

ORIGINAL RESEARCH ARTICLE

A protocol to investigate predictors of healthcare workers' responsiveness in initiating maternal and perinatal death reviews in secondary health facilities

Kabiru Abubakar Gulma^{1*}, Joy Uberu², and Uebari Korfi³¹School of Global Health and Bioethics, Euclid University, Banjul, The Gambia²Department of Nursing Services, Ministry of Health, Birnin Kebbi, Kebbi State, Nigeria³Research Coordination Unit, Study Plus Hub LTD, Port Harcourt, Rivers State, Nigeria

Abstract

Maternal and perinatal mortality remain unacceptably high in sub-Saharan Africa, yet the systematic surveillance and response mechanisms designed to address them are poorly implemented in many low-resource settings. This research aims to investigate the predictors of healthcare workers' responsiveness in initiating maternal and perinatal death surveillance and response (MPDSR) across selected secondary health facilities in Kebbi State, Nigeria. Despite global and national efforts to reduce maternal and perinatal mortality, Nigeria continues to experience high rates, with numerous secondary health facilities yet to fully implement MPDSR strategies. This study will adopt a cross-sectional design and will use a mixed-methods approach to explore factors influencing healthcare workers' responsiveness. Stratified random sampling will be used to select 384 healthcare workers from 28 secondary health facilities. The data will be collected through structured questionnaires and focus group discussions with healthcare professionals, including nurses, midwives, and doctors. The study aims to identify predictors, such as facility capacity, healthcare workers' knowledge, and training, related to the initiation of MPDSR. Findings from this study will provide evidence-based recommendations for policymakers to improve MPDSR implementation, reduce maternal and perinatal mortality, and enhance healthcare systems in Nigeria. The results will guide the formulation of targeted interventions to foster increased engagement and responsiveness among healthcare workers. Additionally, our protocol will assess the roles of organizational culture, facility infrastructure, and leadership support in shaping healthcare workers' readiness to initiate MPDSR, thereby contributing to the broader evidence base on health system strengthening in low-resource settings.

Keywords: Healthcare workers' responsiveness; Maternal and perinatal death reviews; Predictors of responsiveness; Secondary health facilities; Nigeria maternal mortality

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*Corresponding author:

Kabiru Abubakar Gulma
(gulma@euclidfaculty.net)

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1. Introduction

1.1. Background

Every year in Nigeria, approximately 62% of births are attended by skilled birth attendants who support safe deliveries and improved neonatal outcomes (Ene, 2020;

Njoku, 2021; Ogide-Alaeze, 2020). However, despite their efforts, the shortage of qualified, skilled birth attendants presents a significant challenge, contributing to maternal and neonatal deaths (Amutah-Onukagha *et al.*, 2017; Kassie *et al.*, 2022; Nkwo *et al.*, 2015).

In Nigeria, the commitment of the government and key stakeholders to reducing maternal mortality is reflected in increased maternal health funding that supports various maternal healthcare arrangements, including community programs, safe motherhood awareness campaigns, and continuous training of healthcare workers. The persistently high maternal mortality rate is unacceptable, and the majority of maternal deaths are largely avoidable (Ajayi & Akpan, 2020; Mbada, 2020; Robinson & Adams, 2022).

Globally, Nigeria is among the top ten countries, accounting for 60% of all maternal deaths, making it a significant contributor to this global burden (Heard, 2021; Iroanya, 2024). In recent years, the country has transitioned to a young population stage, experiencing notable growth in family size (Reed & Mberu, 2014). However, despite this rise in the number of households, the proportion of healthcare workers with formal government employment contracts remains alarmingly low, standing at less than 20% (Dranove & Burns, 2022; Fasanmade, 2021). Moreover, there is a significant imbalance in the skill mix of healthcare professionals, with a majority falling short of meeting the necessary requirements. These interconnected factors pose significant challenges to the healthcare system in Nigeria, creating a pressing need for comprehensive reforms and strategic interventions to address these issues and safeguard the well-being of mothers and their children (Balogun *et al.*, 2022; Leung *et al.*, 2022; Mohammed *et al.*, 2020).

1.2. Rationale

The empirical evidence from this research can guide policymakers in formulating more specific interventions targeted at improving healthcare workers' responsiveness in initiating maternal and perinatal death reviews. Such recommendations are expected to contribute to reducing the incidence of maternal deaths in Kebbi State in particular and Nigeria at large.

Institutional maternal mortality in Nigeria remains unacceptably high (Fawole *et al.*, 2012; Ope, 2020; Sageer *et al.*, 2019). Various stakeholders in Nigeria have adopted facility-based "Maternal and Perinatal Death Review" in secondary healthcare facilities (SHFs) to evaluate the circumstances surrounding every maternal and perinatal death and to make recommendations for correcting these circumstances. However, most facilities have not launched this initiative or are at least non-responsive to the overall

strategy. No formal research has examined the latent factors influencing healthcare workers' responsiveness in initiating Maternal and Perinatal Death Reviews (Chinwah, 2020; Endjala, 2022; Mukuru *et al.*, 2021).

1.3. Research aim and objectives

Our protocol is guided by an integrated theoretical framework grounded in health behavior models. The framework can be used to identify predictors of maternal and perinatal death surveillance and response (MPDSR) initiation as the first actionable step in the knowledge-to-action cycle, with the ultimate aim of reducing maternal and perinatal mortality.

The aim of this study is to identify predictors of healthcare workers' responsiveness in initiating MPDSR in SHFs in Kebbi State, Nigeria, and to explore how these predictors differ between public and private facilities. The specific objectives are: (i) to assess the influence of incentives on MPDSR initiation; (ii) to determine the role of facility capacity in MPDSR initiation; (iii) to examine the effect of training on MPDSR initiation; (iv) to explore the influence of healthcare providers' knowledge on MPDSR initiation; and (v) to predict willingness to initiate MPDSR among secondary healthcare workers in Kebbi State.

1.4. Significance of the study

African countries are not on track to reach the targets for reducing maternal and perinatal mortality. High-quality, evidence-based MPDSR has been recommended to reduce deaths and improve the quality of care. However, the responsiveness of healthcare workers in initiating MPDSR remains a fundamental problem and has received little attention, despite its proven benefits in practice.

The research can provide an in-depth understanding of the predictors of responsiveness in initiating critically important MPDSR among healthcare workers in Kebbi State, northwest Nigeria. The cascade of care model will reveal factors that explain several layers of causation underlying responsive or non-responsive action in initiating MPDSR at different levels.

2. Literature review

A critical prerequisite for improving maternal and perinatal health outcomes is sustained management support and the active engagement of healthcare workers in mortality review processes. Evidence consistently indicates that without such engagement, audits fail to generate actionable improvements.

Overall, it has been shown that although healthcare workers operate within the system where incidents occur, they are often distant from the audit processes essential for

improvement and accountability. This lack of connection can substantially affect how the review process unfolds, hindering the effective implementation of necessary changes. Consequently, it raises the question: What are the underlying reasons behind these unexpected and excessive personalized responses from healthcare workers? Do these reasons fit neatly into clear-cut categories as outlined in the first level of Shiffman and Sukhtankar's "Problem with a capital P?" Understanding these reasons becomes crucial for devising targeted interventions that address the root causes of resistance in order to foster a culture of engagement and continuous quality improvement within the healthcare sector.

Based on the Theory of Planned Behavior (TPB), behavioral expectations and norm antecedents are key determinants of behaviors. The "goodness-of-fit" of attitudes and behaviors determines the level of engagement, while the discrepancy found between personal values and behaviors causes discomfort. Compliance with institutional expectations and policy can also facilitate the direct involvement of healthcare workers. Central to healthcare are care seekers for services. Positive experiences during utilization influence future demand. For healthcare systems, maternal mortality has implications for several indicators. Preference is for a measurement tool of responsiveness that can be completed by healthcare workers at the bedside as a prompt to action. According to the TPB, the anticipation of certain patterns of behavior and the factors that influence societal norms are crucial in determining how individuals act. The alignment between one's attitudes and actual behaviors plays a vital role in determining the level of commitment, while any inconsistency between personal values and actions can lead to feelings of unease. To foster the active involvement of healthcare professionals, adhering to institutional expectations and policies is crucial. Furthermore, the individuals seeking care are at the core of healthcare systems. Their positive experiences with services significantly impact their future demand. Maternal mortality, being a critical aspect of healthcare, is linked to various key indicators. Our preference is to develop a measurement tool focused on responsiveness that healthcare workers can conveniently use at the bedside as a prompt for immediate action.

2.1. Maternal and perinatal mortality in Nigeria

The United Nations Secretary-General's Global Strategy for Women's and Girls' Health (Every Woman, Every Child) aims to scale up efforts to save newborns. The strategy focuses on new public-private partnerships, resources, and plans to improve maternal, infant, and child health. In recent years, the main cause of maternal mortality has become increasingly diverse. In Nigeria, the demand for

maternal healthcare services for safe motherhood is low. Insufficiently motivated maternal health workers and a lack of basic emergency obstetric and newborn care competence may also necessitate implementing maternal death review (MDR) and continuous medical education during regular, ongoing maternal healthcare services in referral centers.

Nigeria accounts for the second-highest absolute number of maternal, neonatal, and under-five deaths in the world. Globally, neonatal death occurs every 17 s, leading to 2.4 million deaths annually. Nigeria has the second-largest burden of neonatal deaths in the world, with 300,000 neonatal deaths per year. The global stillbirth estimates for 2019 show that two million stillbirths occurred, with 84% occurring in low- and middle-income countries, representing 17 deaths for every 1,000 births, in which Nigeria is one of the 10 countries with the highest stillbirth rates in the world.

2.2. Importance of maternal and perinatal death reviews

In summary, maternal deaths are a significant health issue throughout the world but occur predominantly in the poorest developing countries, where pregnant and laboring women do not have access to adequate medical care. As a result, the single most common cause of maternal mortality in developed and underdeveloped regions of the world remains severe pre-eclampsia and eclampsia, hemorrhage, sepsis, and postpartum infection. These conditions are exacerbated by complications arising from cesarean section, retained placenta, insufficient essential fundamentals of obstetric care, such as safe blood transfusion, antibiotics, anticonvulsants, and management of the third stage of labor. Other problems associated with the management of obstetric emergencies are missed or delayed reporting of the development of critical symptoms and delays in reaching or accessing an appropriate health facility. All these issues combine to result in a higher-than-expected maternal mortality rate. In any standards, maternal mortality is at a tragic level and should be a cause for global concern, but several aspects of discussing the tragedy are contentious. For example, in numerous maternal causes, the number of processes or systems is regarded as important, and these need redress. Other aspects of the problem have not achieved such prominence; for example, a failure of the reporting systems to accurately document the death, the cause of death, or the quality of care provided around the time of death. These concerns are central to accountability discussions in routine obstetric care. Nonetheless, reviews of perinatal morbidity and mortality are necessary, and resultant lessons learned from each death should be acted upon to

adjust care before, during, and after delivery. Comparative evidence from middle-income countries, such as Brazil, further enriches this discussion. The Birth in Brazil II postpartum research cohort, which integrated perinatal mortality surveillance studies and hospital quality-monitoring initiatives within the Stork Network program, provides valuable methodological and contextual parallels for MPDSR research in comparable resource-constrained settings (Domingues *et al.*, 2015; Esteves-Pereira *et al.*, 2024; Miranda Theme Filha *et al.*, 2024).

Maternal deaths occur during pregnancy, childbirth, or in the 42 days post-delivery or termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from causes unrelated to the process of pregnancy or its management. The primary aim of Millennium Development Goal 5 is to reduce the maternal mortality ratio by three-quarters, and, based on current progress, this goal is feasible. However, this depends on the effective coverage of maternal interventions and increasing focus on equity, particularly in areas of low coverage, so that all women—regardless of income or location—have the necessary care to protect their health and rights. Nonetheless, in 2015, an estimated 303,000 maternal deaths occurred, and women's lifetime risk of maternal death continued to range from 1:36 in sub-Saharan Africa to 1:5,400 in high-income countries. Although maternal deaths occur in all countries, over 99% of maternal deaths occur in developing countries, with sub-Saharan Africa (66,000) and Southern Asia (57,000) accounting for approximately 86% of all maternal deaths.

2.3. Factors influencing responsiveness in death reviews

There is a documented challenge with the use of health data in SHFs in Kebbi State, further exacerbated by heavy workloads and competing service delivery demands. Evidence from comparable settings identifies key predictors of MPDSR responsiveness, including positive feedback from reviews, previous experience in facility death reviews, and professional cadre. Knowledge gaps are common, with many healthcare workers reporting limited readiness to train colleagues. This article supports routine MPDSR training.

3. Methodology

3.1. Research design

This study will be community- and facilities-based, and cross-sectional. The target population will include all healthcare workers in the obstetrics and gynecology units of the selected SHFs in Kebbi State. However, in this study, the principal target will be health workers with a higher

number of predicted maternal and perinatal leads, among those from selected general hospitals in Kebbi State, Nigeria. Preceding the research, two hospitals in Kebbi State were selected.

3.2. Research area

The research area, Kebbi State, Nigeria, has a population of 3,471,648 according to the 2006 Nigeria Population and Housing Census (PHC) Enumeration Area Demarcation (Onwuka *et al.*, 2021). It is predominantly rural, with 225 wards. There are 225 political wards, 21 local government areas, and 4 emirates. To the best of our knowledge, the population is predominantly Muslim (Omoleke, Alabi, *et al.*, 2018; Omoleke, Usman, *et al.*, 2021). The dominant ethnic groups include the Hausa, Kabawa, Fulfude, and Dakarawa, who are predominantly peasant farmers. In Kebbi State, River Rima and River Zamfara serve as major sources of water and as points of commercial activity and transportation, especially during the dry season (Wali *et al.*, 2022).

3.3. Sampling strategy

The health workers from the selected SHFs who have ever conducted maternal or perinatal death reviews will be included in the research. The participants will be nurses/midwives, doctors (medical officers), community health extension workers, and community health officers. A computed sample size of 384 healthcare workers (13 per facility) was obtained for the research. The calculated sample cohort was distributed across the 28 selected SHFs (out of 30) in proportion to the number of healthcare workers practicing there. A stratified random sampling technique will be used to select the participants. The sample size was calculated using the Cochran formula (Equation 1): $n = Z^2pq/d^2$

$$n = \frac{Z^2 pq}{d^2} \quad (1)$$

where $Z = 1.96$ (95% confidence level), $p = 0.5$ (maximum variability, adopted conservatively in the absence of prior local data on MPDSR responsiveness in Kebbi State), $q = 1 - p = 0.5$, and $d = 0.05$ (margin of error). Given that the total eligible healthcare worker population across the 28 selected facilities is known ($N = 1,056$), a finite population correction factor was applied— $n_{\text{adj}} = n / (1 + [n - 1] / N)$ —yielding an adjusted estimate of approximately 271. The final sample was set at 384 to account for a projected 30% non-response rate and to maintain adequate statistical power for the planned logistic regression analyses.

This research will exclude primary healthcare centers and select only SHFs as representatives of all SHFs in

Kebbi State. Two reasons justify this decision: First, the prevalence of maternal perinatal death review conducted was higher when compared to PHCs. Second, owing to fewer healthcare workers manning our selected primary healthcare facilities, there are fewer nurses/midwives and doctors, which may threaten the representativeness of the research.

A multi-stage sampling technique will be used to select the participants. Kebbi State is divided into 21 Local Government Areas (Omoleke, Alabi, *et al.*, 2018; Omoleke, Usman, *et al.*, 2021). In 2015, Kebbi State had a total population of 3.3 million people. The state has one tertiary hospital, the Federal Medical Centre Birnin Kebbi, which averages 6,000 deliveries per year. There is also one general hospital per local government area, offering family planning services and deliveries.

3.4. Data collection methods

Data will be collected from healthcare workers using an interviewer-administered questionnaire (Appendix). The structured questionnaire is also provided as supplementary material to facilitate adaptation by researchers working in comparable healthcare settings. Data entry and analysis will be performed using Statistical Package for Social Sciences (SPSS 20.0, IBM, United States). Descriptive statistics, such as frequencies and percentages, will be computed for the listed variables to address the research objectives. Variables will be fitted in a logistic regression model to identify independent predictors of responsiveness. A significant level of prediction will be defined as $p < 0.05$.

3.5. Data analysis plan

For the data analysis plan, a simple descriptive analysis will be conducted to estimate prevalence rates. Knowledge of the case definition and benefits of MDR and perinatal death review, as well as healthcare workers' attitudes and level of competency in initiating perinatal death review and MDR, will be categorized as good or poor. Independent variables will be summarized using frequency and proportions. Multiple logistic regression analyses will be conducted to assess the effect of each predictor. Adjusted odds ratios and 95% confidence intervals will be reported, and the p -value will be set at < 0.05 to determine statistical significance.

The outcome variables will be binary and include healthcare workers' attitudes toward listening to case-defining questions; their ability to identify perinatal and maternal deaths from relevant sources; and their correct responses to case-defining questions. They will also include the experience and anticipation of positive clinical actions, such as taking patient history, assessing the newborn's condition, and examining the mother and baby within five

minutes after delivery. In addition, competency in initiating maternal death review (MDR) and perinatal death review will be assessed. A score of 24–27 will be classified as “Highly Responsive,” 16–23 as “Moderately Responsive,” and 0–15 as “Low Responsiveness.” The responsiveness score will be derived from Section C of the questionnaire (Appendix; items 12–20, each scored 1–5 on a Likert scale, maximum = 45 points) and Section D (Appendix; items 21–25: scored 0 or 1 per item based on favorable response, maximum = 5 points), yielding a composite score ranging from 0 to 50. Cut-points will be revised accordingly: 0–24 = Low Responsiveness; 25–39 = Moderate Responsiveness; 40–50 = High Responsiveness. Thresholds will be set a priori based on theoretical maximum score distribution and informed by analogous MPDSR responsiveness instruments (Willcox *et al.*, 2023). Internal consistency will be assessed using Cronbach's alpha, and construct validity will be assessed through exploratory factor analysis prior to the main regression model.

The researchers will clearly specify how each data set will be handled and analyzed. Computer software packages such as SPSS version 20. will be used to speed up data entry and avoid manual data entry errors. The research anticipates no missing data, but if any are present, they will be handled using imputation methods, such as K-nearest neighbor imputation.

3.6. Data availability

Upon completion of the study, the anonymized quantitative dataset and qualitative data collection instruments (including structured questionnaires and focus group discussion guides) will be deposited in a publicly accessible open-access repository (e.g., Zenodo, Figshare, or the Open Science Framework) in alignment with Open Science principles. This will ensure the reproducibility and transparency of research findings. All data sharing will comply with applicable ethical approvals and participant confidentiality requirements.

3.7. Ethical considerations

This study will be conducted in accordance with the ethical principles of the Declaration of Helsinki. Prior to data collection, ethical approval will be sought from the Kebbi State Ministry of Health Research Ethics Committee and the Institutional Review Board of Euclid University. Written informed consent will be obtained from all study participants. Participants will be informed that: (i) participation is entirely voluntary; (ii) they may withdraw at any time without consequence; and (iii) their data will be used solely for research purposes. All questionnaire responses will be anonymized at the point of data entry, stored on password-protected devices accessible only to

the core research team, and no identifying information will appear in any publication or report. Community gatekeepers, including facility managers and heads of department, will be briefed prior to the commencement of data collection.

4. Conceptual framework

Effective management of maternal and neonatal mortality requires healthcare staff to participate in MPDSR. This protocol explores predictors of MPDSR initiation. MPDSR examines causes of death and proposes systemic improvements to enhance outcomes. According to Almutairi *et al.* (2022), Çağatay *et al.* (2024), and Lu *et al.* (2022), institutional capability, organizational culture, personal variables, referral mechanisms, and resource availability affect healthcare staff's responsiveness to MPDSR. These domains are essential for healthcare workers to participate in MPDSR and meaningfully improve health system responsiveness and mortality rates.

According to the conceptual model, healthcare professionals' responsiveness is affected by quality data, which they must input and use with peers and supervisors. The goal is to achieve involvement and system-wide improvement in maternal and perinatal care, led by a more responsive health system.

4.1. Theoretical foundations

Two primary theories inform the conceptual framework. Klein and Sorra's facilitation model emphasizes the importance of collaboration, particularly among physicians, to promote active engagement in healthcare improvement programs such as MPDSR. Their model illustrates how physicians often engage more actively with one another than with other healthcare professionals, such as nurses. This disparity in engagement is a critical challenge in driving a collaborative MPDSR process. Klein and Sorra argue that a more balanced approach, where leadership facilitates broader participation, would enhance the effectiveness of MPDSR (Dong *et al.*, 2008).

Weiber and Kollmorgen's theory of organizational change, an extension of Lewin's three-step model, provides additional insights (Hussain *et al.*, 2018). The theory posits that organizational change disrupts social equilibrium, leading to resistance from individuals within the system. In the context of MDR, healthcare workers may resist participating in the reviews due to discomfort with change. Lewin's model explains this resistance as a response to the disruption caused by the introduction of new processes, such as MPDSR. The process of "unfreezing" and "refreezing" change, without an intermediate stage for adjustment, can lead to healthcare workers resisting new

responsibilities in maternal and perinatal death reviews.

4.2. Models of healthcare worker behavior

Understanding MDR responsiveness requires several models of healthcare staff behavior. Health-related behaviors are often predicted using the TPB and Health Belief Model (HBM). TPB says intentions predict behavior, but intentions do not necessarily lead to action (Barattucci *et al.*, 2022; Chin & Mansori, 2019). This mismatch between intention and execution makes it difficult to change healthcare professionals' MPDSR-related behaviors.

Popular in health promotion, the HBM integrates knowledge, attitudes, and behaviors into a model. It helps explain how healthcare providers view their duties in preventing maternal and perinatal mortality. It is unclear if the HBM can account for a particular health-related behavior, such as MPDSR initiation. The model is useful for understanding healthcare worker behavior despite its limitations.

In healthcare, Rogers' Diffusion of Innovations Theory explains the adoption of new processes such as MPDSR (Wurster *et al.*, 2024). The hypothesis shows how healthcare personnel adopt MDR based on knowledge, peer influence, and perceived benefits. Due to cultural or organizational resistance, MPDSR uptake may be slow.

5. Predictors of responsiveness

The research will explore the factors that predict healthcare workers' responsiveness in initiating MPDSR. However, little is known about the specific factors that influence responsiveness. Cultural and institutional barriers, especially in private healthcare settings, often hinder healthcare workers' engagement in MPDSR.

In contrast, younger healthcare workers, particularly in public health settings, tend to be more proactive in participating in MPDSR. These workers are more open to participating in new MPDSR initiatives to improve maternal and perinatal care. This difference in responsiveness highlights the need for targeted interventions to address barriers faced by specific groups of healthcare workers.

5.1. Healthcare worker factors

Factors related to healthcare workers significantly influence responsiveness to MPDSR. Cultural obstacles, particularly within private healthcare environments, hinder the initiation and participation in MPDSR. Private healthcare practitioners frequently exhibit greater resistance to new initiatives such as MPDSR, likely due to organizational culture and insufficient institutional support. Conversely, public healthcare workers, particularly the younger demographic, demonstrate heightened responsiveness

to MPDSR. Their participation is crucial for identifying deficiencies in care and formulating strategies to prevent future deaths. The study will examine whether healthcare worker factors, including cultural attitudes and age, are critical predictors of responsiveness in the initiation of MPDSR.

5.2. Health facility factors

Secondary healthcare facilities in Kebbi State are important for initiating and conducting MPDSR. Nevertheless, numerous facilities encounter substantial infrastructural and resource deficiencies that hinder their ability to implement effective MPDSR. In spite of these obstacles to MPDSR quality practices, even without the requisite resources. These facilities can serve as models for MPDSR implementation across the state. It is widely recognized that establishing effective MPDSR processes in healthcare facilities improves data collection, enhances care practices, and reduces maternal and perinatal mortality. However, the lack of essential resources, including medical supplies and trained personnel, continues to impede the comprehensive implementation of MPDSR in numerous facilities.

5.3. Sociodemographic factors

Sociodemographic factors, such as age and profession, substantially influence healthcare workers' participation in MPDSR. The study will investigate whether younger healthcare workers, particularly those under 30, are more likely to initiate MPDSR than older colleagues. This trend may be due to younger workers' openness to new initiatives and their commitment to improving maternal and perinatal care.

Moreover, non-technical staff, such as nurses and midwives, are more likely to engage in the documentation of maternal and perinatal deaths compared to doctors. This difference may be attributed to the distinct roles these professionals play in patient care. Nurses and midwives are often more involved in monitoring and documenting patient outcomes, while doctors may focus more on clinical interventions.

6. Barriers to initiating maternal and perinatal death reviews

Several barriers hinder healthcare workers' engagement in MPDSR. Poor communication, underreporting of maternal and perinatal deaths, and a culture of secrecy are significant obstacles (Mary *et al.*, 2024; Willcox *et al.*, 2023). In certain cases, healthcare workers may avoid participating in MPDSR due to fear of blame or punishment. This culture of secrecy undermines the effectiveness of MPDSR and limits opportunities for learning and improvement.

To address these barriers, we suggest that healthcare institutions need to adopt more supportive organizational policies. Strong leadership, teamwork, and collaboration with other health sectors, such as infectious disease control units, can encourage healthcare workers to participate in MPDSR. Additionally, the introduction of user-friendly tools, such as electronic death review forms, can help streamline the MPDSR process and make it easier for healthcare workers to participate.

6.1. Lack of training and education

One of the main barriers to effective MDR is the lack of standardized training and education for healthcare workers (van de Water *et al.*, 2023). Numerous healthcare workers are unfamiliar with MPDSR procedures and lack the necessary skills to participate effectively. The study will emphasize the need for comprehensive training programs that equip healthcare workers with the knowledge and skills required to implement MPDSR.

Previous studies have shown that healthcare workers who receive in-service training are more likely to participate in MPDSR than those who do not (Alene *et al.*, 2019; Sreepathy *et al.*, 2022). In-service training provides healthcare workers with the opportunity to learn about the importance of MPDSR and how to conduct effective reviews. The study will highlight the need for more structured and consistent training programs to ensure that all healthcare workers are equipped to participate in MPDSR.

6.2. Resource constraints

Maternal and perinatal mortality audits, integral to monitoring and evaluation, require substantial resources, including both human and non-human elements. Ensuring the sustainability of these audits requires healthcare facilities to allocate a dedicated budget. Evidence supports the importance of maternal death management protocols at all levels (Smith *et al.*, 2017). In Northern Nigeria, a study by Yisa (2025) revealed that a lack of infrastructure, inadequate staffing, low salaries, and poor working conditions hinder healthcare workers' motivation to participate in audits, even when they understand their importance. Additionally, basic amenities such as water and electricity are critical to conducting death audits, and their absence discourages workers from fully engaging in the process.

6.3. Cultural and social factors

Cultural and social factors, as highlighted by Omer *et al.*, (2017) significantly influence healthcare workers' participation in MDRs. Numerous healthcare workers believe maternal deaths could be avoided in better-equipped

settings with modern equipment and highly qualified staff. Cultural attitudes within hospital environments, including fears of blame and procedural constraints, often prevent workers from initiating MDRs, even though they understand their value.

7. Enablers of initiating maternal and perinatal death reviews

Given that one-third of maternal deaths in Nigeria occur in Kebbi State, identifying health system barriers to MPDSR is crucial (Nasir *et al.*, 2022). While factors that predict the occurrence of deaths differ from those that predict responsiveness to reviews, enabling factors such as effective communication and leadership support are essential. Our study, with its large sample size, is expected to contribute significantly to understanding the enablers of initiating MPDSR.

7.1. Effective communication strategies

Healthcare workers must have strong communication skills to engage communities and foster discussions around MDRs. Clear, empathetic communication is crucial, especially in Nigeria, where healthcare providers must distinguish between clinical review and emotional or legal consequences (Actis Danna *et al.*, 2023).

7.2. Leadership and management support

Leadership plays a key role in creating an enabling environment for MDRs. Supportive management can encourage healthcare workers to engage in quality improvement processes, while policy changes that address systemic resource gaps further motivate workers to participate.

7.3. Policy and institutional support

Institutions must clearly define roles and responsibilities to support MDRs. National policies should account for the increased workload these reviews entail. Decentralizing responsibilities and using review findings at the facility level can foster healthcare workers' ownership of the process, leading to better outcomes.

8. Expected outcomes

The protocol aims to improve the implementation of MPDSR in Nigeria, thereby reducing maternal and newborn deaths. The findings will inform policy changes and strengthen the use of MPDSR across healthcare facilities. The research also bridges gaps in global knowledge on maternal and perinatal mortality.

9. Conclusion

The study will highlight the significant variation in institutional MPDSR practices and the potential for improved coordination in obstetric care. Key factors influencing staff responsiveness include access, time, and motivation, with improvements in accessibility, observation quality, and self-regulation potentially enhancing occupational health practices. Common predictors for initiating MPDSR include age, pregnancy history, recent deaths, and preparedness to respond to such events. A dynamic institutional culture could bridge preexisting differences among staff members, offering sustainable solutions to improve patient safety. It is recommended that state and local multidisciplinary teams conduct ongoing situational analyses, update resource forecasts, and tailor training and task lists to the needs of healthcare workers. There is a need for robust knowledge assessments to address gaps in healthcare workers' understanding of severe maternal and perinatal outcomes. Emphasis should be placed on equipping nurses and midwives with the skills needed to provide basic emergency obstetric and newborn care. Additionally, coordinated efforts to forecast staffing and allocate resources should be developed, and regular updates should be conducted to ensure readiness for heightened demand in maternal and newborn care.

The study will acknowledge the limitations in collecting comprehensive data on individual-level factors that could influence healthcare workers' responsiveness. Future research should explore social influences, job burnout, emotional exhaustion, and training quality using methodologies that enable deeper analysis of these factors. Larger sample sizes, additional facility types, and prospective studies would provide more insight into the effects of interventions over time. The generalizability of the findings should also be explored in contexts beyond public health settings, as these factors may vary significantly in resource-rich environments.

Overall, the study will provide initial evidence on predictors of responsiveness to MPDSR initiation in SHFs in Kebbi State, Nigeria. It underscores the collective impact of structural, predisposing, and enabling factors in predicting healthcare workers' engagement in MPDSR, paving the way for further research on healthcare quality improvement interventions.

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Conflict of interest

The authors hereby declare no conflict of interest.

Author contributions

Conceptualization: Kabiru Abubakar Gulma, Joy UBERU

Formal analysis: Kabiru Abubakar Gulma, Joy UBERU

Investigation: Kabiru Abubakar Gulma, Joy UBERU

Methodology: Kabiru Abubakar Gulma, Joy UBERU

Writing—original draft: Kabiru Abubakar Gulma, Uebari Korfi

Writing—review & editing: Kabiru Abubakar Gulma, Uebari Korfi

Ethics approval and consent to participate

Ethical approval was granted by the Institutional Review Board (IRB) of Euclid University (EC/2024/0115). Additionally, permission from the Kebbi State Ministry of Health to collect data from participating hospitals will be sought. Participation will be voluntary, and confidentiality will be maintained throughout the research. Written informed consent will be obtained from all study participants.

Consent for publication

Participants in the research will be informed that their responses will be published in a journal, and written consent will be obtained before proceeding. All data collected will be anonymized, and no identifying information will appear in any publication or report.

Availability of data

Not applicable.

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Appendix

Questionnaire for Healthcare Workers on Predictors of Responsiveness in Initiating Maternal and Perinatal Death Reviews

Introduction

Dear Healthcare Professional:

We are researching the factors influencing healthcare workers' responsiveness in initiating Maternal and Perinatal Death Reviews (MPDR) in secondary health facilities in Kebbi State, Nigeria. Your participation is vital to help improve maternal and child health outcomes in our community.

Participation is voluntary, and all responses will be kept confidential. The information collected will be used solely for research purposes and to inform policy and practice improvements. Completing this questionnaire should take approximately 15 minutes.

Thank you for your time and valuable input.

Section A: Demographic Information

1. **Age:**
 - ☐ Under 25 years
 - ☐ 25–34 years
 - ☐ 35–44 years
 - ☐ 45–54 years
 - ☐ 55 years and above
2. **Gender:**
 - ☐ Male
 - ☐ Female
3. **Profession:**
 - ☐ Nurse
 - ☐ Midwife
 - ☐ Doctor (Medical Officer)
 - ☐ Community Health Extension Worker
 - ☐ Community Health Officer
 - ☐ Other (please specify): _____
4. **Years of Experience in Current Profession:**
 - ☐ Less than 1 year
 - ☐ 1–5 years
 - ☐ 6–10 years
 - ☐ 11–15 years
 - ☐ 16–20 years
 - ☐ More than 20 years
5. **Type of Facility:**
 - ☐ Public Secondary Health Facility
 - ☐ Private Secondary Health Facility

6. Department/Unit:

- ☐ Obstetrics and Gynecology
- ☐ Maternity Ward
- ☐ Labor and Delivery
- ☐ Neonatal Unit
- ☐ Other (please specify): _____

Section B: Knowledge of Maternal and Perinatal Death Reviews

7. Have you heard of Maternal Death Review (MDR)?

- ☐ Yes
- ☐ No

8. Have you heard of Perinatal Death Review (PDR)?

- ☐ Yes
- ☐ No

9. What is the primary purpose of conducting an MDR/PDR? (Select all that apply)

- ☐ To assign blame for the death
- ☐ To understand the causes and circumstances of the death
- ☐ To improve the quality of care
- ☐ To fulfill legal requirements
- ☐ To prevent future maternal and perinatal deaths
- ☐ Other (please specify): _____

10. Which components are essential in an MDR/PDR process? (Select all that apply)

- ☐ Identification and notification of deaths
- ☐ Data collection and analysis
- ☐ Confidential case reviews
- ☐ Formulating recommendations for action
- ☐ Implementing changes to prevent future deaths
- ☐ Dissemination of findings
- ☐ None of the above

11. Who is responsible for initiating an MDR/PDR in your facility?

- ☐ Medical Director
- ☐ Head of Department
- ☐ Any healthcare worker involved in the case
- ☐ Designated MDR/PDR Committee
- ☐ Not sure
- ☐ Other (please specify): _____

Section C: Attitudes Toward Initiating MDR/PDR

Please indicate your level of agreement with the following statements:

(Use the scale: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

12. I believe that initiating an MDR/PDR is an important part of my professional responsibilities.

13. Conducting MDR/PDR can help improve patient care in our facility.
14. I am confident in my ability to initiate an MDR/PDR when a maternal or perinatal death occurs.
15. Initiating an MDR/PDR may lead to blame or punishment of the staff involved.
16. There is a supportive culture in my facility that encourages open discussion of maternal and perinatal deaths.
17. Time constraints prevent me from participating in MDR/PDR activities.
18. I am concerned about the legal implications associated with participating in an MDR/PDR.
19. Management in my facility supports staff in initiating and conducting MDR/PDR.
20. Participating in MDR/PDR is stressful and emotionally challenging for me.

Section D: Training and Competency

21. Have you received any formal training on how to conduct an MDR/PDR?

- ☐ Yes
- ☐ No

22. If yes, when did you receive this training?

- ☐ Within the past 6 months
- ☐ 6 months to 1 year ago
- ☐ More than 1 year ago

23. Do you feel competent in conducting an MDR/PDR?

- ☐ Yes
- ☐ No
- ☐ Not sure

24. Are you prepared to train others on how to conduct MDR/PDR?

- ☐ Yes
- ☐ No
- ☐ Not sure

25. Would you like to receive additional training on MDR/PDR?

- ☐ Yes
- ☐ No

Section E: Facility Capacity and Resources

26. Does your facility have established protocols or guidelines for conducting MDR/PDR?

- ☐ Yes
- ☐ No
- ☐ Not sure

27. Is there a designated committee or team responsible for MDR/PDR in your facility?

- ☐ Yes
- ☐ No
- ☐ Not sure

28. How often are MDR/PDR meetings held in your facility?

- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ Only when a death occurs

- ☐ Never
- ☐ Not sure

29. Does your facility provide adequate resources (e.g., time, staff, materials) to support MDR/PDR activities?

- ☐ Yes
- ☐ No
- ☐ Not sure

30. Do you have access to reporting forms and tools necessary for conducting MDR/PDR?

- ☐ Yes
- ☐ No
- ☐ Not sure

Section F: Barriers to Initiating MDR/PDR

31. Please identify any barriers you face in initiating or participating in MDR/PDR: (Select all that apply)

- ☐ Lack of time due to workload
- ☐ Insufficient training or knowledge
- ☐ Fear of blame or punitive actions
- ☐ Lack of management support
- ☐ Cultural or social stigma
- ☐ Inadequate resources or facilities
- ☐ Unclear protocols or guidelines
- ☐ Legal concerns
- ☐ Emotional difficulty dealing with death
- ☐ Other (please specify): _____

32. How significant are these barriers in preventing you from initiating MDR/PDR?

- ☐ Not significant
- ☐ Somewhat significant
- ☐ Significant
- ☐ Very significant

Section G: Facilitators to Initiating MDR/PDR

33. What factors would encourage you to initiate or participate in MDR/PDR? (Select all that apply)

- ☐ Comprehensive training and education
- ☐ Supportive leadership and management
- ☐ Availability of necessary resources and time
- ☐ Clear and accessible protocols/guidelines
- ☐ Positive reinforcement and recognition
- ☐ Effective communication among staff
- ☐ Collaborative team environment
- ☐ Assurance of non-punitive culture
- ☐ Legal protection and clarity
- ☐ Other (please specify): _____

34. How likely are you to initiate an MDR/PDR if these facilitators are in place?

- ☐ Very unlikely
- ☐ Unlikely
- ☐ Likely
- ☐ Very likely

Section H: Knowledge Assessment

Please answer the following questions to the best of your ability:

35. Which of the following best defines a Maternal Death?

- ☐ The death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause related to or aggravated by the pregnancy or its management
- ☐ Death of a woman due to accidental causes
- ☐ Death of a woman more than one year after delivery
- ☐ Not sure

36. Which of the following is a primary goal of Perinatal Death Review?

- ☐ Assigning blame to healthcare workers
- ☐ Improving the quality of care to prevent future deaths
- ☐ Fulfilling administrative requirements
- ☐ Not sure

37. True or False: The information discussed during an MDR/PDR is confidential and should not be disclosed outside the review process.

- ☐ True
- ☐ False
- ☐ Not sure

38. Which of the following actions is important after conducting an MDR/PDR? (Select all that apply)

- ☐ Implementing recommended changes to prevent future deaths
- ☐ Sharing findings with relevant staff and departments
- ☐ Punishing staff involved in the case
- ☐ Monitoring and evaluating the impact of implemented changes
- ☐ Filing the report without further action

Section I: Additional Comments

39. Please provide any additional comments or suggestions on how to improve the initiation and implementation of MDR/PDR in your facility:

Thank you for your participation and valuable contributions to this important research.

Instructions for Submission:

- Please return the completed questionnaire to the designated research assistant or place it in the provided collection box.
- If you have any questions or require further information, please contact the research team at:
 - ☐ **Email:** researchteam@example.com
 - ☐ **Phone:** +234 XXX XXX XXXX

Confidentiality Statement:

All information provided will be kept strictly confidential. Your responses will be anonymized and used only for research purposes. Participation is voluntary, and you may withdraw at any time without any consequences.

Research Team:

- **Principal Investigator:** Kabiru Abubakar Gulma, Professor, Euclid University, The Gambia
- **Co-Investigator:** Joy Uberu, Ministry of Health, Kebbi State