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Research Article

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Prevalence and Factors Associated with Perinatal Deaths at Igunga District Hospital in Tabora, Tanzania

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Abstract

Background: *Perinatal mortality remains a significant public health challenge, particularly in low- and middle-income countries. Globally, the stillbirth rate is estimated at 13.9 per 1,000 births, contributing to approximately 2.6 million stillbirths annually. South Asia records the highest rates (40–70 per 1,000 births), while Sub-Saharan Africa has an estimated stillbirth rate of 21.7 per 1,000 births. In Tanzania, the perinatal mortality rate is approximately 38 per 1,000 pregnancies. Despite various government interventions, the rates remain unacceptably high, particularly in Tabora region and Igunga District, where limited research has been conducted to identify specific determinants. Understanding the prevalence and contributing factors is essential for designing targeted interventions.*

Objective: *To investigate the prevalence and factors associated with perinatal death at Igunga district hospital in Tabora region, Tanzania.*

Methodology: *A retrospective cross-sectional study* ***employed****, a convenience sampling method, utilizing all available files with complete information on perinatal deaths to identify specific causes of perinatal death at Igunga Hospital. All files of perinatal deaths between 2024 to 2020 were reviewed, and only 365 files that met the inclusion criteria were analyzed. Data were collected using structured data abstraction tools and analyzed using SPSS v21 and Stata v17. Descriptive statistics summarized socio-demographic and obstetric characteristics. Bivariate analyses were performed using chi- square and Fisher's exact tests, and modified Poisson regression was used to identify factors independently associated with perinatal deaths.*

Results: *The average age of participants was 26.7 years (SD ±7.3 years), with the majority of women falling within the 20–35-year age range (64.7%). The prevalence of perinatal deaths was 15.8%. The highest stillbirth rate was recorded in 2021 (15.2 per 1,000 deliveries), and the lowest in 2020 (10.9 per 1,000). Increased risk was associated with maternal age 36–45 years (aPR: 1.08; $p = 0.027$), secondary education (aPR: 1.29; $p = 0.003$), rural residence (aPR: 1.19; $p < 0.001$), and gestation of more than 40 weeks (aPR: 1.15; $p < 0.001$). Protective factors included a high socio-economic status (aPR: 0.53; $p < 0.001$) and attending at least 3 antenatal care visits (aPR: 0.82; $p = 0.004$).*

Conclusion: *Perinatal mortality remains high in Igunga District, with birth asphyxia, prematurity, and neonatal sepsis being the leading causes. Maternal, fetal, and healthcare-related factors, including inadequate antenatal care, intrapartum complications, delayed decision-making, and rural residence, were key contributors. Strengthening maternal and newborn health services, ensuring timely risk identification, and addressing health system and socioeconomic gaps are essential for reducing preventable perinatal deaths in similar rural settings.*

Keywords: Perinatal Mortality, Stillbirth, Early Neonatal Death, Tanzania, Maternal Health

1. Introduction

Perinatal mortality, encompassing stillbirths (pregnancy losses occurring after 28 weeks of gestation) and early neonatal deaths (within the first 7 days of life), represents a persistent global health crisis, particularly pronounced in low- and middle-income countries [1].The World Health Organization estimates around 2.6 million perinatal deaths annually, with a disproportionate number occurring in LMICs, especially in sub-Saharan Africa [2].

Sub-Saharan Africa bears the highest burden (SSA), accounts for 84% of global stillbirths, with an estimated rate of 21.7 per 1,000 total births, significantly higher than the 3.1 per 1,000 in developed regions like Europe and North America [3].

In Tanzania, the perinatal mortality rate (PMR) is approximated at 38 per 1,000 pregnancies [4]. This highlights a critical public health issue and serves as a crucial indicator of demographic health, helping policymakers address various public health challenges. More importantly, high facility-based birth rates exceeding 95% between 2015 and 2016 [5]. Notable disparities exist, with urban areas reporting a higher perinatal mortality rate (PMRs) (56.6 per 1,000) compared to rural areas (35.9 per 1,000). Furthermore, the perinatal mortality rate in Zanzibar was higher than that of the Tanzania Mainland, at 45 deaths versus 38 deaths per 1000 pregnancies [6]. The perinatal mortality rate was higher in urban than rural areas by 49 deaths versus 33 deaths per 1,000 pregnancies.

Several factors are associated with increased risk of perinatal mortality in developing countries, including inadequate antenatal care (ANC), limited access to skilled birth attendants, poor referral systems, cultural and social barriers, and complications such as antepartum haemorrhage, infections, maternal hypertensive disorders and delivery complications, preterm birth, and sepsis [7].

The profound consequences of perinatal deaths include increased parents' anxiety, perceived stress, emotional vulnerability, and decreased confidence in the outcome of future pregnancies, posing significant social and economic burdens on families and communities [8]. Similarly, Posttraumatic stress disorder (PTSD) following the perinatal deaths was found to be linked with physical and mental discomfort, such as suicidal ideas, depression, eating disorders, and significant others [9].

While Tanzania has implemented various initiatives to reduce perinatal mortality, such as the Maternal and Perinatal Death Surveillance and Response (MPDSR) program and the Tanzania Health Sector Plan V, and invested in improving maternal and child health services, expanding access to medications and health goods, increasing the number of specialized gynecologists and midwifery professionals, and improving access to the services of the championship and top experts in the fields of mother and child health and reproduction [10].

Despite improvements, Tanzania has yet to reach the Sustainable Development Goal of reducing perinatal, neonatal, and maternal mortality rates through various programs and strategies. This persistent issue remains high in Tanzania, particularly in areas such as the Igunga district, which has a high delivery rate in the Tabora region. The prevalence and factors associated with perinatal death in the Igunga district remain unclear [11]. Little research has been conducted on prenatal mortality in the Tabora region and Igunga District, making it difficult to customize interventions to this community's specific concerns.

Addressing perinatal mortality is critical for individual families and the broader community health landscape, as its consequences extend to emotional, social, and economic elements.

This study aims to determine the prevalence of perinatal death and identify factors associated with perinatal death at Igunga District Hospital. The results would be a bridge toward addressing the challenges associated with perinatal deaths in Igunga and Tanzania at large.

2. Material and Methods

2.1. Study Design

The study employed a retrospective cross-sectional design in a hospital setting. This approach helped in analyzing past medical information, facilitated data collection, enabled the assessment of prevalence and associated risk factors, minimized costs and time, while increasing the potential sample size. Furthermore, provided preliminary evidence for future research, minimized recall bias, and addressed ethical considerations surrounding participant safety [12].

2.2. Study Area

The study was conducted at Igunga District Hospital in the Tabora region. The Igunga District covers an area of 6,912 square kilometers and is bordered by the Kishapu District to the North, the Iramba District to the East, the Uyui District to the South, and the Nzega District to the West. It is one of the 7 districts of the Tabora region since its inauguration in 1975. It has a population of 546,204 people with an annual growth rate of 2.1% [13].

The residents of Igunga engage in economic activities, including livestock keeping and crop production. They cultivate maize, rice, millet, groundnuts, cassava, sweet potatoes, and legumes as subsistence crops. Cash crops are cotton and groundnuts. Livestock commonly kept are cattle, shoats, chickens, donkeys, cats, and dogs. The income per capita is currently estimated at TZS 460,000, which is equivalent to US$214 based on an exchange rate of TZS 2,150 per US dollar [14]. Additionally, the average daily income is $1.50, calculated using an exchange rate of TZS 3,609.08.

Health services in the Igunga district are provided by government and non-governmental facilities, including the private sector and Faith-Based Organizations (FBOs). Statistically, Igunga District has 2 hospitals Igunga District Hospital, Nkinga Referral Hospital, 4 Health Centers, Igurubi, Simbo, Choma, and Nanga Health Centre, and 61 dispensaries [15]. Practically, Igunga District Hospital is following the Maternal and Perinatal Death Surveillance and Response Guideline 2019, adopted by the Tanzania Ministry of Health, which aims to control events associated with maternal and perinatal deaths. This study area was chosen because the Hospital had a high delivery rate in the region, where, according to DHIS2 (2024), there were 21,539 total deliveries per year. This high delivery rate implied increased demand for maternal healthcare and newborn services at the facility. Thus, conducting this study gave insight into maternal health and newborn services [16].

2.3. Study Population

The study population comprised all newborns who died between December 2024 and January 2020 and were documented in the perinatal forms at Igunga District Hospital. All available files with complete information on perinatal deaths during this period were reviewed to identify the specific causes of perinatal mortality.

2.3.1. The Inclusion and Exclusion Criteria

- Inclusion Criteria: All fetal death files from 28 weeks of gestational age or more to 7 days of life were selected.
- Exclusion Criteria: All files with incomplete data were excluded from this study.

2.4. Sample size

A retrospective cross-sectional study employed a convenience sampling method, utilizing all available files with complete information on perinatal deaths to identify specific causes of perinatal death at Igunga Hospital. All file of perinatal deaths between December 2024 to January 2020 were reviewed [17]. From these, 365 files that met the inclusion criteria containing complete information on maternal characteristics, fetal details, socio-demographic data, and facility-related factors were selected for analysis. The records were obtained from the office of the matron and the District Reproductive and Child Health Coordinator (DRCHCO). All files reviewed by the perinatal death committee were included in the study, with those containing complete information being selected [18].

2.5. Sampling Technique

All perinatal death files from December 2024 to January 2020 were reviewed and checked for completeness of information [19]. Those files with missing data were excluded, and then files with complete information were reviewed for data collection.

The researcher considered gathering information from various sources, including DHIS2, perinatal death files, and the MTUHA book, to gain a more comprehensive understanding of perinatal deaths. This approach aimed to mitigate bias that could arise from relying on a single source and to capture a broader range of information. By utilizing multiple sources, the researcher sought to lower the potential for systematic errors.

2.6. Study Variable

2.6.1. Dependent Variable

The primary outcome was measured as the incidence of perinatal deaths (MSB) (FSB) and Early neonatal deaths. Igunga District Hospital [20]. The rate of early neonatal deaths was also assessed, which were defined as the deaths of live births within the first seven days of life. We expressed this data as the number of deaths per 1,000 live births in a given year.

2.6.2. Independent variable

Social demographic factors and community variables included household wealth, maternal education, race, cultural background, and place of residence. Health facility-related factors, environmental risks, and behavioral variables encompass health-seeking behavior. Obstetric risk factors involved the mother's age, number of previous children, weight, and medical conditions [21]. Fetal variables comprised sex, gestational age, birth weight, and time of birth. Obstetric complications included obstructed labor and maternal infections.

2.7. Data Collection Tool and Procedure

The data abstraction tools (questionnaire) were effectively used to extract data from registries and medical files of perinatal who had been registered at Igunga District Hospital. This tool was adapted from the WHO, an established technical working group on perinatal death classification, which included professionals from both developing and developed countries to prepare a standard guide for capturing information relating to perinatal deaths [22]. The standard method for gathering data on perinatal mortality was based on ICD-10 and was developed through a consultative process.

The original tool was designed to provide a standardized approach for capturing maternal, fetal, and facility-related information on perinatal deaths. For this study, the tool was modified to suit the local context of Igunga District Hospital. Specifically, variables on maternal age, occupation, education, parity, antenatal care (ANC) attendance, and labor and delivery-related conditions were retained, while additional sections on socio-demographic characteristics, health facility factors, and availability of newborn resuscitation services were incorporated. Sections that were not applicable to the hospital setting, such as those requiring advanced diagnostic tests unavailable at the facility, were excluded. The final

tool therefore comprised four sections: maternal characteristics, fetal and newborn details, socio-demographic information, and facility-related factors [23].

The rationale for tool selection was based on its appropriateness for the study objectives, ease of use in the clinical setting, and capacity to yield reliable and valid data. The tool included multiple sections that covered a wide range of relevant variables related to perinatal health. By ensuring that all pertinent factors are considered, the tool enhances the validity of the data by providing a holistic view of the circumstances surrounding perinatal health [24]. The Research Assistants (RAs) gathered data. A team of three (3) RAs was expected to cover the workload, trained healthcare professionals such as nurses or midwives, and public health experts were responsible for collecting data. Before data collection, all RAs received training, and the anticipated duration of the training program was three days.

This training covered the research objectives, provided guidance on ethically handling sensitive patient data, and emphasized that each tool section received special attention to ensure clear explanations were provided when needed.

2.8. Ethical Issues and Ethical Considerations

Ethical clearance and permission for the waiver of participant consent were obtained from the Directorate of Research and Publication at Muhimbili University of Health and Allied Sciences (MUHAS) with Ref. No.DA.282/298/01.c/2689 attached to Appendix 2. This study did not involve direct contact with the patient. Administrative permission to conduct the study in a designated area was obtained from the District Executive Director (DED) and the administration of Igunga District Hospital. The reference number for this permission is AC.54/218/01/478, which is attached as Appendix 4 [25].

To maintain privacy and confidentiality, structured questionnaires did not include the names of participants or any information that could directly identify them. All collected data were stored in a computer system that used a strong password.

3. Results

3.1. Social Demographic Characteristics

A total of 365 files with complete information were included in the study. The mean age was 26.7 years with a standard deviation of 7.3 years. The majority (64.7%) were aged 20–35 years, followed by 20.8% aged 15–19 years, and 14.5% aged 36– 45 years. Most participants had primary education (67.4%), while 22.5% had no formal education, and only 10.1% attained secondary education.

Regarding occupation, the majority were farmers or peasants (73.2%). A large proportion of the participants were married (94.0%). In terms of delivery characteristics, 98.6% gave birth at a health facility, with very few reporting home births (0.5%) or births before arrival (0.8%). Most deliveries occurred between 37 and 40 weeks of gestation (69.9%), while 24.7% delivered before 37 weeks and 5.5% after 40 weeks. Antenatal care attendance was relatively balanced, with 51.8% attending more than three visits (Table 1)

Variable	Frequency	Percentage
Age group (Years)		
15-19	76	20.8
20-35	236	64.7
36-45	53	14.5
Mean (SD)	26.7	7.3
Level of education		
No formal education	82	22.5
Primary level	246	67.4
Secondary level	37	10.1
Occupation		
Business & Employed	26	7.1
Farmer / Peasant	267	73.2
Housewife	72	19.7
Marital status		
Marriage	343	94.0
Not in marriage	22	6.0
Socioeconomic status		
Low	338	92.6

High	27	7.4
Place of delivery		
Birth before arrival (BBA)	3	0.8
Health facility	360	98.6
Home	2	0.5
Parity		
Para 1	93	25.5
Para 2-4	142	38.9
Para>=5	130	35.6
Gestation age (Weeks)		
<37	90	24.7
37-40	255	69.9
>40	20	5.5
ANC visits		
1-3	176	48.2
>3	189	51.8
Residence		
Urban	76	20.8
Rural	289	79.2

Table 1: Social Demographic Characteristics (n=365)

3.2. Prevalence Rate of Perinatal Deaths at Igunga District Hospital in Tabora Region

The total perinatal death counts from 2024 to 2020 were 1742, macerated stillbirth (MSB) 916, fresh stillbirth (FSB) 451, and early neonatal death (END) 375 for a total of 110,595. The perinatal mortality rate at Igunga District Hospital stands at 15.8 deaths per 1000 live births. Between 2024 and 2020, the perinatal death rate in the population exhibited notable fluctuations [26]. The highest perinatal death rate was observed in 2022 (21.0 per 1,000 deliveries), driven by a peak in both MSB (9.5), FSB (4.4) rates, and END (8.2) rates. In contrast, the lowest perinatal death rate occurred in 2020 (12.7 per 1,000). The high number of cases reported in 2022 was due to the recruitment of a data officer responsible for documenting all perinatal deaths. In contrast, the low prevalence in 2020 was due to underreporting caused by weak data collection systems and limited documentation of perinatal deaths. While MSB rates remained relatively high throughout the period, peaking in 2021 and stabilizing at 8.2 in both 2022 and 2024, the FSB rate showed a steady decline from 5.7 in 2021 to 3.3 in 2024 [27].

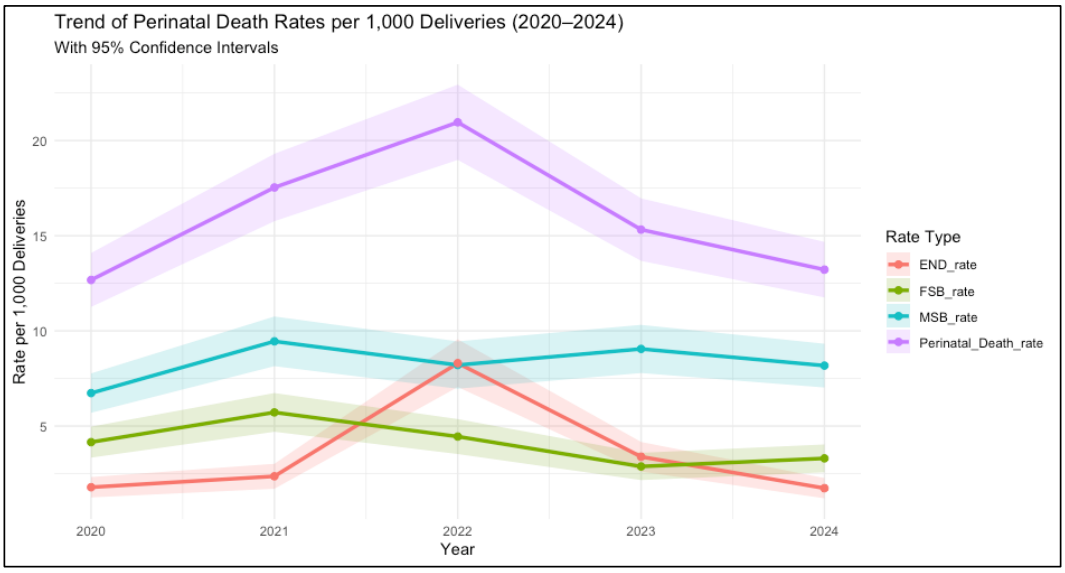

Figure 1: The Trend of Perinatal Death in Igunga District from 2024 to 2020

3.3. Maternal Factors Associated with Perinatal Death

Out of 365 files of perinatal deaths, 18.4% had Preterm Premature rupture of membrane (PPROM/PROM), 15.9% Maternal HTN &its complications, 14.0% Gland Multiparity, 12.6% antepartum hemorrhage, 11.8% maternal Sepsis, and 8.5% anemia. Only 0.5% had Cephalopelvic disproportion (CPD).

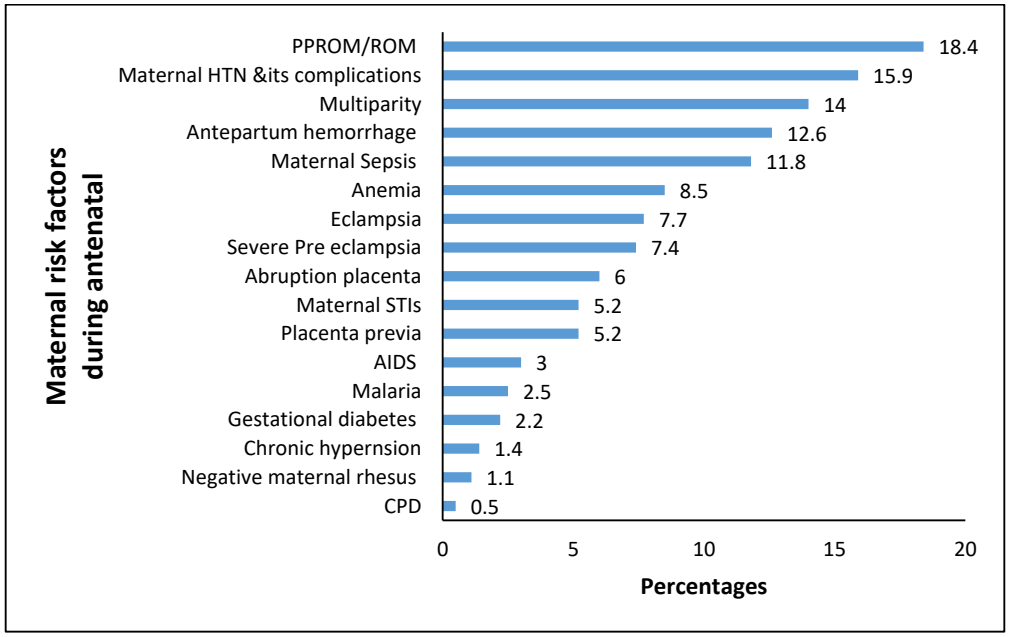

Figure 2: Maternal Factors Associated with Perinatal Deaths

Out of 365 files of perinatal deaths,21.4% had prolonged labor, 21.1% had fetal distress, and 17.5% had difficult labor. Only 0.3% had malpresentation.

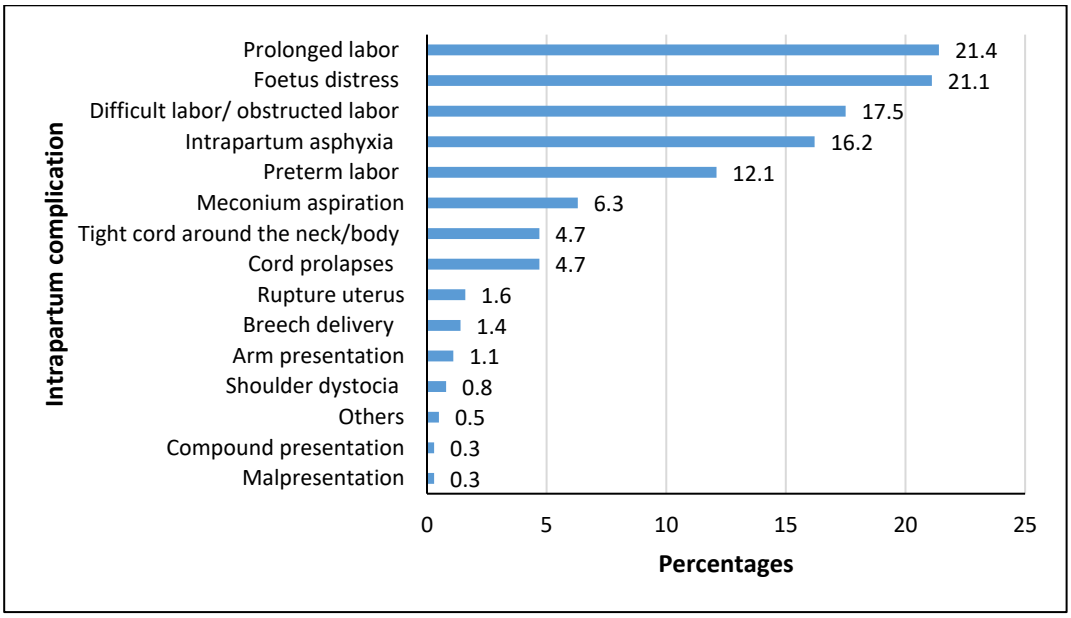

Figure 3: Intrapartum Complication

Out of 167 early neonatal deaths, 48.8% had birth asphyxia before death, followed by cyanosis at 9.6%, and neonatal sepsis at 8.8%. Only 0.5% had severe vomiting.

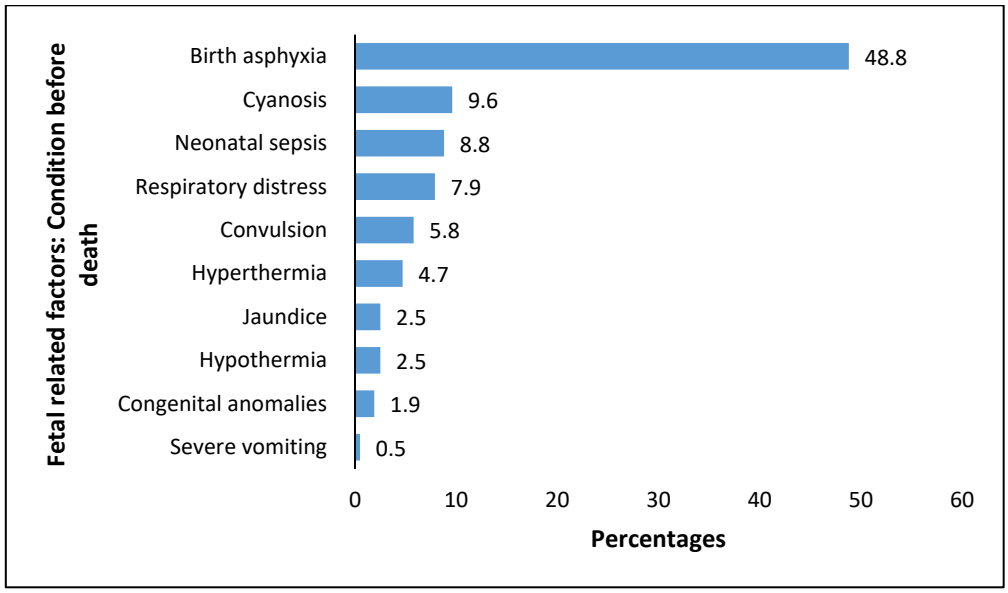

Figure 4: Causes of Death for Early Neonatal Death (Condition Before Death)

Out of 365 files of perinatal deaths, birth asphyxia accounts for 50.4%, followed by prematurity 12.6%, neonatal sepsis 8.8%, and respiratory distress syndrome 4.9%.

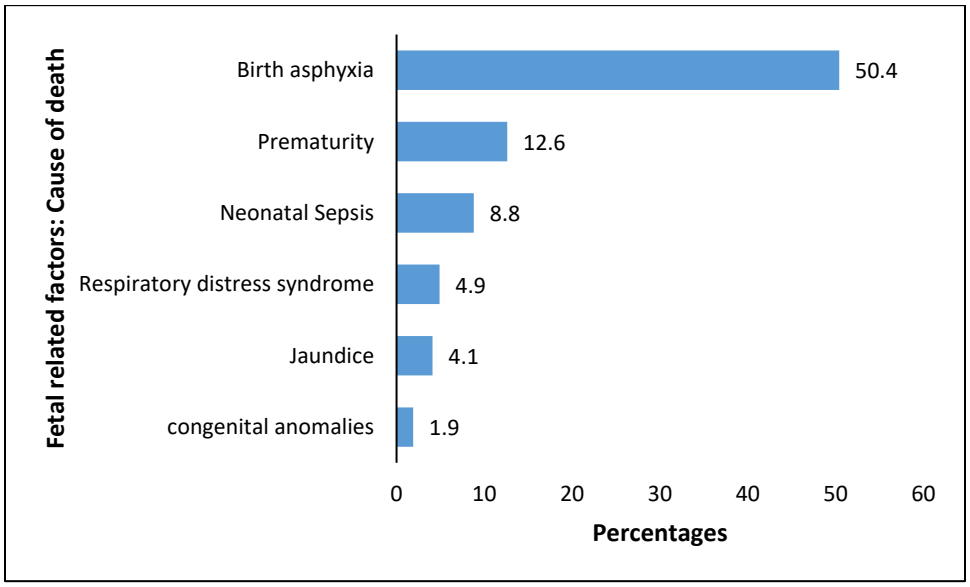

Figure 5: Fetal-related Factors Associated with Perinatal Death

Facility-related factors associated with perinatal deaths indicated that Out of 365 files of perinatal deaths 77.3% were delayed in receiving appropriate care, 43.0 were delayed in decision-making, and 9.9% were due to unskilled personnel.

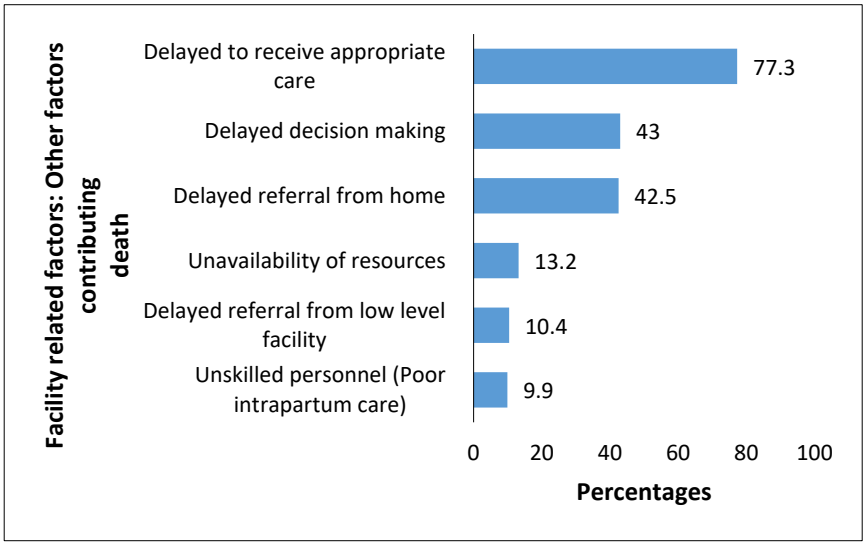

Figure 6: Facility-Related Factors (Other Contributing Factors)

3.4. Bivariate Analysis of Factors Associated with Perinatal Deaths in Igunga District

Chi-square analysis revealed several statistically significant associations between maternal, fetal, and healthcare-related factors and perinatal outcomes. Among the 365 perinatal records reviewed, 80 cases (21.9%) were fresh stillbirths (FSB), 118 cases (32.3%) were macerated stillbirths (MSB), and 167 cases (45.8%) were early neonatal deaths.

Maternal age showed a marginal association with perinatal outcomes (p=0.063), with adolescents aged 15–19 having a higher proportion of live births compared to older mothers. Significant differences were also observed across socio-demographic and obstetric factors. Occupation was significantly associated with outcomes (p=0.021); women engaged in business or formal employment had a higher likelihood of delivering live infants, while those working as peasants or housewives experienced more stillbirths. Socio-economic status (p=0.026) and place of residence (p=0.013) were also important predictors. Women from high-income households and those living in urban areas had better perinatal outcomes, with a greater proportion of live births, compared to those from low-income or rural backgrounds who faced higher stillbirth rates [28]. Antenatal care (ANC) attendance showed a strong association with outcomes. Women who attended more than three ANC visits were significantly more likely to have live births (p<0.001), compared to those with fewer visits, who were more likely to experience adverse outcomes.

Higher parity and post-term gestation (beyond 40 weeks) were significantly associated with increased rates of stillbirth (p=0.002 and p<0.001, respectively), compared to lower parity and term pregnancies, which were more likely to result in live births. Similarly, the mode of delivery (p<0.001) and duration of labor (p<0.001) were strongly associated with perinatal outcomes, vaginal deliveries and shorter labor durations were more often linked to live births, while prolonged labor and certain delivery modes were associated with stillbirths. Maternal antenatal risk factors (p<0.001) and intrapartum complications (p<0.001) also showed strong associations; mothers without complications were significantly more likely to deliver live infants. The timing of membrane rupture (p=0.003) and delays in seeking care (p<0.001) were critical factors; early rupture and prompt care-seeking behavior were more common in cases of live birth. Birth weight was another significant predictor (p=0.028), with normal and higher birth weights more often linked to survival [29]. The Apgar score emerged as a particularly strong predictor of outcome (p<0.001); all babies scoring between 7–10 survived, while the majority of those scoring 0–3 resulted in stillbirth. In contrast, the sex of the baby (p=0.227) and multiple pregnancies (p=0.963) did not show a significant association with perinatal outcomes, indicating similar risks across both male and female infants and between single and multiple gestations.

Variables	END n(%)	FSB n(%)	MSB n(%)	p-value
Total	**167(45.8)**	**80(21.9)**	**118(32.3)**	
Social demographic factors				
Age group (Years)				0.063
15-19	45 (59.2)	15 (19.7)	16 (21.1)	
20-35	98 (41.5)	56 (23.7)	82 (34.7)	

36-45	24 (45.3)	9 (17.0)	20 (37.7)	
Level of education				0.211
No formal education	35 (42.7)	16 (19.5)	31 (37.8)	
Primary level	110 (44.7)	55 (22.4)	81 (32.9)	
Secondary level	22 (59.5)	9 (24.3)	6 (16.2)	
Occupation				0.021
Business	18 (69.2)	4 (15.4)	4 (15.4)	
Farmer / Peasant	110 (41.2)	66 (24.7)	91 (34.1)	
Housewife	39 (54.2)	10 (13.9)	23 (31.9)	
Marital status				0.587
Marriage	156 (45.5)	74 (21.6)	113 (32.9)	
Not in marriage	11 (50.0)	6 (27.3)	5 (22.7)	
Socioeconomic status				0.026
Low	148 (43.8)	76 (22.5)	114 (33.7)	
High	19 (70.4)	4 (14.8)	4 (14.8)	
Residence				0.013
Urban	43(56.6)	19(25.0)	14(18.4)	
Rural	124(42.9)	61(21.1)	104(36.0)	
Maternal-related factors				
Place of delivery				0.313
Birth before arrival (BBA)	3 (100.0)	0 (0.0)	0 (0.0)	
Health facility	162 (45.0)	80 (22.2)	118 (32.8)	
Home	2 (100.0)	0 (0.0)	0 (0.0)	
ANC visits				<0.001
1-3	63 (35.8)	39 (22.2)	74 (42.0)	
>3	104 (55.0)	41 (21.7)	44 (23.3)	
Parity				0.002
Para 1	54 (58.1)	19 (20.4)	20 (21.5)	
Para 2-4	60 (42.3)	40 (28.2)	42 (29.6)	
Para>=5	53 (40.8)	21 (16.2)	56 (43.1)	
Gestation age (Weeks)				<0.001
<37	34 (37.8)	13 (14.4)	43 (47.8)	
37-40	125 (49.0)	65 (25.5)	65 (25.5)	
>40	8 (40.0)	2 (10.0)	10 (50.0)	
Mode of delivery				<0.001
Cesarean section	38 (55.9)	25 (36.8)	5 (7.4)	
Spontaneous Vertex Delivery	129 (43.4)	55 (18.5)	113 (38.0)	
Duration of the labour				<0.001
Normal labour	108 (39.7)	49 (18.0)	115 (42.3)	
Prolonged labour	59 (63.4)	31 (33.3)	3 (3.2)	
Maternal risk factors during antenatal				<0.001
Yes	114 (40.7)	56 (20.0)	110 (39.3)	
No	53(62.3)	24(28.2)	8(9.4)	
Intrapartum complication				<0.001
Yes	141 (64.4)	66 (30.1)	12 (5.5)	
No	26(17.8)	14(9.6)	106(72.6)	
The time when the membranes ruptured				0.003

Rupture before 37 gestation weeks	27 (36.5)	11 (14.9)	36 (48.6)	
Ruptured after 37 weeks before labour	19 (37.3)	17 (33.3)	15 (29.4)	
Ruptured during labour	121 (50.4)	52 (21.7)	67 (27.9)	
Time to seek care				<0.001
Delayed referral from home	3 (100.0)	0 (0.0)	0 (0.0)	
Delayed until complications occur	34 (23.1)	36 (24.5)	77 (52.4)	
Reach on time before labor	130 (60.5)	44 (20.5)	41 (19.1)	
Fetal-related factors				
Sex				0.227
Female	60 (41.7)	30 (20.8)	54 (37.5)	
Male	107 (48.4)	50 (22.6)	64 (29.0)	
In multiple pregnancy				0.963
Yes	12 (48.0)	5 (20.0)	8 (32.0)	
No	155(45.6)	75(22.1)	110(32.3)	
Birth weight				0.028
Less than 2500	27 (39.1)	9 (13.0)	33 (47.8)	
2500-3500	111 (47.8)	57 (24.6)	64 (27.6)	
Above 3500	29 (45.3)	14 (21.9)	21 (32.8)	
Apgar score				<0.001
0-3	23 (10.5)	79 (36.1)	117 (53.4)	
4-6	106 (98.1)	1 (0.9)	1 (0.9)	
7-10	37 (100.0)	0 (0.0)	0 (0.0)	

Table 2: Bivariate Analysis of Factors Associated with Perinatal Deaths

Multivariable Modified Poisson regression to identify factors associated with perinatal deaths.

In the multivariable modified Poisson regression analysis, several factors were significantly associated with perinatal death. Women aged 36–45 years had a higher risk of perinatal death compared to those aged 15–19 (aPR: 1.08; 95% CI: 1.01–1.16; p =0.027). Mothers with secondary education had a higher risk of perinatal death compared to those with no formal education (aPR: 1.29; 95% CI: 1.09–1.54; p =0.003).

Perhaps, it may reflect unmeasured confounding factors such as delays in referral, healthcare system barriers, or cultural practices not captured in the dataset. High socio-economic status was significantly protective against perinatal death compared to low socio-economic status (aPR: 0.53; 95% CI: 0.53–0.53; p<0.001), indicating better access to quality care and health resources among wealthier families. while rural residence was associated with increased risk of perinatal death compared to their urban counterparts (aPR: 1.19; 95% CI: 1.09–1.29; $p < 0.001$), likely due to limited access to timely and quality maternal health services. Attending more than three ANC visits significantly reduced the risk of perinatal death compared to attending fewer visits (aPR: 0.82; 95% CI: 0.72–0.94; p =0.004), emphasizing the importance of adequate prenatal monitoring. Post-term pregnancies (over 40 weeks) were associated with a higher risk of perinatal death compared to term (aPR: 1.15; 95% CI: 1.11–1.21; $p < 0.001$), and the presence of intrapartum complications (aPR: 2.06; 95% CI: 1.50–2.82; $p < 0.001$) was strongly associated with increased risk [30]. Additionally, Spontaneous vertex delivery (normal vaginal delivery) was associated with a lower risk of perinatal death compared to other modes of delivery (aPR: 0.96; $p = 0.023$). Other variables, including marital status, parity, sex of the baby, and birth weight, were not significantly associated with perinatal death.

Variable	aPR(95% CI)	p-value
Age group (Years)		
15-19	1	
20-35	1.17(0.76-1.78)	0.476
36-45	1.08(1.01-1.16)	0.027
Level of education		
No formal education	1	

Primary level	1.09(0.73-1.61)	0.684
Secondary level	1.29(1.09-1.54)	0.003
Marital status		
Not in marriage	1	
Marriage	0.95(0.42-2.13)	0.892
Socioeconomic status		
Low	1	
High	0.53(0.53-0.53)	<0.001
Residence		
Urban	1	
Rural area	1.19(1.09-1.29)	<0.001
ANC visits		
1-3	1	
>3	0.82(0.72-0.94)	0.004
Parity		
Para 1	1	
Para 2-4	1.09(0.57-2.09)	0.799
Para>=5	1.02(0.51-2.04)	0.945
Gestation age (Weeks)		
<37	1	
37-40	1.1(0.83-1.45)	0.514
>40	1.15(1.11-1.21)	<0.001
Mode of delivery		
Cesarean section	1	
Spontaneous Vertex Delivery	0.96(0.93-0.99)	0.023
Labor duration		
Normal	1	
Prolonged labour	0.87(0.79-0.96)	0.005
Maternal risk factors during antenatal		
No	1	
Yes	1.22(0.97-1.54)	0.084
Intrapartum complication		
No	1	
Yes	2.06(1.5-2.82)	<0.001
The time when the membranes ruptured		
Rupture before 37 gestation weeks	1	
Ruptured after 37 weeks before labor	1.05(0.7-1.57)	0.821
Ruptured during labor	0.81(0.55-1.2)	0.292
Sex of the baby		
Male	1	
Female	1.06(0.7-1.6)	0.796
In multiple pregnancy		
No	1	
Yes	1.03(0.89-1.19)	0.697

Birth weight		
Less than 2055	1	
2500-3500	1.12(0.83-1.52)	0.456
Above 3500	1.11(0.9-1.37)	0.316

Table 3: Multivariable Poisson Regression to Identify Factors Associated with Perinatal Deaths

4. Discussion

This study examined the prevalence and determinants of perinatal deaths at Igunga District Hospital. The findings are discussed in relation to national data, global evidence, and local health system realities, highlighting key maternal, fetal, and health service factors influencing outcomes. Implications for public health and clinical practice are also considered [31].

Perinatal deaths remain a public health challenge in resource-limited settings in Tanzania being part. The current study revealed a high prevalence of perinatal deaths (15.8%) at Igunga District Hospital, which is significantly below the national average reported in the Tanzania Demographic and Health Survey, which estimated the perinatal mortality rate at 38 deaths per 1,000 pregnancies. Despite the observed low burden in this setting, there is a need for critical context-specific strategies to address perinatal mortality in rural health facilities [32]. This finding highlights persistent inequalities in maternal and neonatal outcomes between urban and rural settings, reflecting disparities in healthcare access, skilled birth attendance, and timely emergency obstetric care. In this study, sociodemographic characteristics, antenatal clinic attendance, gestation beyond 40 weeks, presence of intrapartum complications, and prolonged labor were significantly associated with perinatal deaths.

The findings indicated that sociodemographic factors were significantly associated with perinatal deaths. Older maternal age was independently associated with increased risk; this finding is consistent with global studies indicating higher obstetric risks in advanced maternal age due to placental dysfunction and coexisting conditions. In Tanzania, where early marriage and repeat childbirths are common, this finding implies a need for targeted reproductive health counseling and services for older women. Notably, women with secondary education had a higher risk of perinatal death, contrary to the protective effect of education widely documented [33]. This inconsistency may reflect the underlying quality of care disparities or delayed health-seeking behavior among educated women who expect better services, suggesting a gap in perception versus actual service readiness in rural health systems.

Higher socioeconomic status was protective against perinatal death, aligning with existing evidence that income affects health-seeking behavior, nutritional status, and timely facility delivery.

However, this finding contrasts with the Tanzania Demographic and Health Survey (TDHS), which reported that perinatal mortality increases with wealth, from 26 deaths per 1,000 pregnancies among the poorest to 55 per 1,000 among the richest . Additionally, rural residence was associated with a higher risk, reinforcing the urban-rural divide in maternal health outcomes observed across sub-Saharan Africa. These findings emphasize the need to strengthen rural health systems, particularly referral networks and transport infrastructure, in settings like Tabora to reduce delays in accessing care.

Antenatal care attendance of more than three visits significantly reduced the risk of perinatal death, supporting WHO recommendations for regular ANC to monitor maternal and fetal health, manage risk factors, and plan for safe delivery. This finding is consistent with Tanzanian data showing that improved ANC coverage correlates with better perinatal outcomes and another study conducted in Delta Medical College & Hospital, Dhaka, Bangladesh, from March 2023 to August 2023, which further suggested that adequate antenatal care significantly reduces adverse perinatal outcomes. The implication for public health is the need to enhance ANC quality and ensure that women not only attend but also receive comprehensive risk screening and education during visits.

Among obstetric-related variables, gestation beyond 40 weeks, presence of intrapartum complications, and prolonged labor were significantly associated with perinatal deaths. Post-term pregnancies are known to increase the risk of fetal distress and stillbirth, particularly in settings lacking continuous fetal monitoring.

Intrapartum complications doubled the risk of perinatal death in this study, echoing findings from Ethiopia and Nigeria that emphasize the role of emergency obstetric care. Strengthening labor ward readiness, training of birth attendants, and timely cesarean sections are urgent priorities to reduce intrapartum-related deaths in Tanzanian health facilities [34].

Fetal characteristics such as birth weight, sex, and multiple pregnancies did not significantly influence outcomes in this study, suggesting that systemic and maternal factors are stronger drivers of perinatal mortality in this context. However, a strong predictive relationship was found between Apgar scores and survival, reinforcing its continued relevance as a low-cost, effective tool for assessing newborn viability.

This highlights the need to train midwives and clinical officers on accurate Apgar scoring and neonatal resuscitation in resource-limited settings.

Lastly, delays in seeking care and receiving timely interventions were key contributing factors. Over 77% of cases experienced delays in receiving appropriate care, and 43% involved delayed decision-making. These align with the "Three Delays Model" commonly used in maternal health literature, which emphasizes the delay in deciding to seek care, reaching care, and receiving adequate care as contributors to adverse outcomes. For the Tanzanian context, these findings imply an urgent need for community-level health education, male involvement in birth preparedness, and investment in emergency transport systems.

4.1. Strengths and Limitations of The Study

4.1.1. Strengths

i. The use of multiple data sources, such as data collected from DHIS2, MTUHA books, and perinatal death files, reduces bias associated with relying on a single source and improves data accuracy.
ii. A comprehensive data collection tool, adapted from WHO standards, ensures the inclusion of all relevant variables related to perinatal care.
iii. A robust retrospective analysis utilizing five years of data offers a comprehensive view of trends and factors associated with perinatal death.
iv. Statistical Rigor, the accuracy of identifying related components was enhanced by employing modified Poisson regression with robust standard errors. This enabled accurate estimation of adjusted prevalence ratios, which are more understandable than odds ratios in cross-sectional studies.
v. **Policy Relevance:** The findings are directly relevant to ongoing national efforts under MPDSR and the Tanzania Health Sector Strategic Plan V (2021–2026).

4.1.2. Limitation

i. **Incomplete Records:** The study acknowledged the challenges of incomplete or missing data in medical records, which necessitated the exclusion of some files and may have affected the thoroughness of the results.
ii. **Retrospective Design Constraints:** The study's design involved analyzing past data, which complicated the determination of cause-and-effect relationships between certain factors and perinatal deaths.
iii. **Lack of Qualitative Data:** The study mainly focused on quantitative factors and overlooked qualitative insights, such as patient experiences and provider perspectives, which could have improved the understanding of delays and health-seeking behavior.
iv. **Hospital-based Scope:** the findings are limited to a single facility (Igunga District Hospital), which restricts their applicability to the wider population in Tabora or Tanzania as a whole.

5. Conclusion

This study highlights a persistently high burden of perinatal mortality in Igunga District, Tanzania, with birth asphyxia, prematurity, and neonatal sepsis identified as the leading causes. Key issues such as maternal, fetal, and healthcare-related factors such as inadequate antenatal care attendance, intrapartum complications, delayed decision-making, and rural residence significantly influenced perinatal outcomes. The findings underscore the importance of improving maternal health services through early risk identification, strengthening emergency obstetric and neonatal care, and addressing health system and socioeconomic disparities. Targeted interventions at both the community and facility levels are essential to reduce preventable perinatal deaths and improve neonatal survival rates in similar low-resource settings. This study also fills a critical knowledge gap for the Tabora region and lays a foundation for evidence-based interventions tailored to rural Tanzanian settings.

Recommendations

Based on research findings, the following are recommended;

1. The hospital management team at Igunga District Hospital is to establish regular perinatal death reviews (PDRs) by institutionalizing routine maternal and perinatal death surveillance and response (MPDSR) meetings to analyze causes of death and propose actionable changes.
2. Improve Referral systems by strengthening linkages and timely communication with low-level health facilities to reduce delays in accessing emergency care.
3. Strengthen antenatal care programs by increasing Community awareness of the importance of attending at least four Antenatal care (ANC) visits during pregnancy. Health education should emphasize early booking and consistent follow-up to identify and manage maternal and fetal risk factors.
4. Enhance Emergency Obstetric and Neonatal Care by equipping rural health facilities with the necessary tools, supplies, monitoring (e.g., fetal dopplers, partographs), neonatal care (e.g., incubators, resuscitation kits), and skilled personnel to handle intrapartum complications promptly. Clinical audits, including regular audits of labor management, cesarean decision-making, and neonatal resuscitation practices, should be introduced to identify clinical gaps.
5. 5.For Health Workers to conduct ongoing clinical training by providing targeted in-service training on emergency obstetric and newborn care (EmONC), particularly for managing birth asphyxia, sepsis, and complications of prematurity. Enhance the Use of Protocols by ensuring consistent use of partographs, ANC cards, and risk screening tools to detect complications early.
6. Improve attitude and responsiveness by promoting compassionate, respectful maternity care to encourage facility deliveries and timely health-seeking.
7. Early recognition of risk, midwives and clinicians must be vigilant in identifying maternal risk factors (e.g., post-term pregnancy, hypertensive disorders) during antenatal care.
8. Enhance Community-Based Health Education by promoting awareness campaigns on danger signs in pregnancy and childbirth, proper birth preparedness, and the need to seek timely care. Engaging male partners and community leaders may increase the impact and reach of such interventions.
9. Government and Policymakers, to address socioeconomic and geographical inequities by implementing targeted

interventions to support women in rural and low-income communities, such as conditional cash transfers or transport vouchers, which have proven effective in improving maternal health service utilization. Invest in maternal transport by strengthening ambulance services and mobile outreach programs to improve access in remote areas.

10. Support community health workers (CHWs), scale up CHW programs to deliver health education, and conduct home visits, especially in hard-to-reach rural settings.
11. Encourage further research to assess qualitative studies to explore barriers to care-seeking behavior, decision-making among women and families, and healthcare worker experiences, and evaluate the quality of ANC and intrapartum monitoring using observational and facility-based assessments.

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Conflict of Interest

The authors affirm that they have no financial conflict of interests or personal relationships that could be perceived as influencing the findings presented in this paper.

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