# EXPECTANT MANAGEMENT OF LATE PRETERM PREMATURE RUPTURE OF MEMBRANES BETWEEN 34 TO 37 WEEKS OF GESTATION: AN INSIGHT FROM A TERTIARY HOSPITAL IN SUB-SAHARAN AFRICA

Malede Birara[1], Shewanesh Muleta[1], Aida Tilahun[1], Abraham Fessehaye Sium[1]

## ABSTRACT

**OBJECTIVE:** To determine the maternal and early neonatal adverse outcomes of expectant management of preterm prelabour rupture of membranes (PPROM) beyond 34 to 37 weeks in a single center in Africa.

**METHODS:** A retrospective cross-sectional study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC) among pregnant women with PPROM beyond 34 weeks, from February 1, 2023, to July 31, 2023. Data were collected using a structured data abstraction form from patient records and analyzed using SPSS version 22. The primary outcomes were maternal and neonatal morbidities, including clinical chorioamnionitis, NICU admissions, and neonatal death.

**RESULTS:** Among the 102 participants who received inpatient expectant management for PPROM beyond 34 weeks, the mean gestational age at delivery was 36 weeks, with 42 participants delivering at 37 weeks. The mean latency period was 15 days. NICU admission occurred in 22.5% of neonates, with 20% of those suspected of having sepsis. No early neonatal deaths or confirmed cases of neonatal sepsis were reported. Clinical chorioamnionitis occurred in 13 cases (12%), and postpartum hemorrhage (PPH) in 2.2% of cases. No maternal deaths were reported. No statistically significant association was found between the latency period and either maternal or neonatal outcomes. Prophylactic antibiotics and antenatal corticosteroids were administered to all patients, and no major neonatal complications were observed.

**CONCLUSION:** Expectant management of PPROM beyond 34 to 37 weeks is associated with favorable neonatal outcomes and no increased maternal complications. This approach may be safely practiced in other low-income settings with appropriate patient selection and monitoring.

**KEYWORDS:** PPROM, Expectant management, Maternal outcome, Neonatal outcome, Ethiopia

(The Ethiopian Journal of Reproductive Health; 2025; 17; 1-7)

1 St. Saul's Millennium Medical College, Addis Ababa, Ethiopia.

## INTRODUCTION

Premature rupture of membranes (PROM) refers to the rupture of fetal membranes before the onset of labor. When this occurs before 37 completed weeks of gestation, it is termed preterm prelabour rupture of membranes (PPROM).[1] Although PPROM complicates only about 3% of all pregnancies, it accounts for up to 40% of neonatal morbidity and mortality, primarily due to complications such as prematurity, sepsis, umbilical cord prolapse, and pulmonary hypoplasia. Maternal risks include chorioamnionitis, placental abruption, and prolonged hospitalization with associated psychosocial effects.[2]

Most international guidelines recommend expectant management of PPROM up to 34 weeks of gestation unless contraindicated by high-risk conditions requiring immediate delivery. During expectant management, close inpatient surveillance, prophylactic antibiotics, and corticosteroids are advised. However, management of PPROM beyond 34 weeks remains controversial due to the need to balance maternal and neonatal risks.[3]

While many guidelines recommend delivery at or after 34 weeks, evidence suggests that immediate delivery at this stage may increase the risk of prematurity-related complications such as respiratory distress syndrome (RDS). Conversely, expectant management may pose risks of infection, umbilical cord accidents, and sepsis, though recent studies indicate that these risks are comparable to immediate delivery while improving overall neonatal survival.[4]

The American College of Obstetricians and Gynecologists (ACOG) recommends induction of labor if PPROM occurs at or beyond 34 weeks of gestation.[5] Similarly, the Royal College of Obstetricians and Gynaecologists (RCOG) advises considering delivery at 34 weeks while counseling patients on the risks of chorioamnionitis versus potential benefits of reduced neonatal respiratory morbidity and NICU admission with later delivery.[6] Currently, there is limited evidence regarding the safety and feasibility of managing PPROM conservatively beyond 34 weeks in low-resource settings. At SPHMMC, institutional protocol supports expectant management for PPROM beyond 34 weeks, with universal administration of prophylactic antibiotics and corticosteroids. Delivery is deferred until 37 weeks unless complications such as infection or fetal distress occur. Despite this practice, maternal and neonatal outcomes have not been systematically evaluated. This study addresses that gap by examining outcomes of expectantly managed PPROM beyond 34 weeks at SPHMMC, providing evidence to guide safe management in low-resource environments.

### Methods and Materials

#### Study Setting and Period

The study was conducted at St. Paul's Hospital Millennium Medical College (SPHMMC) in Addis Ababa, the capital city of Ethiopia. SPHMMC is one of the largest teaching and referral hospitals in the country, serving approximately 200,000 patients annually and providing care to high-risk obstetric cases referred from across Ethiopia. The hospital has 360 beds and handles over 10,000 deliveries per year. The study period was from February 1 to July 31, 2023.

#### Study Design

A retrospective descriptive cross-sectional study design was employed.

#### Study Variables and Outcomes

The primary outcomes were maternal outcomes (chorioamnionitis, postpartum hemorrhage, length of hospital stay, and ICU admission) and neonatal outcomes (NICU admission, neonatal sepsis, RDS, APGAR scores, and neonatal mortality).

Secondary outcomes included gestational age at admission and delivery, antibiotic and corticosteroid administration, use of magnesium sulfate, birth weight, and latency period. Independent variables included socio-demographic (age, marital status, residence) and reproductive characteristics (gravidity and parity). The latency period was defined as the duration from membrane rupture to delivery.

**Study Population**

The study included all women admitted with PPROM beyond 34 weeks and managed expectantly at SPHMMC during the study period.

**Management Protocol at SPHMMC**

The diagnosis of PROM was based on clinical findings, including a history of vaginal fluid leakage and visualization of pooling in the posterior fornix during sterile speculum examination. In uncertain cases, diagnosis was supported by a positive pad test or ultrasound evidence of oligohydramnios, defined as an amniotic fluid index (AFI) below 5 cm or the largest vertical pocket <2 cm.

Per hospital protocol, women diagnosed with PPROM between 28 and 36 weeks were hospitalized for expectant management until 37 weeks after providing informed consent. Maternal monitoring included daily assessment using a PROM chart, focusing on symptoms of infection such as fever, uterine tenderness, contraction frequency, and maternal or fetal tachycardia. Laboratory monitoring (total leukocyte count and C-reactive protein) was performed weekly. Fetal monitoring included daily fetal movement counts, non-stress tests, and twice-weekly biophysical profiles.

All women received prophylactic antibiotics (intravenous ampicillin 2 g every 6 hours for 2 days, followed by oral amoxicillin 500 mg every 8 hours for 5 days, and azithromycin 500 mg for three doses). Because group B streptococcus (GBS) screening was not routinely performed, the antibiotic regimen was applied universally. Antenatal corticosteroids (four doses of 6 mg dexamethasone IM every 12 hours) were given at admission. For patients admitted before 34 weeks, no repeat corticosteroid course was given after 34 weeks.

Delivery was indicated in cases of chorioamnionitis, non-reassuring fetal status, placental abruption, spontaneous labor onset, or upon reaching 37 weeks. Chorioamnionitis was clinically defined as an axillary temperature >38°C with two or more of the following: uterine tenderness, maternal WBC >15,000/mm$^3$, maternal pulse >100 bpm, fetal heart rate >160 bpm, or foul-smelling vaginal discharge.

Neonatal sepsis was suspected if the newborn presented with maternal chorioamnionitis or symptoms such as tachypnea, hypothermia, depressed reflexes, elevated CRP (>6 mg/dL), or an increased immature-to-mature leukocyte ratio. Suspected cases received empirical antibiotic therapy, which was discontinued if culture results were negative.

**Inclusion and Exclusion Criteria**

Inclusion criteria: All pregnant women admitted with PPROM between 28 and 34 weeks who continued expectant management beyond 34 weeks up to 37 weeks. Gestational age was determined using a reliable last menstrual period (LMP) or early ultrasound.

Exclusion criteria: Fetal distress, abnormal biophysical profile, meconium-stained liquor, chorioamnionitis, preeclampsia with severe features, eclampsia, HELLP syndrome, antepartum hemorrhage, diabetes, intrauterine growth restriction, multiple gestations, major fetal anomalies, or maternal heart disease.

**Sample Size and Sampling Technique**

Sample size was calculated using Online StatCalc software, assuming a 7% incidence of chorioamnionitis in expectant management of late PPROM, resulting in a sample size of 105. Purposive sampling was used, and all eligible women who met inclusion criteria during the study period were included.

**Data Collection and Management**

Data were extracted using structured questionnaires from patient charts, delivery logs, and NICU registers. The tool was pretested on five cases, and necessary adjustments were made. Data were collected by interns, residents, and midwives involved in patient care, under daily supervision by the principal investigator for completeness and accuracy.

Data were entered into SPSS version 20 for analysis. Quantitative variables were summarized using means ± standard deviation or medians with interquartile ranges when appropriate. Categorical variables were expressed as frequencies and percentages and compared using the Pearson chi-square test. Associations between outcomes (infection, neonatal death) and predictor variables were analyzed using odds ratios (OR) with 95% confidence intervals (CI). A p-value <0.05 was considered statistically significant.

## Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of SPHMMC. The study did not interfere with clinical management. Confidentiality was maintained using coded identifiers, and all data were securely stored with access restricted to the research team. There were no conflicts of interest.

## Results

There were 146 late participants' with PPROM were managed expectantly in SPHMMC during the study period from February 1, 2023, to July 2023. From these there were 122 study participants were managed expectantly beyond 34 weeks of gestation, among these 102 were included who fulfilled the inclusion criteria.

The age range of the study participants was 18 to 38 with a mean age of 28.09 ± 5.26 years (Table-1). Fifth-six (54.9%) participants were from rural areas and one hundred one of the study participants (91%) were married.

Sixty-two (60.8%) of study partcipants are multiparous and Eighty-eight (86.3%) were not provided with magnisum sulphate (MGSO4) for neuroprotection. Mean latency period was with mean (± standard deviation) 15.09 ±11.27. The mean gestational age at admission was 33 weeks and the mean gestational age at the time of delivery was 36.12±0.848weeks. All except one took dexamethasone and 42 percent of them delivered at the gestational age of 37 weeks. Among these 68.6% of them had vaginal delivery.

**Table 1: Socio demographic and treatment characteristics of late PPROM patients, SPHMMC, 2023. (n=102)**

| Variable | Category | Frequency | Percent |
|---|---|---|---|
| **Age** | Less than 20 | 6 | 5.9 |
| | 20 to 35 | 83 | 81.4 |
| | More than or equal to 35 | 13 | 12.7 |
| **Residence of mother** | Urban | 46 | 54.9 |
| | Rural | 56 | 45.1 |
| **Marital status** | Married | 101 | 99 |
| | Not married | 1 | 1 |
| **Parity** | Primigravida | 40 | 39.2 |
| | Multigravida | 62 | 60.8 |
| **GA at admsiion** | <34 | 36 | 35.3 |
| | >= 34 | 66 | 64.7 |
| **GA at Delivery** | 35 | 31 | 30.4 |
| | 36 | 28 | 27.3 |
| | 37 | 43 | 42.3 |
| **Latency period** | <7days | | |
| | >=7days | | |
| **Dexamethasone** | Yes | 102 | 100 |
| **Antbiotics given** | Yes | 102 | 100 |
| **Mode of delivery** | Vaginal | 70 | 68.6 |
| | CS | 32 | 31.4 |

Analysis of maternal outcomes revealed that thirteen (12.7%) had chorioamnionitis and eighty-eight (86.3%) of them stayed in the hospital less than three days after delivery (Table-2).

**Table 2 Maternal outcomes among late PPROM patients managed expectantly , SPHMMC Ethiopia, 2023, N = 102**

| Variable | Category | Frequency | Percent |
|---|---|---|---|
| **Number of post-partum hospital stay** | <3 days | 88 | 86.3 |
| **PPH** | Yes | 3 | 2.9 |
| | No | 99 | 97.1 |
| **Clinical Chorioamnionitis** | Yes | 13 | 12.7 |
| | No | 89 | 87.3 |

Among the study participants who developed PPH that lead to anemia were three (2.9%) and all of them were transfused. There were no peripartum hysterectomies or ICU admission.

The newborns birth weight ranged from 2500 to 3999gm was fifty-two (51%) with mean (± standard deviation) weight of 2635 ± 616 grams. There were twenty-three (22.5%) newborns admitted to NICU and twenty-one (20.6%) Suspected early neonatal sepsis (EONS). Hundred-two (100%) newborns had an APGAR of >7 at 5th minute and no neonatal deaths.

**Table 3: Neonatal outcomes among late PPROM patients managed Expectantly at SPHMMCEthiopia, 2023, N = 102**

| Variable | Category | Frequency | Percent |
|---|---|---|---|
| **APGAR SCORE** | <>= 7 | 102 | 100 |
| Suspected EONS | Yes | 21 | 20.6 |
| | No | 81 | 79.4 |
| **Birth weight** | 1500-2499 | 50 | 49.0 |
| | 2500-3999 | 52 | 51.0 |
| **NICU admission** | Yes | 23 | 22.5 |
| | No | 79 | 77.5 |

## DISCUSSION

In this study, we found a prolonged latency period with low maternal infection rates and favorable neonatal outcomes among women with late preterm prelabour rupture of membranes (PPROM; 34⁶⁄₇–36⁶⁄₇ weeks) managed expectantly up to 37 weeks. The average latency period exceeded two weeks, and fewer than one-quarter of neonates required NICU admission. No neonatal deaths were recorded.

Late preterm PPROM accounts for nearly one-third of maternal and neonatal complications; however, management practices vary considerably across regions because of concerns about infection risks. Recent evidence supports expectant management for stable maternal and fetal conditions, provided no contraindications exist, though not beyond 37⁶⁄₇ weeks of gestation.[8] Prolonging pregnancy to more advanced gestational ages reduces neonatal respiratory distress syndrome (RDS) and low birth weight. Consistent with this, Choi et al. reported no cases of RDS among infants delivered at 37 weeks.[9] This approach is particularly valuable in low-resource settings, where NICU capacity is limited, underscoring the benefits of expectant management in improving neonatal survival.

In our study, 102 women with confirmed PPROM between 28 and 36 weeks were managed expectantly up to 37 weeks. The mean latency period was 15.09 ± 11.27 days. The extended latency and higher gestational age at delivery observed highlight the potential benefits of prophylactic antibiotic use in PPROM beyond 34 weeks. Similar findings have been reported in Korea, India, and Iran, where comparable antibiotic protocols produced prolonged latency without increasing adverse outcomes.[10–12]

A notable finding of this study is the mean gestational age at delivery of 36.12 ± 0.85 weeks—higher than figures reported elsewhere.[10],[13],[14] Furthermore, 42% of cases delivered at 37 weeks, a rate considerably greater than the 0.8% reported in the PPROMT trial and the 12% reported by Kaur et al.[10]

Expectant management of PPROM is often associated with maternal complications such as chorioamnionitis, endomyometritis, antepartum and postpartum hemorrhage, and prolonged hospitalization.[15],[16] Previous studies have reported chorioamnionitis rates as high as 60%,[17] though estimates vary depending on study design, diagnostic criteria, and management protocols.[18] In our cohort, clinical chorioamnionitis occurred in 12.7% of patients—lower than in earlier reports and below the expected 15% incidence in low-resource settings.[19] The NICU admission rate was 22%, with no neonatal deaths, which is also lower than previously reported rates.[8—12] This improved outcome may reflect the availability of subspecialty care at our institution, including maternal-fetal

medicine and neonatology services, as well as the presence of midwives trained in advanced neonatal life support.

Among the strengths of this study is that it is one of the first to report on expectant management of late preterm PPROM (34–36 weeks) in a low- and middle-income country (LMIC) context, where safety concerns often lead to early delivery due to fear of infection and limited NICU resources. However, this study also has several limitations. Its retrospective descriptive design carries an inherent risk of bias. The relatively small sample size, resulting from the brief study period, limits generalizability. Inadequate laboratory testing may have led to under-recognition of subclinical infection, and the absence of placental histopathology precluded confirmation of histologic chorioamnionitis. Future studies employing larger sample sizes and prospective designs are recommended.

## Conclusion

This study demonstrated that expectant management of PPROM beyond 34 weeks is associated with favorable neonatal outcomes and no increase in maternal complications, particularly sepsis. Our findings support the safe extension of expectant management beyond 34 weeks, provided that cases are carefully selected and that prophylactic antibiotics and antenatal corticosteroids are administered.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Funding Statement

No external funding was received for this study.

## Author Contributions

MB and SM conceived and designed the study, collected and analyzed the data. MB, AT, and SM drafted the manuscript, and AFS critically reviewed and edited it. The final version was reviewed and approved by all authors.

## Data Availability Statement

Data are available from the corresponding author upon reasonable request.

## Acknowledgements

The authors thank St. Paul's Hospital Millennium Medical College (SPHMMC), Department of Obstetrics and Gynecology, Addis Ababa, Ethiopia, for institutional support.

**Corresponding author:** Dr. Malede Birara, email: maledebirara@yahoo.co.uk.

## REFERENCES

1. Begum A, Ghani T, Paul SK, Hussain T, JAHAN N, BEGUM N. OUTCOME OF PREMATURE RUPTURE OF MEMBRANES--A STUDY OF 120 CASES IN DHAKA MEDICAL COLLEGE HOSPITAL. Journal of Dhaka Medical College. 2016 Oct 1;25(2).
2. Galask RP, Varner MW, Petzold CR, Wilbur SL. Bacterial attachment to the chorioamniotic membranes. American journal of obstetrics and gynecology. 1984 Apr 1;148(7):915-28.
3. Morris JM, Roberts CL, Bowen JR, Patterson JA, Bond DM, Algert CS, et al. Immediate delivery compared with expectant management after preterm pre-labour rupture of the membranes close to term (PPROMT trial): a randomised controlled trial. The Lancet. 2016 Jan 30;387(10017):444–52.
4. Garg A, Jaiswal A. Evaluation and management of premature rupture of membranes: a review article. Cureus. 2023 Mar;15(3).
5. American College of Obstetricians and Gynecologists' Committee on Practice Bulletins—Obstetrics. Prelabor Rupture of Membranes: ACOG Practice Bulletin, Number 217. Obstet Gynecol. 2020, 135, e80–e97. [CrossRef] [PubMed]
6. Thomson AJ. Royal College of Obstetricians and Gynaecologists. Care of Women Presenting with Suspected Preterm Prelabour Rupture of Membranes from 24 Weeks of Gestation: Green-top Guideline No. 73. BJOG. 2019; 126(9): e152–e166,
7. Bohiltea RE, Cioca AM, Dima V, Ducu I, Grigoriu C, Varlas V, Furtunescu F. Expectant management of PPROM improves neonatal outcome—a retrospective study of 562 patients. Journal of Clinical Medicine. 2021 Dec 31;11(1):214.
8. Lee D, Lynch TA. PPROM in the late preterm period: an argument for expectant management. American Journal of Obstetrics & Gynecology MFM. 2024 Nov 26:101563.
9. Boskabadi H, Zakerihamidi M. Evaluation of maternal risk factors, delivery, and neonatal outcomes of premature rupture of membrane: a systematic review study. Journal of Pediatrics Review. 2019 Apr 10;7(2):77-88.
10. Kaur A et al. International Journal of Reproduction, Contraception, Obstetrics and Gynecology Int J Reprod Contracept Obstet Gynecol. 2024 Sep;13(9):2308-2315
11. Akbarian Rad Z, Yazdani S, Galeshi M, Eftekhari N, Shafizadeh F. Maternal and neonatal outcomes in cases of premature preterm rupture of membranes and the effect of latency periods (rupture of membranes to delivery) on adverse pregnancy outcomes. Journal of Obstetrics, Gynecology and Cancer Research. 2021 Sep 9;7(1):45-51.
12. Boskabadi H, Zakerihamidi M. Evaluation of maternal risk factors, delivery, and neonatal outcomes of premature rupture of membrane: a systematic review study. Journal of Pediatrics Review. 2019 Apr 10;7(2):77-88.
13. Sgayer I, Naskovica K, Shaqara RA, Odeh M, Bornstein J, Wolf MF. Early planned labor induction vs expectant management in late preterm pre-labor rupture of membranes: maternal and neonatal outcomes. Ginekologia Polska. 2021;92(7):498-504.
14. Ferraz MF, Lima TD, Cintra SM, Júnior EA, Petrini CG, Caetano MS, Paschoini MC, Peixoto AB. Active Versus Expectant Management for Preterm Premature Rupture of Membranes at 34–36 Weeks of Gestation and the Associated Adverse Perinatal Outcomes. Revista Brasileira de Ginecologia e Obstetrícia/RBGO Gynecology and Obstetrics. 2020 Nov;42(11):717-25.
15. van der Ham DP, Nijhuis JG, Mol BW, van Beek JJ, Opmeer BC, Bijlenga D, Groenewout M, Arabin B, Bloemenkamp KW, van Wijngaarden WJ, Wouters MG. Induction of labour versus expectant management in women with preterm prelabour rupture of membranes between 34 and 37 weeks (the PPROMEXIL-trial). BMC pregnancy and childbirth. 2007 Dec;7:1-6.
16. Van Der Ham DP, Van Der Heyden JL, Opmeer BC, Mulder AL, Moonen RM, van Beek JH, Franssen MT, Bloemenkamp KW, Sikkema JM, De Groot CJ, Porath M. Management of late-preterm premature rupture of membranes: the PPROMEXIL-2 trial. American journal of obstetrics and gynecology. 2012 Oct 1;207(4):276-e1.
17. Lukanović D, Batkoska M, Kavšek G, Druškovič M. Clinical chorioamnionitis: where do we stand now?. Frontiers in Medicine. 2023 May 24;10:1191254.
18. Melamed N, Ben-Haroush A, Pardo J, Chen R, Hadar E, Hod M, Yogev Y. Expectant management of preterm premature rupture of membranes: is it all about gestational age?. American journal of obstetrics and gynecology. 2011 Jan 1;204(1):48-e1.
19. Manuck TA, Maclean CC, Silver RM, Varner MW. Preterm premature rupture of membranes: does the duration of latency influence perinatal outcomes?. American journal of obstetrics and gynecology. 2009 Oct 1;201(4):414-e1.

## REFERENCES

1. WHO. Global health observatorty 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 birtharround 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 Hoope-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‐least 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.wh.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‐least 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; .