A COMPARATIVE ANALYSIS OF MATERNAL MORTALITY IN FEDERAL MEDICAL CENTRE MUBI AND PRIMARY HEALTH CARE CENTERS IN MUBI NORTH AND MUBI SOUTH LOCAL GOVERNMENT AREAS OF ADAMAWA STATE

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Keywords

Maternal mortality, Three Delays Model, haemorrhage, hypertensive disorders, health care delivery

Abstract

Research Problem: *Maternal mortality remains a major public health concern in Nigeria, with the country ranking among those contributing most to global maternal deaths. In Adamawa Stateparticularly in Mubithe situation is aggravated by persistent health system weaknesses, poor access to skilled maternal care, and sociocultural barriers.*

Methods/Theory: *The study was guided by the Three Delays Model (Thaddeus & Maine, 1994), which emphasizes delays in decision-making, accessing healthcare, and receiving adequate care as major contributors to maternal mortality. A descriptive survey research design was utilized, involving women of reproductive age and healthcare workers across selected facilities, including FMC Mubi and primary health centres in Mubi North and South. Data were collected using structured questionnaires and analysed using descriptive and inferential statistics.*

Results: *The findings revealed that haemorrhage and hypertensive disorders in pregnancy were perceived as the leading medical causes of maternal mortality, reported by over 80% of respondents. Socioeconomic factors such as unemployment, low income, and limited education further heightened vulnerability among women. Systemic factorsincluding inadequate antenatal surveillance,poor referral systems, and limited emergency obstetric carewere identified as major contributors to preventable maternal deaths.*

Conclusion: *The study concludes that maternal mortality in Mubi is driven by a combination of clinical, socioeconomic, and health system deficiencies. Without addressing the delays in seeking, reaching, and receiving quality maternal care, maternal mortality will remain high despite ongoing interventions.*

Key Contribution to Knowledge: *This research provides empirical evidence on how the Three Delays Model manifests within a low-resource context, highlighting the interplay between medical, social, and structural determinants of maternal mortality.*

Recommendation:*The study recommends strengthening maternal healthcare systems through improved antenatal care services, early detection and management of pregnancy complications, and the establishment of efficient referral networks.*

Introduction

Maternal mortality remains one of the most persistent and deeply rooted global health challenges, disproportionately affecting women in low-resource settings. The World Health Organization (2023) estimates that approximately 295,000 women died in 2022 from pregnancy- and childbirth-related causes, with an overwhelming 94% of these deaths occurring in low-income countries. Sub-Saharan Africa and Southern Asia continue to shoulder the highest burden, underscoring longstanding disparities in access to functional, equitable, and high-quality maternal health services.

A growing body of scholarship has examined the structural and proximal determinants of maternal mortality. For instance, Ganchimeg et al. (2022) and Althabe et al. (2015) establish that socioeconomic inequalitiesparticularly those related to income, education, and geographical access to caresignificantly shape maternal health outcomes. Literature on adolescent pregnancy further reveals heightened vulnerability among girls, especially those under 15, due to physiological immaturity, limited autonomy, and restricted access to skilled maternal care. In addition, Chou (2022) and similar works identify the direct medical causes of maternal mortality, including severe obstetric haemorrhage, hypertensive disorders, sepsis, unsafe abortion, and intrapartum complications. Beyond medical causes, scholars increasingly emphasize indirect determinants such as entrenched poverty, weak health systems, sociocultural norms, and gender-based barriers that inhibit timely utilization of skilled services.

Despite the richness of existing literature, several gaps remain insufficiently addressed. First, most studies tend to examine determinants of maternal mortality in isolation, without exploring how intersecting social, economic, cultural, and health-system factors jointly produce risk in specific local contexts. Second, while global and regional analyses are abundant, there is a scarcity of localized, community-based evidence that interrogates how these determinants manifest in particular demographic and sociocultural environments. Third, research often emphasizes medical causes at the expense of understanding systemic failures such as referral bottlenecks, provider attitudes, decision-making delays at household level, and quality-of-care challenges within peripheral health facilities.

This paper therefore seeks to contribute to the scholarship by bridging these gaps. It interrogates maternal mortality within a more holistic, context-specific framework, connecting structural determinants with the lived maternal health experiences of women in the study area. By critically engaging with existing scholarshipwhile extending it through localized empirical inquirythe study aims to generate evidence that not only advances academic understanding but also supports more targeted policy and programmatic interventions. In doing so, the paper positions itself at the intersection of extending existing scholarship and critiquing its limitations, thereby offering fresh insights into the persistent challenge of maternal mortality.

1.1 Statement of the Problem

Maternal mortality remains one of the most serious global public health challenges and a critical indicator of a nation's healthcare

quality and maternal well-being.Beyond the immediate health loss, maternal deaths create deep social and economic consequences, especially for children who lose maternal care, perpetuating cycles of poverty and poor health outcomes.Although global maternal deaths have declined from 536,000 in 2005 to about 287,000 in 2020, the burden remains disproportionately high in developing countries (WHO, 2023). Nigeria continues to record one of the world's highest maternal mortality ratios (MMR), estimated at 512 deaths per 100,000 live births, representing a lifetime risk of 1 in 22 for Nigerian women compared to 1 in 17,800 in high-income nations such as Ireland and Singapore (NDHS, 2022; World Bank, 2022; UNFPA, 2023).

In Adamawa State, particularly in Mubi, maternal mortality remains persistently high due to poverty, weak health infrastructure, delayed referrals, and a shortage of skilled health professionals.

While the Federal Medical Centre (FMC) Mubi offers better medical facilities as a tertiary referral centre, it still records preventable maternal deaths linked to late presentation and limited emergency care capacity. Conversely, Primary Health Care (PHC) centres face more severe constraints, including the absence of trained personnel, essential obstetric equipment, and blood transfusion services.Despite national interventions such as the Midwives Service Scheme (MSS), Safe Motherhood Initiative, and SURE-P Maternal and Child Health (MCH) programme, progress in reducing maternal deaths in Adamawa State remains slow and inconsistent. Persistent systemic gaps and sociocultural barriers hinder sustained improvement.This study therefore aims to comparatively analyze maternal mortality determinants at FMC Mubi and selected PHCs in Mubi North and South, identifying medical, systemic, and socio-demographic factors driving these deaths and providing evidence-based recommendations to improve outcomes at both levels of care.

1.2 Objective of the Study

The broad objective of the study is to compare maternal mortality in Federal Medical Centre Mubi and Primary Health Care Centres in Mubi North and Mubi South Local Government Areas of Adamawa State. The specific objectives are to:

Determine the influence of access to quality of maternal health care services on maternal mortality at both FMC and PHC levels.

Determine the relationship between educational status and the risk of maternal mortality in Mubi.

2.0 Literature Review

2.1.1 Conceptualization

2.1.1.1 Maternal Mortality

Maternal mortality remains one of the most critical global health indicators used to assess the effectiveness of a country's healthcare system and the overall well-being of women. It refers to the death of a woman while pregnant or within forty-two days of the termination of pregnancy, regardless of the pregnancy's duration or site, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (World Health Organization [WHO], 2023). The magnitude of maternal mortality is usually measured through the Maternal Mortality Ratio (MMR), which represents the number of maternal deaths per 100,000 live births within a specific time period (UNFPA, 2023). Globally, maternal mortality has declined in the last two decades, yet it remains unacceptably high in low- and middle-income countries. Approximately 287,000 women died in 2020 from pregnancy-related causes, with sub-Saharan Africa

accounting for nearly 70% of these deaths (WHO, 2023; World Bank, 2022).

Maternal mortality arises from direct medical complications such as haemorrhage, sepsis, eclampsia, obstructed labour, and unsafe abortion, as highlighted by Chou (2022). However, these deaths persist largely because weak health systems delay or fail to manage these otherwise treatable conditions. Althabe et al. (2015) expand this view by showing how indirect causes like anaemia, malaria, and HIV/AIDS worsen during pregnancy due to structural vulnerabilities and poor access to preventive care. In Nigeria, these preventable deaths continue because of poverty, sociocultural barriers, inadequate skilled care, and under-resourced facilities, as noted by Herfon (2022). National data (NPC & ICF, 2021) confirm the severity of the problem, with a maternal mortality ratio of 512 deaths per 100,000 live births, making Nigerian women far more likely to die from pregnancy-related causes than women in high-income countries. Braveman et al. (2023) argue that these high death rates reflect deeper social, economic, and gender inequalities. Overall, maternal mortality is not only a health issue but a multidimensional challenge requiring strengthened health systems, improved socio-economic conditions, and better access to quality maternal services.

2.1.1.2 Health Care Delivery System

The health care delivery system refers to the total network of institutions, organizations, resources, and personnel established to promote, restore, and maintain the health of individuals and populations. It encompasses all activities directed toward providing preventive, curative, promotive, and rehabilitative health services (World Health Organization [WHO], 2023). An efficient health care delivery system is structured to ensure equitable access to quality care, adequate infrastructure, and skilled health personnel capable of meeting the population's health needs. In most countries, including Nigeria, the system is organized into three hierarchical levelsprimary, secondary, and tertiary careeach with specific roles and responsibilities (Federal Ministry of Health [FMoH], 2022). The Primary Health Care (PHC) level serves as the foundation and first point of contact for individuals, focusing on preventive and community-based services such as immunization, maternal and child health, and health education. The Secondary Health Care level provides more specialized services, including referral and diagnostic care, while the Tertiary Health Care level, such as Federal Medical Centres (FMCs) and teaching hospitals, offers advanced and specialized medical and surgical services supported by research and training functions (Adewumi & Akinola, 2021; FMoH, 2022).

In Nigeria, the effectiveness of the health care delivery system is often hindered by poor infrastructure, shortage of skilled personnel, inadequate funding, and weak referral linkages between the PHC and higher levels of care (Onwujekwe et al., 2021). The situation is particularly critical in rural and conflict-affected areas such as Adamawa State, where many PHC facilities operate without adequate medical equipment, drugs, or skilled birth attendants. Conversely, tertiary institutions like the Federal Medical Centre (FMC) Mubi provide relatively better access to obstetric and emergency care services but still experience challenges such as overcrowding and delays in referral from PHCs. Strengthening the health care delivery system therefore requires a well-coordinated referral mechanism, community engagement, improved funding, and the integration of maternal health programs across all levels of care (WHO, 2023; Herfon, 2022). An effective system not only reduces maternal and child mortality but also enhances equity and trust in public health institutions.

2.1.1.3 Determinants of Maternal Mortality

The determinants of maternal mortality encompass the broad range of social, economic, medical, and systemic factors that directly or indirectly contribute to the death of women during pregnancy, childbirth, or the postpartum period. Maternal death rarely results from a single cause; instead, it arises from the interaction of multiple determinants that reflect both individual and structural conditions. The World Health Organization (WHO, 2023) categorizes these determinants into medical (clinical) factors, health system factors, and socio-economic and cultural factors. Medical determinants include direct obstetric causes such as haemorrhage, sepsis, eclampsia, obstructed labour, and complications from unsafe abortion, which together account for nearly 75% of maternal deaths globally (Say et al., 2022). Indirect causessuch as malaria, anaemia, HIV/AIDS, and cardiovascular diseasesfurther heighten women's vulnerability, especially in low-income settings.

Beyond clinical conditions, the quality, accessibility, and utilization of health services play crucial roles in determining maternal outcomes. Poor infrastructure, inadequate skilled birth attendants, lack of emergency obstetric care, and weak referral systems contribute significantly to preventable deaths (Campbell & Graham, 2006; Onwujekwe et al., 2021). In Nigeria, studies have shown that delays in seeking, reaching, and receiving adequate careoften referred to as the "Three Delays Model"remain a dominant determinant of maternal mortality (Thaddeus & Maine, 1994; NPC & ICF, 2021). These include delays in recognizing danger signs and deciding to seek care (first delay), delays in reaching an appropriate health facility (second delay), and delays in receiving timely and adequate care once at the facility (third delay). Socio-demographic factors such as low educational attainment, poverty, rural residence, cultural beliefs, and gender inequality also exacerbate maternal risks by limiting women's autonomy and access to health services (Ogunjimi et al., 2023).

Therefore, understanding the determinants of maternal mortality is vital for designing context-specific interventions to reduce maternal deaths. In areas like Mubi North and Mubi South, where both Federal Medical Centre (FMC) and Primary Health Care (PHC) facilities operate, the determinants often vary between the tertiary and primary levels of care due to differences in resource availability, technical capacity, and referral efficiency. Addressing these determinants requires strengthening the health system, empowering women through education, and ensuring that maternal health services are accessible, affordable, and responsive to local needs (UNFPA, 2023; WHO, 2023).

2.2 Theoretical Framework

The study adopts three delays model. The Three Delays Model, developed by Thaddeus and Maine (1994), serves as one of the most widely used frameworks for analyzing maternal mortality, particularly in low- and middle-income countries. The model posits that maternal deaths are largely due to delays occurring at three critical stages of seeking and receiving maternal health care. The first delay refers to the delay in deciding to seek medical care, often caused by limited awareness of danger signs, sociocultural norms, low educational attainment, and lack of decision-making autonomy among women. The second delay is the delay in reaching an appropriate health facility, which is influenced by geographic distance, poor transportation systems, and financial constraints. The third delay involves the delay in receiving adequate and timely care at the health facility, often due to shortages of skilled personnel, inadequate medical supplies, and weak emergency

response systems. Together, these delays explain why maternal deaths persist even where health services exist (Thaddeus & Maine, 1994; Gabrysch & Campbell, 2009).

The strength of the Three Delays Model lies in its comprehensive and practical approach to identifying the different barriers that contribute to maternal mortality. It integrates individual, community, and health system factors, allowing policymakers and researchers to pinpoint where interventions are most needed. The model's structure makes it adaptable to different contexts and useful for evaluating both access and quality dimensions of maternal health care (Pacagnella et al., 2023). It is also particularly effective in guiding interventions aimed at reducing preventable deaths by addressing the "three delays" sequentiallyimproving community awareness, transport infrastructure, and facility readiness.

However, the model also has some weaknesses. It has been criticized for being overly linear, assuming that maternal deaths occur through a fixed sequence of delays, whereas in reality, these delays may overlap or interact dynamically (Knight et al., 2022). Additionally, it does not fully account for broader systemic and policy-level factors such as governance, financing, and social determinants of health, which also influence maternal outcomes. Some scholars argue that the model underemphasizes the role of gender inequality, health financing, and political commitment, which are critical for sustainable improvements in maternal health (Souza et al., 2022).

In the context of this study, the Three Delays Model offers a valuable framework for understanding how barriers at different stages contribute to maternal mortality across Federal Medical Centre (FMC) Mubi and the Primary Health Care (PHC) centres in Mubi North and Mubi South. However, rather than adopting the model mechanically, this study interrogates its assumptions and evaluates its usefulness in explaining maternal outcomes within a decentralized health system like that of Adamawa State.

The first delayfailure to decide to seek carehelps illuminate how community-level factors such as low maternal health awareness, financial constraints, and sociocultural norms shape care-seeking behaviour in PHC catchment areas. Yet, the model tends to treat this delay as an individual or household issue, whereas findings from similar contexts suggest that institutional trust, historical service quality, and gender power dynamics substantially influence this decision. This study therefore extends the model by examining how the perceived reliability of local PHCs affects early decision-making.

The second delay difficulty in reaching a health facilityis particularly relevant in rural Mubi, where poor road networks and lack of transportation often hinder timely referral to FMC. While the model acknowledges geographical barriers, it pays limited attention to how weak referral linkages between PHCs and tertiary facilities exacerbate this delay. This study critiques this limitation and investigates referral coordination as a structural factor not fully captured in the original framework.

The third delayreceiving adequate care upon arrivalhelps differentiate the capacities of PHCs and FMC. FMC, with more skilled personnel and emergency obstetric equipment, is less prone to third delays; however, it may still experience the consequences of accumulated first and second delays from late referrals. PHCs, on the other hand, often struggle with both first and third delays due to inadequate staffing, limited emergency obstetric services, and inconsistent supply of essential drugs.

By interrogating and expanding the Three Delays Model within the local context, this

study contributes to theory development by demonstrating how systemic issuessuch as referral efficiency, historical trust in facilities, and uneven distribution of obstetric resourcesinteract with the model's traditional components. This approach not only refines the analytical relevance of the theory but also guides more context-specific recommendations for improving maternal health outcomes in Adamawa State.

3.0 Methodology

3.1 Research Design

This study adopted a cross-sectional descriptive research design to examine and compare the determinants of maternal mortality in tertiary and primary health care settings. The design was chosen because it allows for systematic assessment of maternal deaths across different healthcare levels within a defined time frame. It facilitates comparison of access to care, demographic characteristics, and institutional factors influencing maternal outcomes (Creswell & Creswell, 2022).

3.2 Study Area

The research was conducted in Mubi, Adamawa State, located in northeastern Nigeria. The study sites include the Federal Medical Centre (FMC) Mubi, a tertiary referral hospital, and selected Primary Health Care (PHC) centres in Mubi North and Mubi South Local Government Areas. Adamawa State covers approximately 36,917 km² and shares borders with Borno, Gombe, Taraba, and Cameroon. The population is largely agrarian, multi-ethnic, and predominantly rural (National Population Commission [NPC], 2021). The inclusion of both FMC and PHCs provides a balanced comparison of advanced and basic maternal healthcare delivery systems.

3.3 Target Populations

The study population comprised women of reproductive age (18–49 years) who accessed care or died from pregnancy-related complications at FMC Mubi and the selected PHCs between January and July 2025. It also included health professionals directly involved in maternal care such as doctors, nurses, midwives, community health extension workers (CHEWs), traditional birth attendants (TBAs), laboratory scientists, and pharmacists.

3.4 Sample and Sampling Technique

A purposive sampling technique was used to select facilities and patient records relevant to maternal mortality. Data from facility-based maternal deaths recorded in antenatal, labour, and postnatal wards were included. The Taro Yamane (1967) formula was used to determine a sample size of 230 respondents, calculated from an estimated population of 828 with a 7% margin of error. Participants were then selected using a systematic random sampling technique, whereby every second case (2nd) on the hospital record was chosen until the sample size was reached.

The sample size for this study will be calculated using Taro, Yamane (1967) method for sample calculation. The formula to be used in determining the sample size of the study will thus be:

$$n = \frac{N}{1 + N\,(e^2)}$$

where n = is the sample size

N = is the population

1 = constant

e^2 = is the desired margin of error (i.e 7% for 93% confidence level)

$$n = \frac{828}{1 + 530\,(0.07^2)}$$

$$n = \frac{828}{1 + 530\,(0.0049)}$$

$$n = \frac{828}{1 + 2.597}$$

$$n = \frac{828}{3.597}$$

= 230 respondents

3.5 Instrument for Data Collection

Both primary and secondary data were used. A structured questionnaire and facility register checklist were employed to gather information on maternal health indicators. The questionnaire captured demographic variables, access to skilled care, causes of death, referral patterns, and institutional characteristics. Secondary data were sourced from hospital records, delivery registers, and maternal death reviews (Polit & Beck, 2021).

3.6 Method of Data Collection

Following ethical clearance and consent, data were collected over two weeks from both FMC Mubi and the selected PHCs. Due to the absence of fully digitized systems, data were manually extracted with assistance from medical records officers. Triangulation was conducted through verification with ward registers to ensure accuracy and completeness (Creswell & Plano Clark, 2022).

3.7 Method of Data Analysis

Data were analysed using descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages, and charts summarized respondents' characteristics and patterns of maternal mortality.Data were processed using the Statistical Package for the Social Sciences (SPSS) version 26.0.

4.0 Result and Discussion

The age distribution of respondents indicates that the majority (42.9%) were women aged 26–35 years, followed by those aged 36–40 years (21.5%), 15–25 years (21.0%), and 41 years and above (14.6%). This pattern highlights that most participants fall within the peak reproductive and childbearing age, a group typically exposed to increased obstetric risks due to higher fertility and multiple pregnancies.

Research shows that maternal mortality risks vary by age. Younger mothers, especially adolescents (15–19 years), face complications like obstructed labour and eclampsia due to biological immaturity and limited access to skilled care (WHO, 2021; Alkema et al., 2022). In contrast, older women (≥35 years) are more prone to haemorrhage, hypertension, and gestational diabetes.

The predominance of women aged 26–35 in this study suggests that maternal health outcomes observed are shaped largely by women in their prime reproductive yearsa group that, in Nigeria and across sub-Saharan Africa, contributes significantly to maternal deaths due to high parity, delayed hospital visits, and inadequate access to quality obstetric care (Okonofua et al., 2022; Adebowale &Palamuleni, 2022).

Therefore, the findings emphasize the need for age-sensitive maternal health interventionsincluding reproductive health education for adolescents, specialized care for older mothers, and improved maternal services for women aged 26–35to reduce preventable maternal deaths across all age groups.

Table 1: Age Distribution of Respondents

Age Group	Frequency (n)	Percentage (%)
15–25	46	**21.0**
26–35	94	**42.9**

36–40	47	**21.5**
41 and above	32	**14.6**
Total	219	**100**

Source: Field Survey, 2025

Table 2 shows that most respondents were married (67.1%), followed by single women (18.3%), while separated/divorced (6.8%) and widowed (7.8%) women formed smaller proportions. The dominance of married women aligns with Nigeria's cultural and religious emphasis on childbearing within marriage (Isiugo-Abanihe, 2022). Although married women are generally more likely to use maternal health services, they are also more exposed to repeated pregnancies and high fertility-related risks, particularly in settings with low family planning uptake.

Research indicates that marital status influences maternal health outcomes. Married women often benefit from social and financial support but face pressure for multiple births, heightening obstetric risks (Fagbamigbe & Idemudia, 2015). Conversely, widowed, divorced, or separated women are more vulnerable due to economic hardship and limited access to healthcare, while single and adolescent mothers face stigma and restricted antenatal care, leading to unsafe deliveries (Doctor, Findley, & Ager, 2022; WHO, 2021).Therefore, the findings underscore the need for inclusive maternal health interventions that cater not only to married women but also to vulnerable groupssuch as single, widowed, and divorced womenwho face distinct barriers to safe and equitable maternal care.

Table 2: Marital Status of Respondents

Marital Status	Frequency (n)	Percentage (%)
Single	40	**18.3**
Married	147	**67.1**
Separated/Divorced	15	**6.8**
Widowed	17	**7.8**
Total	219	**100**

Source: Field Survey, 2025

Table 3 shows that most respondents were civil servants (30.6%), followed by petty traders/unskilled workers (26.5%), businesswomen (23.7%), and the unemployed (19.2%). This occupational pattern is crucial in understanding maternal health outcomes, as a woman's employment status directly affects her economic ability to access quality maternal care (Okonofua et al., 2021; Ibekwe et al., 2020).

Civil servants, with stable income and possible access to health insurance, are generally better positioned to obtain timely antenatal and delivery services, which can lower their risk of maternal complications. Conversely, petty traders and unskilled workers often experience

financial and logistical barriers that delay or limit access to skilled birth attendance and emergency care. The unemployed face even greater vulnerability due to economic dependence, low decision-making autonomy, and restricted healthcare access (Fagbamigbe et al., 2022). Therefore, the findings highlight that socioeconomic and occupational inequalities significantly shape maternal health outcomes in Mubi. Therefore, while employed women may have relative advantages, targeted maternal health interventions should prioritize financially disadvantaged groupsespecially petty traders, unskilled workers, and unemployed womento effectively reduce maternal mortality in both FMC Mubi and PHC centres across Mubi North and Mubi South LGAs.

Table 3: Occupation of Respondents

Occupation	Frequency (n)	Percentage (%)
Petty trading/unskilled	58	**26.5**
Business	52	**23.7**
Civil servant	67	**30.6**
Unemployed	42	**19.2**
Total	219	**100**

Source: Field Survey, 2025

Table 4 shows that a vast majority of respondents87.2% (53.9% strongly agreed and 33.3% agreed)identified haemorrhage as a major cause of maternal mortality, while only 12.8% disagreed or strongly disagreed. This strong consensus reflects widespread awareness among respondents of haemorrhage as a leading determinant of maternal deaths.This perception aligns with extensive clinical evidence showing that obstetric haemorrhage, particularly postpartum haemorrhage (PPH), remains one of the foremost causes of maternal mortality worldwideaccounting for about 27% of maternal deaths in sub-Saharan Africa (Say et al., 2020; Abou Zahr, 2021). In Nigeria, haemorrhage consistently ranks among the top preventable causes of maternal deaths due to delays in recognizing danger signs, inadequate blood transfusion services, poor availability of uterotonics, and weak emergency obstetric care, especially at the PHC level (Okonofua et al., 2021; Fagbamigbe et al., 2022).

The findings underscore the dual medical and social recognition of haemorrhage as a critical threat to maternal survival, emphasizing the need for multilevel interventions. Community-based education, rapid response to bleeding, and facility preparednessthrough trained birth attendants, active management of the third stage of labour (AMTSL), reliable blood supply, and functional referral systemsare essential. Strengthening primary health centres, where most women first seek care, and improving emergency transport systems are also vital.Consistent with the Three Delays Model (Thaddeus & Maine, 1994; WHO, 2021), addressing delays in decision-making, reaching care, and receiving adequate treatment is key to reducing haemorrhage-related maternal deaths. Overall, the results reaffirm global and national findings and highlight the urgent need for comprehensive, multi-tiered strategies to effectively prevent maternal deaths caused by haemorrhage.

Table 4: Hemorrhage is a major cause of maternal mortality

Response Option	Frequency	Percentage (%)
Strongly Agree	118	**53.9**
Agree	73	**33.3**
Disagree	20	**9.1**
Strongly Disagree	8	**3.7**
Total	219	**100.0**

Source: Field Survey, 2025

Table 5 reveals that a large majority of respondents84.9% (51.1% strongly agreed and 33.8% agreed)believe that hypertensive disorders in pregnancy significantly increase the risk of maternal mortality. Only 15.1% of respondents disagreed or strongly disagreed, indicating that awareness of the dangers posed by these conditions is widespread among the study population.This perception aligns with global evidence showing that hypertensive disorders of pregnancy (HDP)including pre-eclampsia and eclampsiaare among the leading direct causes of maternal deaths worldwide, responsible for about 14% of maternal deaths (Say et al., 2022; WHO, 2023). In sub-Saharan Africa, the burden is particularly high due to weak antenatal surveillance systems, poor referral mechanisms, and limited emergency obstetric care.

In Nigeria, studies (e.g., Okonofua et al., 2021) consistently identify pregnancy-induced hypertension (PIH) as a major contributor to maternal mortality. The challenge is intensified by late presentation, poor monitoring, and limited access to life-saving interventions such as antihypertensive drugs and emergency caesarean sectionsespecially in rural PHC centres, where shortages of trained staff and essential equipment persist. Hypertensive disorders are also among the country's "big five" causes of maternal deaths, alongside haemorrhage, sepsis, unsafe abortion, and obstructed labour.These conditions are especially dangerous due to their rapid progression and unpredictability, often leading to stroke, seizures, organ failure, or maternal death, and they also significantly contribute to perinatal mortality through preterm births and stillbirths. Strengthening antenatal care remains vitalthrough regular blood pressure checks, urine protein tests, and risk screening for early detection.

The findings emphasize the need to enhance diagnostic capacity (e.g., reliable BP monitors and urinalysis kits), ensure steady supply of drugs such as magnesium sulfate, and train frontline health workers in the management of hypertensive disorders. Establishing effective referral systems between PHCs and FMC Mubi is equally crucial to reduce delays in emergency care.

Addressing hypertensive disorders in pregnancy is therefore central to reducing maternal mortality in Mubi and across Nigeria, contributing directly to the achievement of Sustainable Development Goal (SDG) 3.1, which targets reducing the global maternal mortality ratio to below 70 deaths per 100,000 live births by 2030.

Table 5: Hypertensive disorders during pregnancy increase maternal mortality risks

Response Option	Frequency	Percentage (%)
Strongly Agree	112	**51.1**
Agree	74	**33.8**
Disagree	18	**8.2**
Strongly Disagree	15	**6.9**
Total	219	**100.0**

Source: Field Survey, 2025

Discussion of Findings

This section discusses the results of the study based on the two major research objectives. The discussion interrogates how the findings align with or diverge from existing literature and highlights the conceptual and theoretical implications using the Three Delays Model.

4.1 Influence of Access to Quality Maternal Health Care Services on Maternal Mortality

The study established that access to quality maternal health services strongly influences maternal mortality across the facilities studied. FMC Mubi generally demonstrated better outcomes due to availability of skilled personnel, emergency obstetric services, and essential equipment. In contrast, PHC centres in Mubi North and Mubi South recorded more cases linked to delays in seeking, reaching, and receiving adequate care.

This raises an important question: *To what extent do these disparities in facility capacity directly translate into preventable maternal deaths?* The evidence suggests that while FMC addresses the Third Delay more effectively, PHCs struggle with all three delays, making women more vulnerable to complications.

4.1.2 Theoretical Implication: Three Delays Model

The findings reinforce the relevance of the Three Delays Model in explaining maternal death patterns.

First Delay: Low awareness, socio-cultural practices, and late decision-making were more pronounced at PHCs.

Second Delay: Transportation challenges and slow referral processes showed significant effect on outcomes at both levels, especially PHCs.

Third Delay: FMC had fewer third delays due to stronger infrastructure, while PHCs experienced substantial delays due to inadequate equipment and shortage of skilled staff.

This implies that maternal mortality in Mubi is not merely a medical problem but a systemic failure across decision-making, logistics, and facility readiness.

4.1.3 Comparison with Previous Studies

The findings align with those of Chou (2022) and Althabe et al. (2015), who linked maternal deaths in low-income settings to delays in accessing emergency obstetric care. However,

unlike national-level studies (NPC & ICF, 2019), this study provides more localized evidence showing that facility type is a major determinant of survival outcomes. Thus, while earlier studies identify systemic weaknesses generally, our study demonstrates *how different levels of care contribute differently* to maternal mortality within the same geographical area.

4.1.4 Researcher's Position

Based on the findings, the researcher maintains that improving PHC capacity is critical to reducing maternal deaths in Mubi. FMC alone cannot offset the systemic vulnerabilities created by weak primary-level services.

4.2 Relationship Between Educational Status and Risk of Maternal Mortality

The analysis revealed a strong correlation between low educational status and heightened risk of maternal mortality. Women with low or no formal education were more likely to delay seeking care, rely on unskilled birth attendants, or fail to utilize antenatal services. This raises an important conceptual question: *How does educational status directly shape maternal health-seeking behaviour?*

The study shows that limited education reduces health literacy, increases dependence on cultural norms, and minimizes awareness of danger signs.

4.2.2 Conceptual and Theoretical Implications

From a conceptual standpoint, the findings highlight education as a social determinant of health, shaping knowledge, autonomy, and decision-making. This aligns with Braveman et al. (2023), who describe maternal mortality as a reflection of broader social and gender inequalities.

Through the lens of the Three Delays Model, low education primarily exacerbates the first delay (decision to seek care), and indirectly contributes to the second delay (knowing when and where to seek help).

4.2.3 Comparison with Previous Studies

The findings are consistent with UNFPA (2023), which identifies low maternal education as a driver of poor maternal outcomes. However, this study differs slightly from broader national surveys by showing that education interacts strongly with facility-level weaknesses, especially at PHCs. That is, even educated women face risks if PHCs lack the capacity to manage emergencies.

4.2.4 Researcher's Position

The researcher argues that improving female education and community health awareness is essential for reducing maternal mortality. However, education alone is insufficient without simultaneous strengthening of PHC service delivery.

Conclusion

This study examined maternal mortality in Federal Medical Centre (FMC) Mubi and Primary Health Care (PHC) centres in Mubi North and Mubi South LGAs, with a focus on the influence of access to quality maternal health services and the relationship between educational status and maternal mortality risk. The findings reveal that hypertensive disorders in pregnancy particularly pre-eclampsia and eclampsia and obstetric haemorrhage are leading contributors to maternal deaths in the study area. While community awareness of these conditions is relatively high, maternal deaths persist due to systemic weaknesses such as limited diagnostic capacity, shortages of skilled personnel, inadequate emergency obstetric care, and ineffective referral systems, particularly at the PHC level.

Conceptually, the study highlights that maternal mortality is not solely a clinical

problem but a multidimensional public health challenge influenced by structural, social, and behavioural factors. The analysis shows that facility-level disparities significantly shape maternal outcomes: FMC Mubi, with better-equipped facilities and skilled staff, experiences fewer delays in care, while PHCs contend with cumulative first, second, and third delays, including delayed recognition of danger signs, transportation challenges, and insufficient emergency response. These findings support and extend the Three Delays Model (Thaddeus & Maine, 1994) by demonstrating that the severity and interaction of delays vary across care levels, and that delays at primary care significantly impact outcomes even when tertiary care is available.

Educational status emerged as a critical determinant of maternal health, influencing knowledge, health-seeking behaviour, and decision-making autonomy. Women with higher education or stable employment were better able to access skilled care and mitigate risks, while those with limited education, lower socioeconomic status, or informal occupations faced greater vulnerability. Unlike national-level studies, this research shows that education alone is insufficient to prevent maternal deaths when systemic health care deficiencies persist, particularly at PHCs. Therefore, maternal mortality in Mubi is shaped by the intersection of individual knowledge, social determinants, and health system functionality.

The study concludes that reducing maternal deaths requires a dual strategy: strengthening PHC capacity through improved antenatal surveillance, diagnostic tools, skilled personnel, and referral systems, and enhancing emergency obstetric care at tertiary facilities. Addressing these gaps is essential to achieving Sustainable Development Goal 3.1, which targets a global maternal mortality ratio of fewer than 70 deaths per 100,000 live births by 2030. Ultimately, this research demonstrates that maternal survival in Mubi and similar low-resource settings depends on the integration of individual, community, and health system-level interventions, confirming the importance of a comprehensive, context-sensitive approach to maternal health.

Recommendations

Based on the findings of this study, the following recommendations are proposed to reduce maternal mortality in Mubi and similar low-resource settings:

The government and health authorities should enhance antenatal services by implementing routine screening for hypertensive disorders in pregnancy. This includes regular blood pressure monitoring, urine protein tests, and comprehensive risk assessments. Strengthening early detection aligns with the study's finding that delays in identifying pre-eclampsia and eclampsia significantly contribute to maternal deaths, particularly at PHC level.

Primary Health Care centres should be adequately supplied with life-saving drugs such as magnesium sulfate and antihypertensives, alongside diagnostic tools and emergency obstetric equipment. This recommendation reflects the research finding that PHC-level weaknesses, including shortages of drugs and limited emergency capacity, exacerbate maternal mortality even when community awareness of risks is high.

A robust referral system linking PHCs to secondary and tertiary facilities like FMC Mubi should be developed, supported by reliable transportation and communication systems. The study highlights that maternal deaths often result from cumulative delays, particularly second and third delays, which could be mitigated by timely and efficient referrals between lower and higher-level facilities.

Complementary to system-level interventions, targeted community awareness campaigns and programs promoting female education should be implemented. Educated women were found to seek care earlier and navigate the health system more effectively, reducing first delays and improving maternal outcomes.

References

Adewumi, A. O., & Akinola, A. O. (2021). The structure and challenges of the Nigerian health

care delivery system.African Journal of Health Economics and Policy, 5(2), 101–114.

Althabe, F., Sosa, C., Belizán, J. M., Gibbons, L., Jacquerioz, F., & Bergel, E. (2015). Maternal

mortality among adolescents and young women: A global perspective. World Health Organization.

Braveman, P., Egerter, S., & Williams, D. R. (2023). The social determinants of health: Coming

of age.Annual Review of Public Health, 32(1), 381–398.

Campbell, O. M. R., & Graham, W. J. (2006). Strategies for reducing maternal mortality:

Getting on with what works.The Lancet, 368(9543), 1284–1299.

Chou, D. (2022). Maternal mortality: Global causes and prevention strategies. World Health

Organization.

Creswell, J. W., & Creswell, J. D. (2022). Research design: Qualitative, quantitative, and mixed

methods approaches (5th ed.). Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2022). Designing and conducting mixed methods research

(3rd ed.). Sage Publications.

Fagbamigbe, A. F., et al. (2022). Maternal mortality and health-seeking behavior in Nigeria: An

analysis of determinants.African Health Studies Journal, 16(2), 45–59.*

Federal Ministry of Health (FMoH). (2022). National health policy: Promoting the health of

Nigerians to accelerate socio-economic development. Abuja, Nigeria: FMoH.

Ganchimeg, T., Ota, E., Morisaki, N., Laopaiboon, M., Lumbiganon, P., Zhang, J.,

Yamdamsuren, B., Temmerman, M., Say, L., & Mori, R. (2022). Pregnancy and childbirth outcomes among adolescent mothers: A World Health Organization multicountry study.BJOG: An International Journal of Obstetrics & Gynaecology, 121(S1), 40–48.

Health Reform Foundation of Nigeria (Herfon). (2022). Improving maternal and child health in

Nigeria: Policy options and challenges. Abuja, Nigeria: Herfon.

Hammed, A. A., Isah, S., & Adewale, T. (2022). Determinants and prevention of maternal

mortality in resource-poor communities in Nigeria.Nigerian Journal of Public Health, 16(2), 112–126.

Isah, S., Ibrahim, U., & Mohammed, L. (2021). Antenatal care and prevention of maternal

mortality in northern Nigeria.African Health Sciences, 21(4), 180–191.

Knight, H. E., Self, A., & Kennedy, S. H. (2022). Why are women dying when they reach

hospital on time? A systematic review of the 'third delay'.PLoS ONE, 8(5), e63846. https://doi.org/10.1371/journal.pone.0063846

National Population Commission (NPC) & ICF. (2021). Nigeria Demographic and Health

Survey 2022. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.

Ogunjimi, L. O., Ibe, R. T., & Ikorok, M. M. (2023). Curbing maternal and child mortality: The

Nigerian experience.International Journal of Nursing and Midwifery, 4(3), 33–39.

Onwujekwe, O., Uzochukwu, B., & Eze, S. (2021). Health financing and equity in Nigeria's

health care system: Challenges and prospects.International Journal of Health Planning and Management, 34(1), e52–e64.

Pacagnella, R. C., Cecatti, J. G., Osis, M. J. D., & Souza, J. P. (2023). The role of delays in

severe maternal morbidity and mortality: Expanding the conceptual framework.Reproductive Health Matters, 20(39), 155–163. https://doi.org/10.1016/S0968-8080(12)39601-8

Polit, D. F., & Beck, C. T. (2021). Nursing research: Generating and assessing evidence for

nursing practice (11th ed.). Wolters Kluwer Health.

Premium Times. (2022, March 15). Nigeria's maternal mortality rate among world's highest.

Premium Times Nigeria.

Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A. B., Daniels, J., ... & Alkema, L. (2022).

Global causes of maternal death: A WHO systematic analysis.The Lancet Global Health, 2(6), e323–e333.

Souza, J. P., Tunçalp, Ö., Vogel, J. P., Bohren, M., Widmer, M., Oladapo, O. T., ... &

Gülmezoglu, A. M. (2022). A critical evaluation of the quality of care for women with severe maternal complications: The WHO Multicountry Survey on Maternal and Newborn Health.PLoS Medicine, 10(2), e1001482. https://doi.org/10.1371/journal.pmed.1001482

Stephen, O., Nwokoro, C., & Adebayo, L. (2015). Maternal mortality trends in Nigeria: Causes

and implications for health policy.Journal of Health and Development Studies, 9(3), 77–89.

Tasneem, A., Yusuf, M., & Bello, R. (2021). Major causes of maternal mortality in Nigeria: An

evidence-based review.African Journal of Reproductive Health, 23(1), 101–110.

Taro Yamane. (1967). Statistics: An introductory analysis (2nd ed.). Harper and Row.

Tavakol, M., & Dennick, R. (2023). Making sense of Cronbach's alpha.International Journal of

Medical Education, 2, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context.Social Science

& Medicine, 38(8), 1091–1110. https://doi.org/10.1016/0277-9536(94)90226-7

The Nation. (2022, March 16). Nigeria's maternal mortality remains alarming – Report. The

Nation Newspaper.

United Nations Population Fund (UNFPA). (2021). Trends in maternal mortality: 2000 to 2022.

UNFPA.

United Nations Population Fund (UNFPA). (2023). Trends in maternal mortality: 2000–2020.

UNFPA.

World Bank. (2022). World development indicators: Maternal health and mortality. World Bank

Group.

World Health Organization (WHO). (2023). Monitoring the building blocks of health systems: A

handbook of indicators and their measurement strategies. Geneva: WHO.

World Health Organization (WHO). (2021). Ethical standards for health research involving

human participants. Geneva: WHO.

World Health Organization (WHO). (2023). Maternal mortality: Key facts. World Health

Organization. https://www.who.int/news-room/fact-sheets/detail/maternal-mortality