetal gender. *J Matern Fetal Neonatal Med*. 2012 Feb;25(2):158–61. doi: 10.3109/14767058.2011.565838. Epub 2011 Mar 31. PMID: 21449834.
31. Di Renzo GC, Rosati A, Sarti RD, Cruciani L, Cutuli AM. Does fetal sex affect pregnancy outcome? *Gend Med*. 2007 Mar;4(1):19–30. doi: 10.1016/s1550-8579(07)80004-0. PMID: 17584623.
32. Mondal D, Galloway TS, Bailey TC, Mathews F. Elevated risk of stillbirth in males : systematic review and meta-analysis of more than 30 million births. 2014;1–11.
33. Welegebriel TK, Dadi TL, Mihrete KM. Determinants of stillbirth in Bonga General and Mizan Tepi University Teaching Hospitals southwestern Ethiopia, 2016: A casellcontrol study. *BMC Res Notes* [Internet]. BioMed Central; 2017;10(1):1–5. Available from: <https://doi.org/10.1186/s13104-017-3058-y>.
34. Abebe H, Shitu S, Workye H, Mose A. Predictors of stillbirth among women who had given birth in Southern Ethiopia, 2020: A casell control study. *PLoS One* [Internet]. 2021;16(5 May):1–13. Available from: <http://dx.doi.org/10.1371/journal.pone.0249865>.
35. Tesfay N, Legesse F, Kebede M and Woldeyohannes F (2022) Determinants of stillbirth among reviewed perinatal deaths in Ethiopia. *Front. Pediatr*. 10:1030981. doi: 10.3389/fped.2022.1030981.
36. Madrid L, Alemu A, Seale AC, Oundo J, Tesfaye T, Marami D, et al. Articles Causes of stillbirth and death among children younger than 5 years in eastern Hararghe , Ethiopia : a population-based postmortem study. :1032–40.