http://www.ijwhr.net
doi 10.15296/ijwhr.2025.8901
Open Access Original Article
IJWHR
International Journal of Women's Health and Reproduction Sciences
Vol. 13, No. 3, July 2025, 136–146
ISSN 2330-4456

Assessing Maternal Knowledge of Stillbirth and Its Influence on Antenatal Care Practices in Reducing Stillbirth Risk

Simbarashe Magaisa[1*], Nirmala Dorasamy[2]

Abstract

Objectives: Stillbirth remains a critical public health issue in South Africa, especially in rural areas like the Lejweleputswa district, where maternal and neonatal outcomes are compromised by systemic challenges. This study investigates the influence of maternal knowledge of stillbirth on antenatal care (ANC) practices and explores how this relationship affects infant outcomes.

Materials and Methods: A mixed-methods design was adopted. Quantitative data were collected from 263 mothers using structured questionnaires, while qualitative data were gathered through in-depth interviews with 20 healthcare workers across public health facilities.

Results: Results showed that 58% of respondents had limited knowledge of stillbirth causes and risk factors, and only 35% recognized early ANC as a preventive measure. Significant positive correlations were found between stillbirth knowledge and ANC practices ($R = 0.571$, $R^2 = 0.325$, $P < 0.001$), ANC practices and maternal healthcare quality ($R = 0.635$, $R^2 = 0.403$, $P < 0.001$), and infant outcomes ($R = 0.605$, $R^2 = 0.366$, $P < 0.001$).

Conclusions: Qualitative findings supported these results, with healthcare providers citing staffing shortages, rushed consultations, and weak referral systems as barriers to quality care. The study highlights the need for provider-led maternal health education and systemic improvements in ANC delivery. Targeted interventions strengthening health education and infrastructure can significantly reduce perinatal mortality in under-resourced regions.

Keywords: Antenatal, Education, Healthcare, Infrastructure, Knowledge, Maternal, Mortality, Qualitative

Introduction

Stillbirths defined as the death of a fetus at 28 weeks of gestation or later remain one of the most persistent and under-addressed global health challenges, particularly in low- and middle-income countries (1,2). Despite global health targets such as Every Newborn Action Plan (ENAP) which aims to reduce stillbirths to 12 or fewer per 1000 births by 2030, progress remains uneven and painfully slow in sub-Saharan Africa and South Asia, where the majority of the estimated 1.9 million annual stillbirths occur (3). These losses are not only deeply traumatic for families but are also indicative of systemic gaps in maternal and newborn healthcare services (4).

South Africa, while more economically developed than many of its regional counterparts, continues to struggle with unacceptably high stillbirth rates particularly in rural and underserved areas (5). Data from the *Saving Babies Report* indicates that approximately 16000 stillbirths occur annually in South Africa, with intrapartum deaths (those occurring during labor) being especially prevalent (6). The Free State Province and more specifically, the Lejweleputswa district has consistently recorded higher-than-average stillbirth incidences, pointing to persistent disparities in maternal health access, quality, and utilization (7). These outcomes emphasize the urgent need for targeted interventions that address both the clinical and non-clinical determinants of stillbirth (8).

Among the most critical factors influencing maternal and neonatal outcomes is antenatal care (ANC). Effective ANC has been shown to significantly reduce the risk of stillbirth by enabling early detection and management of hypertensive disorders, infections, fetal growth restriction, and other complications (9). Additionally, ANC visits serve as platforms for health promotion, nutrition counseling, birth preparedness, and danger sign recognition. The WHO recommends a minimum of eight ANC contacts for a healthy pregnancy, yet in South Africa, many pregnant women especially in rural settings initiate ANC late or attend fewer than the recommended visits (10). Late initiation and infrequent ANC attendance are consistently associated with higher risks of poor pregnancy outcomes, including stillbirth (11,12).

However, the success of ANC in improving maternal and neonatal outcomes is highly dependent on women's

Received 10 February 2025, **Accepted** 24 June 2025, **Available online** 8 July 2025

[1]Doctor of Philosophy in Management Sciences: Public Administration, Durban University of Technology, South Africa.
[2]Department of Public Management and Economics, Durban University of Technology, South Africa.
***Corresponding Author:** Simbarashe Magaisa, Email: simbamagaisa18@gmail.com

knowledge, beliefs, and health-seeking behavior (13). In rural communities, maternal health literacy defined as the capacity to obtain, process, and understand basic health information to make appropriate health decisions plays a decisive role in ANC utilization (14). When pregnant women lack knowledge about the purpose and timing of ANC, or fail to recognize stillbirth risk factors, they may delay seeking care until complications arise (15).

Studies in Limpopo and Kwazulu-Natal provinces have further illustrated how inadequate health communication, combined with entrenched socio-cultural norms, deters early ANC attendance (16). Women often attend ANC for administrative purposes such as obtaining a clinic card or registering for child support grants rather than for preventive health reasons (17). In such contexts, the lack of targeted health education during ANC sessions means that stillbirth risk factors, warning signs (such as reduced fetal movements), and danger signs in pregnancy remain poorly understood (18).

Moreover, the Basic Antenatal Care (BANC) model implemented in South Africa emphasizes a limited number of goal-directed visits for low-risk pregnancies, but this model assumes that women present early in pregnancy and that healthcare workers have adequate time and resources to conduct effective counseling (19,20). Unfortunately, resource constraints, high patient loads, and inadequate training in health education often undermine this assumption (21). As a result, stillbirth education is often overlooked or inconsistently delivered, and pregnant women may leave ANC visits without receiving vital information on how to safeguard their pregnancies (22).

This study therefore seeks to fill a critical knowledge gap by assessing the level of awareness among pregnant women regarding stillbirth and exploring how this awareness or lack thereof influences their engagement with ANC services. The underlying premise is that improving maternal knowledge of stillbirth risks could enhance ANC practices and thereby reduce stillbirth incidence (23). By examining this link within the specific context of the Lejweleputswa district, the study aims to inform more effective maternal health education strategies and contribute to broader efforts to reduce preventable perinatal mortality in South Africa.

Methods

Research Setting and Design

This study adopted a mixed-methods research design to investigate how healthcare quality and infrastructure influence maternal and infant health outcomes in the Lejweleputswa District Municipality, Free State Province, South Africa. Quantitative data were collected through structured questionnaires, while qualitative data were obtained via semi-structured interviews with healthcare professionals to capture deeper insights into systemic challenges and perceptions (24). A cross-sectional approach was used for the quantitative component, enabling the collection of data at a single point in time across multiple healthcare facilities.

Lejweleputswa district is categorized as a Category C municipality and is situated in the northwestern region of the Free State (25). The district spans approximately one-third of the province and comprises five local municipalities: Masilonyana, Tokologo, Tswelopele, Matjhabeng, and Nala. It encompasses around 18 towns, including Welkom, Virginia, Odendaalsrus, Bothaville, and Theunissen. Due to its demographic diversity and variability in healthcare infrastructure, the district presents an ideal setting for evaluating the quality of maternal care and its impact on outcomes such as stillbirth (26). This study seeks to provide policy-relevant insights for improving maternal healthcare delivery in rural and peri-urban settings.

Population and Sampling

Quantitative data on stillbirth and infant mortality were extracted from patient records in district hospitals and clinics. In addition, structured questionnaires were administered to mothers to document their antenatal experiences, care quality, and pregnancy outcomes (27). To pregnant women visiting specific public health clinics for ANC, 267 structured questionnaires were issued. From this number, 263 responses were received resulting in the respondents completing 72% of the total queries and thus forming a basis for quantitative assessment. In the same manner, from the initial pool of 32 identified and approached healthcare providers for qualitative interviews, only 20 attended the final data collection session. The total sample size is therefore comprised by the remaining participating respondents: 263 mothers and 20 healthcare providers. Overall, all analyses wherein these participants are cited pertain to this study. The differences observed between initial projections and actual participants illustrate some practical issues during data collection such as lack of participant availability and restrictions to provide consent.

The sample size was determined using the Raosoft sample size calculator, assuming a 5% margin of error, a 95% confidence interval, and a target population of 5225, resulting in a minimum required sample of 358 participants. Based on sample size calculations made using Raosoft (358 participants with a 95% confidence level and a 5% error rate), a significant portion of the responses were collected for the study. However, only 263 questionnaires were returned, resulting in a response rate of 72%. Although this sample size is relatively good for fieldwork, it poses problems in terms of both statistical power and generalizability. In particular, reduced sampling may limit the study's ability to detect minor effects as the risk of type II error increases. Moreover, while statistically

significant, the results may be less accurate – the results may be dominated by random noise and may not reflect significant characteristics of the population outside the Lejweleputswa district. In the absence of a follow-up capacity analysis, there is also no definitive attribution to quantify its impact, which in turn justifies the above-mentioned uncertainty. Therefore, these results need to be taken at face value and with considerable uncertainty – and to broaden these conclusions, further research with stronger and more representative samples is recommended to strengthen this evidence base.

The target population also included healthcare providers such as nurses, doctors, midwives, facility managers, and community health workers working within the district's public health facilities (28). Participants were purposively selected for the qualitative interviews based on their roles in maternal healthcare provision. For the qualitative component, healthcare providers such as nurses, doctors, midwives, facility managers, and community health workers were purposively selected from public health facilities in the district based on their roles in maternal healthcare provision. While this approach ensured that participants had relevant experience and insights, it may also introduce selection bias. Specifically, the representativeness of these participants relative to the broader population of healthcare providers in the Lejweleputswa district is uncertain. As such, the perspectives captured in the qualitative data may reflect the experiences and views of a particular subset of providers, potentially limiting the generalizability of the findings. Future research may benefit from incorporating more systematic or stratified sampling methods to enhance representativeness.

Data Collection Instruments

A structured questionnaire was developed to assess knowledge, attitudes, and practices related to maternal healthcare and stillbirth prevention. The tool was divided into the following sections:

- Section A: Demographic Information (age, gender, role, years of service, facility type)
- Section B: General Knowledge of Stillbirth and Maternal Health
- Section C: Understanding of Stillbirth (causes, risk factors, prevention strategies)
- Section D: Attitudes Toward Maternal Healthcare and Perinatal Risk
- Section E: Socioeconomic Influences (education, income, employment, transport access)
- Section F: ANC Practices (frequency, timing, quality of ANC visits)
- Section G: Quality of Maternal Health Services (service delivery, staffing, diagnostic capacity)
- Section H: Infant Outcomes (including live birth or stillbirth)

Each item was measured on a 5-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). Qualitative interviews were guided by a semi-structured interview schedule aligned with the study's objectives, focusing on healthcare workers' experiences, challenges, and perceptions regarding maternal care and stillbirth prevention (29).

Validity and Reliability

To ensure content validity, the questionnaire was reviewed by a panel of public health experts specializing in maternal and child health. A pilot study involving 20 participants was conducted to refine the instrument. Cronbach's alpha was used to assess internal consistency, with a minimum acceptable threshold of 0.70 for each construct (30). For the mixed-methods integration, triangulation was applied to enhance credibility by comparing and contrasting qualitative and quantitative findings.

Data Collection Procedure

Data were collected via self-administered questionnaires distributed both in person and electronically to selected participants. For the qualitative component, interviews were conducted face-to-face in private, secure locations to ensure participant comfort and confidentiality (31). Participation was entirely voluntary, and written informed consent was obtained from all respondents. Confidentiality and anonymity were strictly maintained throughout the study.

Data Analysis

Quantitative data were analyzed using SPSS version 29. Descriptive statistics including means and standard deviations were used to summarize respondent characteristics and identify patterns in maternal healthcare quality, infrastructure, and infant outcomes (32). Inferential statistics, such as correlations and regression analysis, were used to explore associations between stillbirth knowledge and ANC practices. Due to the cross-sectional nature of the study, the analysis is limited to identifying relationships without identifying a causal relationship. No multivariate regression models or reliability checks, including checks on the mother's known age, education, income level, or geographic access to health care, were performed. The associations are probably due to unmeasured factors. Although the results provide important preliminary information, strong causal conclusions should not be drawn from the main socio-demographic disruptors that have not been measured. The use of these identified confounding factors in longitudinal studies would greatly strengthen future studies. Qualitative data were transcribed and analyzed thematically using manual coding and validation against emerging patterns. Qualitative data was transcribed and analyzed thematically through manual coding processes. However, no NVivo,

Atlas.ti, MAXQDA, or any other qualitative data analysis software were utilized to assist in organizing the data. While manual coding has its usefulness, lack of software support can hinder transparency and reproducibility. Also, inter-coder reliability was not formally assessed which impacts consistency in theme identification and categorization. Future research would be strengthened qualitatively if multiple coders with quantitative reliability checks (Cohen's kappa or percent agreement) were applied to cross-validated analyses using qualitative software to diversify analytical rigor and credibility. Key quotes were extracted to support and contextualize the quantitative findings.

Ethical Considerations

The study was approved by the Durban University of Technology Institutional Research Ethics Committee (Ref. No. IREC 056/24) and formally authorized by the Free State Provincial Department of Health (FS_202407_013). Participants were fully informed about the nature, purpose, and scope of the study and signed informed consent forms before participation. They were assured of their right to withdraw at any stage without any consequence (33). Interviews were conducted in a safe and private environment, ensuring the ethical principles of autonomy, confidentiality, and non-maleficence were upheld throughout the research process. The qualitative interviews addressed culturally sensitive topics, including community beliefs related to stillbirth, such as witchcraft, taboos, and spiritual explanations for pregnancy loss. To minimize potential distress or stigma, interviewers received training on cultural competence and respectful communication. Questions were phrased in a non-judgmental, open-ended manner, allowing participants to express beliefs without fear of judgment. Interviews were conducted in private settings to ensure confidentiality and emotional safety, and participants were reminded of their right to decline to answer any question or to withdraw from the interview at any point. These precautions were taken to uphold ethical standards while fostering trust and encouraging honest, culturally nuanced responses.

A cross-sectional mixed-methods design was employed. Quantitative data were collected using a structured questionnaire administered to 263 pregnant women attending ANC at public health clinics in Lejweleputswa District. The questionnaire measured participants' knowledge of stillbirth causes, warning signs, and prevention strategies, alongside their ANC attendance patterns and compliance (34). Qualitative data were obtained through in-depth interviews with 20 healthcare providers, focusing on their perspectives regarding patient knowledge and education gaps. Quantitative data were analyzed using SPSS, including regression analysis to determine associations, while qualitative responses were analyzed thematically.

Results

Quantitative Data

The study assesses ways of enhancing South African maternal care within the public health system by exploring a case of stillbirths in the Lejweleputswa District Municipality. The researcher successfully retrieved 263 administered questionnaires, resulting in a response rate of approximately 72% (Table 1). It is important to highlight the previous sections of the manuscript, which mention a sample of 267 mothers and 32 providers. Nevertheless, the final dataset available for analysis consisted of 263 completed maternal questionnaires and 20 health care provider interviews. This gap is due to practical issues during data collection, including participant dropouts, incomplete responses, and lack of time for scheduled interviews. Therefore, all statistical analyses conducted in this study are limited to the final sample of 263 maternal respondents and 20 health care providers. The study achieved a 72% response rate, with 263 out of 365 questionnaires distributed. Although this ratio is acceptable in community-based health research, it also has caveats. The study does not attempt to explain the unexplained 28% non-response rate or determine whether non-respondents systematically differed from participants in terms of demographic variables, access to health care, or use of prenatal services. This lack of information significantly limits the investigation of potential factors that could contribute to non-response bias, which could affect the generalizability and representativeness of the results.

Future studies should aim to collect basic demographic information from non-respondents or employ other methods aimed at better understanding and correcting for these biases.

Impact of Knowledge of Stillbirth on Antenatal Care Practices

The analysis tested the hypothesis that knowledge of stillbirth (KS) significantly predicts ANC practices (P) (35). Results showed a moderate positive correlation ($R = 0.571$), with KS explaining 32.5% of the variation in antenatal practices ($R^2 = 0.325$). The model was statistically significant ($F(1, 262) = 125.950$, $P < 0.001$), and the regression coefficient ($\beta = 0.571$) confirmed that higher stillbirth knowledge is linked to improved ANC practices (Table 2).

Table 1. Response Rate Analysis

Total Number of Questionnaires Distributed	Numbers of Questionnaires Returned/Responded (%)	Number of Questionnaire Non-Responded (%)
365	263(72%)	102 (28%)

Table 2. The Impact of Knowledge of Stillbirth on Antenatal Care Practices

Hypothesis	DV	IV	R	R^2	F	df1; df2	B (Regression Coefficient)	t	*P* Value
H1	P	KS	0.571	0.325	125.950	1; 262	0.571	11.223	<0.001

Note: P = Practices related to antenatal care; KS=Knowledge of stillbirth; DV = Dependable value; IV = Independent value.

The regression equation for this relationship is P = 1.965 + (0.571 * KS)

Impact of Practices Related to Antenatal Care on Quality of Maternal Health Services

The second hypothesis (H2) tested whether ANC practices (P) significantly predict the quality of maternal health services (Q) (36). Results showed a strong positive correlation (R = 0.635), with 40.3% of the variation in Q explained by P ($R^2 = 0.403$). The model was statistically significant (F (1, 262) = 176.222, $P < 0.001$), and the regression coefficient (β = 0.635) indicates that better ANC practices lead to notable improvements in maternal health service quality (Table 3).

The Impact of Practices Related to Antenatal Care on Infant Outcomes

The sixth hypothesis (H3) tested whether ANC practices (P) significantly influence infant outcomes (IF). The analysis showed a strong positive correlation (R = 0.605), with 36.6% of the variation in infant outcomes explained by ANC practices ($R^2 = 0.366$). The model was significant (F (1, 262) = 150.562, $P < 0.001$), and the regression coefficient (β = 0.605) confirmed that better antenatal practices lead to improved infant health outcomes (Table 4). Regression models identified important associations between maternal awareness of stillbirth, prenatal care, perceived quality of service, and infant mortality outcomes, with R^2 values ranging from 0.325 to 0.403. This means that 32.5% to 40.3% of the variance of the results was explained by the corresponding predictors. These moderate estimates are indeed significant, but suggest that there are still a significant number of unexplained differences in the data analyzed. The results of the model also did not include other important factors, such as socioeconomic status, maternal health, distance from health centres, or availability of obstetric emergency services, which could significantly influence these outcomes and shape behavioural patterns in maternal care and health outcomes. Thus, the relationships explained can be strong, but they should be adapted to the context when interpreting predictive power, especially given the numerous factors that influence maternal and newborn health.

The regression equation for this relationship is IF = 1.766 + (0.605 * FC).

Qualitative DATA

Four main themes emerged from the analysis of the transcripts. The detailed structure of these themes and sub-categories is presented in Table 5.

Theme 1: Knowledge of Stillbirth

Sub-theme 1.1: Awareness of Causes

Participants commonly associated stillbirth with factors such as inadequate ANC, hypertension, infections, and delayed hospital visits (37). Midwives highlighted mismanagement of high-risk pregnancies and referral delays as significant contributors.

> *"We often see cases where mothers come in too late with complications we could have managed earlier."* – Nurse, Masilonyana Clinic (Participant 5)

> *"High blood pressure is a big problem. If not controlled early, it can lead to losing the baby."* – Midwife, Tswelopele (Participant 12)

These insights align with findings from Bedwell et al (38), who noted that poor communication and delayed interventions contribute to unexplained stillbirths in sub-Saharan Africa.

Sub-theme 1.2: Prevention Strategies

There was a strong recognition among participants that

Table 3. Impact of Practices Related to Antenatal Care on Quality of Maternal Health Services

Hypothesis	DV	IV	R	R^2	F	df1; df2	B (Regression Coefficient)	t	*P* Value
H4	Q	P	0.635	0.403	176.222	1; 262	0.635	13.275	<0.001

Note: P = Practices related to antenatal care; Q=Quality of Maternal health services; DV = Dependable value; IV = Independent value.

Table 4. The Impact of Practices Related to Antenatal Care on Infant Outcomes

Hypothesis	DV	IV	R	R^2	F	df1; df2	B (Regression Coefficient)	t	*P* Value
H6	IF	P	0.605	0.366	150.569	1; 262	0.605	12.271	<0.001

Note: IF=Infant outcome; P = Practices related to antenatal care; DV = Dependable value; IV = Independent value.

Table 5. Themes and Sub-themes

Theme	Sub-themes
Knowledge of stillbirth	Awareness, prevention, responsibility
Antenatal care practices	Timing, compliance, barriers
Quality of maternal services	Infrastructure, staff competence, availability
Infant outcomes & stillbirth	Birth preparedness, emergency response, community beliefs

timely ANC visits, ultrasound scans, and nutritional support could prevent stillbirths.

"Early check-ups help us detect problems before they become serious." – (Participant 8)

"Proper nutrition and regular scans are essential to monitor the baby's health." – (Participant 15)

This perspective is supported by research indicating that quality ANC, including timely ultrasounds, nutritional counseling, and early detection of complications, plays a crucial role in reducing stillbirth risks. A multi-country analysis by Mina et al,[39] Arsenault et al,[40] emphasized that up to 50% of stillbirths could be prevented through improved ANC services and timely obstetric interventions.

Sub-theme 1.3: Perceived Responsibility

Some respondents viewed stillbirth prevention as a collective responsibility involving health professionals and communities.

"It's not just the mother's duty; we all have a role in ensuring a healthy pregnancy." – (Participant 20)

"Community education can help dispel myths and encourage timely care-seeking." – (Participant 25)

This aligns with who emphasized the importance of health system accountability and community involvement in preventing stillbirths.

Theme 2: Antenatal Care Practices

Sub-theme 2.1: Timing and Frequency

Many women-initiated ANC after 20 weeks, often due to distance, lack of transport, or delayed recognition of pregnancy.

"Most mothers live far from the clinic, and transport is expensive. That's why they started late." – (Participant 3)

"Some mothers didn't know they were pregnant until they missed several periods." – (Participant 9)

These barriers are consistent with findings from the African Journal of Midwifery and Women's Health, which reported that cultural beliefs and logistical challenges hinder timely ANC attendance.

Sub-theme 2.2: Compliance with Medical Advice

Respondents reported following dietary advice and taking iron supplements but highlighted gaps in continuity of care during the third trimester.

"Most moms take the supplements as advised, but towards the end, they miss some appointments due to work." – (Participant 14)

"The clinic was overcrowded, and some mothers complain that they couldn't get an appointment in my last month." – (Participant 22)

These findings are consistent with research by, which observed that while women often adhere to dietary and supplement recommendations during early ANC visits, challenges such as work commitments and clinic overcrowding contribute to reduced attendance and continuity of care in the third trimester, potentially compromising maternal and fetal health outcomes.

Sub-theme 2.3: Barriers to Care

Key barriers included long waiting times, inadequate staff, and negative provider attitudes.

"Some mothers wait for hours, and when they were finally seen, the nurse was rude." – (Participant 7)

"There aren't enough staff to attend to everyone promptly." – (Participant 11)

These findings mirror Mira-Catalá et al (41), who highlighted gaps in respectful maternity care and the impact of provider attitudes on care-seeking behavior.

Theme 3: Quality of Maternal Health Services

Sub-theme 3.1: Infrastructure and Equipment

Participants noted frequent equipment breakdowns (e.g., fetal monitors, ultrasound machines) and power outages.

"The ultrasound machine has been broken for weeks; we have to refer patients elsewhere." – (Participant 13)

"Power cuts disrupt our services, especially during emergencies." – (Participant 18)

These infrastructural challenges including inadequate facilities, poor equipment, and unreliable electricity, pose significant barriers to delivering quality maternal care. According to Sarikhani et al (42), such deficiencies in healthcare infrastructure are directly linked to delays in care and increased maternal and perinatal mortality, especially in rural settings.

Sub-theme 3.2: Staff Competence

Some women reported confidence in nurses' skills, but others described rushed consultations and misdiagnoses.

"The nurses are knowledgeable, but they're overwhelmed with patients." – (Participant 6)

"Other patients complain of misdiagnosed because the consultation gets too quick." – (Participant 16)

This aligns with findings by Van der Pijl et al (43), who noted that overburdened health workers in low-resource settings often compromise care quality, leading to patient

dissatisfaction and clinical errors. Similarly, Dolatabadi et al (44), emphasized that inadequate staffing undermines effective diagnosis and trust in healthcare systems.

Sub-theme 3.3: Service Availability

Limited 24-hour services and inconsistent ambulance availability were repeatedly mentioned.

"Some mothers go into labor at night, but the clinic was closed." – (Participant 2)

"Some mothers complain that call for an ambulance, but it never arrives." – (Participant 19)

These service delivery gaps are consistent with findings by Lateef et al (45), who reported that limited after-hours services and unreliable emergency transport significantly delay maternal care access, contributing to poor perinatal outcomes. Similarly, Chauke (46), highlight that emergency response inefficiencies in rural areas are linked to increased maternal and neonatal mortality.

Theme 4: Infant Outcomes and Stillbirth Prevention

Sub-theme 4.1: Birth Preparedness

Participants who attended multiple ANC sessions were better prepared for birth, understood early warning signs, and had birth plans.

"The health talks helped me recognize danger signs and prepare for delivery." – (Participant 4)

"Most mothers appreciate that they have a clear birth plan, thanks to the guidance from the clinic." – (Participant 10)

This finding aligns with the study by Tony-Igwe et al (47), which showed that comprehensive ANC education improves maternal preparedness and recognition of obstetric danger signs. Similarly, Kaewkiattikun and Lekbornvornwong (48), emphasized that structured ANC sessions enhance birth planning and timely healthcare-seeking behaviors.

Sub-theme 4.2: Emergency Response Readiness

Facilities were reportedly slow to respond to obstetric emergencies.

"Most mother that lost her babies mostly is because the ambulance takes too long." – (Participant 17)

"Other women complain to nurses that there was no doctor available during my emergency; and had to wait for hours." – (Participant 21)

Delayed responses to obstetric emergencies are a known contributor to stillbirths, as supported by the "three delays" model outlined by Kassa et al (49), which highlights delays in reaching and receiving care as critical risk factors. Similarly, a study by found that prolonged waiting times and lack of emergency response in rural facilities significantly increase perinatal mortality rates.

Sub-theme 4.3: Community Beliefs

Cultural misconceptions (e.g., witchcraft, taboos) sometimes delayed health-seeking behavior.

"Some still think a baby dies because of curses. They don't trust the hospital." – (Participant 32)

"People believe that discussing pregnancy complications invites bad luck." – (Participant 24)

These beliefs can hinder timely access to care and need to be addressed through community education. The data underscores the multifaceted challenges in maternal healthcare within Lejweleputswa District. Addressing these issues requires a holistic approach that includes improving infrastructure, enhancing staff training, ensuring service availability, and engaging communities to dispel harmful myths. Such efforts are crucial for reducing stillbirth rates and improving maternal and infant health outcomes.

Discussion

The findings of this study reveal a significant association between maternal knowledge of stillbirth and ANC practices, underscoring the critical role of awareness in improving maternal and infant health outcomes in the Lejweleputswa District. The quantitative analysis demonstrated a moderate positive correlation ($R = 0.571$, $P < 0.001$), indicating that enhanced knowledge of stillbirth substantially influences ANC engagement. This is consistent with findings by Gwako et al (50), Berhe (51), who emphasized that maternal understanding of stillbirth risk factors such as hypertension, infections, and late health-seeking can drive proactive behaviors in pregnancy management. Similarly, the regression model ($R^2 = 0.325$) confirms that over 32% of the variation in ANC practices can be attributed to knowledge levels, highlighting the value of educational interventions in this context.

The study further established that improved ANC practices are strongly linked to the quality of maternal health services ($R = 0.635$, $P < 0.001$) and infant outcomes ($R = 0.605$, $P < 0.001$). These findings align with previous literature, including which illustrated that timely and routine ANC visits significantly reduce the risks of perinatal mortality by ensuring early identification and management of complications. Qualitative data from this study reinforced these conclusions, with health workers and mothers affirming that timely ANC allows for better monitoring, nutritional support, and identification of high-risk pregnancies. However, systemic barriers such as late initiation of ANC, long distances to facilities, and understaffed clinics were frequently cited, echoing studies by Abdiwali et al (52), which reported similar infrastructural and sociocultural challenges across sub-Saharan Africa.

Additionally, respondents in the qualitative analysis highlighted the role of health infrastructure and emergency response systems in determining care quality. Frequent power outages, broken medical equipment, and the lack of 24-hour services were seen as critical impediments,

supporting arguments by Mahada et al (53), who stressed that health system deficiencies are a major contributor to maternal and perinatal mortality. Moreover, staff competence and patient-provider interactions emerged as key themes, with several participants noting rushed or inadequate consultations. These sentiments are consistent with the WHO's framework for respectful maternity care, which advocates for competent, empathetic, and well-resourced health providers to improve maternal outcomes.

Importantly, the findings also emphasized the impact of community beliefs on stillbirth prevention. Misconceptions surrounding witchcraft, taboos, and fatalism often delayed care-seeking behaviors, a challenge well-documented in research by Vousden et al (54), who found that cultural norms can significantly shape maternal decision-making in rural South Africa. While the study establishes a meaningful link between maternal knowledge and ANC practices, alternative explanations for these findings merit further consideration. Socioeconomic status such as household income, education level, employment stability, and access to transportation may significantly influence both the acquisition of maternal health knowledge and the ability to act on it. For example, women with greater financial or educational resources are often better positioned to access information, attend ANC appointments regularly, and advocate for their health needs. Similarly, cultural beliefs and community norms around pregnancy, fatalism, or traditional healing practices can either support or obstruct engagement with formal healthcare. Although the qualitative data briefly touched on these barriers, deeper exploration of how such contextual factors mediate knowledge and behavior could have offered richer explanatory insight. Future research should therefore aim to disentangle these interacting determinants through stratified or multivariate analyses and more nuanced ethnographic inquiry. To address these issues, respondents called for increased community health education and shared responsibility among healthcare workers and the broader public, a view echoed in Hand et al (55), who advocate for integrated health systems that empower both providers and communities.

This study highlights that improving maternal knowledge of stillbirth is not only essential for enhancing ANC practices but also for strengthening maternal health service quality and reducing preventable stillbirths. While this study offers important insights, several limitations should be highlighted to provide context for the findings. First, with knowledge and ANC practices provided by maternal figures during pregnancy, the use of a cross-sectional design further limits any attempts aimed at inference in causality between maternal factors and infant outcomes. Though some associations turned out to be statistically significant, the temporal direction remains in question thus limiting conclusions on whether increased knowledge drives improvement in attendant practices or the other way around. Second, achieving a 72% response rate (263 out of 365 questionnaires) is not very poor when contextualized alongside other studies within this area; however, it still stands to undermine the overall claims that can effectively be made given this data set. With regard to the calculated sample size of 358 respondents suggests lessened statistical power as well as generalizability across domains and populations. Moreover, examining characteristics pertaining to non-respondent biases seemed overlooked due to an overwhelming focus on skewed portions only focused upon participant-centric details. Especially if non-participants differed from assumed normative socio-economic status alongside health-seeking behaviors mapped onto ease of access towards care facilities deemed necessary through services offered system-wide, results starkly deviated from accurately representing general population. Third, discrepancies with participant numbers reporting 267 mothers and 32 healthcare providers in some sections, then showing 263 and 20 in others all raise concerns about the data's integrity. While the final analysis deemed 263 maternal responses and 20 provider interviews as sufficient, it is crucial to highlight that this inconsistency needs better resolution across all manuscript sections. Finally, manual thematic coding was employed for the qualitative analysis without using dedicated qualitative software or other formal inter-coder reliability processes. This directly impacts the transparency and reproducibility of the analysis, regardless of its rigor. Furthermore, while socioeconomic and cultural barriers were acknowledged, they were not examined deeply alongside the quantitative findings, which could have strengthened triangulation. The limitations described thus far indicate that additional caution is needed in interpreting these findings despite their significance. Future studies should seek to amend these explorative contributions by incorporating more robust qualitative analysis techniques alongside controlling for confounding variables with longitudinal designs.

Addressing the barriers identified, ranging from infrastructure to cultural norms, will require a multifaceted and community-centered approach. These findings contribute to the growing body of evidence advocating for targeted educational programs, systemic reforms in healthcare delivery, and culturally sensitive interventions as critical components in the fight against stillbirth in resource-constrained settings like Lejweleputswa.

Conclusions

This study highlights the critical influence of maternal knowledge on ANC practices and, by extension, on the prevention of stillbirths. The findings underscore that when pregnant women are well-informed about the risk factors, warning signs, and causes of stillbirth, they are more likely to engage with ANC services in a timely and

consistent manner. This proactive behavior enables early detection and management of potential complications such as hypertensive disorders, gestational diabetes, and intrauterine growth restriction conditions that, if left unmonitored, significantly increase the risk of fetal death. Therefore, maternal knowledge is not merely an individual attribute but a public health asset with far-reaching implications for pregnancy outcomes.

In rural districts like Lejweleputswa, where stillbirth rates remain high despite the availability of ANC services, a key gap lies in the insufficient dissemination of relevant health information during pregnancy. While infrastructure and clinical competencies remain foundational to maternal health systems, it is evident that the impact of these resources is diminished without corresponding investment in maternal education. Many women in such communities still hold misconceptions about the causes of stillbirth, delay initiating ANC due to low-risk perception, or view ANC as a bureaucratic rather than preventive necessity. These behavioral patterns reflect deeper issues of health literacy and socio-cultural beliefs, which must be addressed as part of any comprehensive stillbirth prevention strategy.

To reduce stillbirth incidence, maternal health programs must integrate stillbirth education into routine ANC services. This requires healthcare facilities to move beyond clinical checklists and embrace a patient-centered approach that empowers women with accurate, comprehensible, and culturally relevant information. Training healthcare workers to communicate effectively about stillbirth its causes, preventive strategies, and warning signs can improve the quality of counseling during ANC visits. Furthermore, the development and distribution of educational materials such as pamphlets, posters, mobile health messages, and community radio programs can extend the reach of stillbirth awareness beyond the clinic setting. Community-based outreach and engagement are equally important, particularly in areas with low ANC uptake. Collaborations with traditional birth attendants, community health workers, and local leaders can help challenge myths, reduce stigma surrounding pregnancy complications, and normalize early and regular ANC attendance. Health departments at both provincial and national levels should also prioritize monitoring and evaluation systems to track the effectiveness of health education interventions in reducing stillbirths. Ultimately, strengthening maternal knowledge is not a peripheral concern but a central strategy in addressing South Africa's persistent burden of preventable perinatal mortality. Informed mothers are more likely to make empowered decisions, seek care proactively, and adhere to recommended health practices thus creating a ripple effect that benefits not only individual pregnancies but entire communities. As maternal knowledge impacts health-seeking behavior and engagement with ANC, the findings of this study especially the moderate R^2 values between 32.5% and 40.3% suggest that knowledge is not an intervening factor by itself. Instead, it functions as part of a larger system shaped by factors such as socioeconomic circumstances, the capacity of the health system, and cultural convictions. Therefore, while maternal education is an important stillbirth prevention strategy, its impact should be viewed as supportive rather than as fundamentally transformative. Meaningful reductions in stillbirths necessitate improvements in health literacy alongside access to caring and respectful interactions with providers, robust systems changes infrastructure within the chronic care approach framework. As such, policies and programs aimed at reducing stillbirth must embed health literacy at their core, treating it not merely as a tool for education but as a life-saving intervention in its own right.

Authors' Contribution

Conceptualization: Simbarashe Magaisa.
Data curation: Simbarashe Magaisa.
Supervision: Nirmala Dorasamy.
Writing–original draft: Simbarashe Magaisa.
Writing–review & editing: Simbarashe Magaisa, Nirmala Dorasamy.

Conflict of Interests

Authors declare that they have no conflict of interests.

References

1. Tavares Da Silva F, Gonik B, McMillan M, et al. Stillbirth: case definition and guidelines for data collection, analysis, and presentation of maternal immunization safety data. Vaccine. 2016;34(49):6057-6068. doi:10.1016/j.vaccine.2016.03.044
2. Terefe B, Jembere MM, Abrha NN, Asgedom DK, Assefa SK, Assimamaw NT. Pooled prevalence and multilevel determinants of stillbirths in sub-Saharan African countries: implications for achieving Sustainable Development Goal. Glob Health Res Policy. 2025;10(1):1-14. doi:10.1186/s41256-024-00395-6
3. Souza JP, Bahl R. Purpose Study: understanding the burden of stillbirths in South Asia. Lancet Glob Health. 2022;10(7):e930-e931. doi:10.1016/S2214-109X(22)00218-2
4. Lawn JE, Bhutta ZA, Ezeaka C, Saugstad O. Ending preventable neonatal deaths: multicountry evidence to inform accelerated progress to the Sustainable Development Goal by 2030. Neonatology. 2023;120(4):491-499. doi:10.1159/000530496
5. Zegeye AF, Mekonen EG, Tamir TT, et al. Prevalence and associated factors of stillbirth among women at extreme ages of reproductive life in sub-Saharan Africa: a multilevel analysis of the recent Demographic and Health Survey. Matern Health Neonatol Perinatol. 2025;11(1):1-14. doi:10.1186/s40748-025-00205-y
6. Hlongwane TM, Botha T, Nkosi BS, Pattinson RC. Preventing antenatal stillbirths: an innovative approach for primary health care. S Afr Fam Pract. 2022;64(1):5487. doi:10.4102/safp.v64i1.5487
7. Malinga NS, du Preez A, Rabie T. Maternal and neonatal factors associated with perinatal deaths in a South African healthcare institution. Health SA Gesondheid. 2020;25:1-7. doi:10.4102/hsag.v25i0.1332
8. Alayu BA, Balla ET, Fekene DB, Namara GT, Fekadu M. Determinants of stillbirth among deliveries attended at public hospitals of Southwest Shoa Zone, Oromia, Ethiopia: a case-control study. Health Sci Rep. 2025;8(5):e70806. doi:10.1002/hsr2.70806
9. Ota E, da Silva Lopes K, Middleton P, et al. Antenatal interventions for preventing stillbirth, fetal loss and perinatal death: an overview

of Cochrane systematic reviews. Cochrane Libr. 2020;(12):1-92. doi: 10.1002/14651858.CD009599.pub2
10. Lee S, Adam E, Kanyike AM, et al. Compliance with the WHO recommended 8+ antenatal care contacts schedule among postpartum mothers in Eastern Uganda: a cross-sectional study. PLoS One. 2024;19(12):e0314769. doi:10.1371/journal.pone.0314769
11. Battu GG, Kassa RT, Negeri HA, Kitawu LD, Alemu KD. Late antenatal care booking and associated factors among pregnant women in Mizan-Aman town, South West Ethiopia, 2021. PLOS Glob Public Health. 2023;3(1):e0000311. doi:10.1371/journal.pgph.0000311
12. Teshale G, Jejaw M, Demissie KA, et al. Late antenatal care booking and associated factors among pregnant women in Ethiopia: evidence from 2019 Performance Monitoring for Action data analysis. BMC Pregnancy Childbirth. 2024;24(1):826. doi:10.1186/s12884-024-07038-1
13. Jiao B, Iversen I, Sato R, et al. Association between achieving adequate antenatal care and health-seeking behaviors: a study of Demographic and Health Surveys in 47 low- and middle-income countries. PLoS Med. 2024;21(7):e1004421. doi: 10.1371/journal.pmed.1004421
14. Lori JR, Kukula VA, Liu L, et al. Improving health literacy through group antenatal care: results from a cluster randomized controlled trial in Ghana. BMC Pregna Childb. 2024;24(1):1-9. doi:10.1186/s12884-023-06224-x
15. Christou A, Alam A, Hofiani SM, et al. Understanding pathways leading to stillbirth: the role of care-seeking and care received during pregnancy and childbirth in Kabul Province, Afghanistan. Women Birth. 2020;33(6):544-555. doi:10.1016/j.wombi.2020.02.012
16. Sewpaul R, Crutzen R, Dukhi N, Sekgala D, Reddy P. A mixed reception: perceptions of pregnant adolescents' experiences with health care workers in Cape Town, South Africa. Reprod Health. 2021;18(1):167. doi:10.1186/s12978-021-01211-x
17. Myburgh N, Qwabi T, Shivambo L, et al. Factors affecting antenatal care attendance in Soweto, Johannesburg: the three-delay model. Afr J Prim Health Care Fam Med. 2024;16(1):1-9. doi:10.4102/phcfm.v16i1.4333
18. Sánchez TE, Matvienko-Sikar K, Meaney S, O'Donoghue K. Exploring first-time mothers' experiences and knowledge about behavioural risk factors for stillbirth. Health Expect. 2023;26(1):329-342. doi:10.1111/hex.13662
19. Hlongwane TMAG, Bozkurt B, Barreix MC, et al. Implementing antenatal care recommendations, South Africa. Bull World Health Organ. 2021;99(3):220-227. doi:10.2471/BLT.20.278945
20. Patience NTS, Sibiya NM, Gwele NS. Evidence of application of the basic antenatal care principles of good care and guidelines in pregnant women's antenatal care records. Afr J Prim Health Care Fam Med. 2016;8(2):1-6. doi:10.4102/phcfm.v8i2.1016
21. Malematja DN, Nkosi EM, Nene SE. The impact of insufficient resources on the quality-of-service delivery at a primary healthcare clinic in Limpopo. Curationis. 2025;48(1):1-7. doi:10.4102/curationis.v48i1.2696
22. Pollock D, Ziaian T, Pearson E, Cooper M, Warland J. Breaking through the silence in antenatal care: fetal movement and stillbirth education. Women Birth. 2019;33(1):77-85. doi:10.1016/j.wombi.2019.02.004
23. Bashir S, Ansari AH, Sultana A. Knowledge, Attitude, and Practice on Antenatal Care Among Pregnant Women and its Association With Sociodemographic Factors: A Hospital-Based Study. J Patient Exp. 2023;10:1-10. doi:10.1177/23743735231183578
24. Quebu SR, Murray D, Okafor UB. Barriers to exclusive breastfeeding for mothers in Tswelopele Municipality, Free State Province, South Africa: a qualitative study. Children. 2023;10(8):1380. doi:10.3390/children10081380
25. Botai CM, De Wit JP, Botai JO. Temporal variability of hydroclimatic extremes: a case study of Vhembe, UMgungundlovu, and Lejweleputswa district municipalities in South Africa. Water. 2024;16(20):2924. doi:10.3390/w16202924
26. Lukwa AT, Chiwire P, Aggrey S, Akinsolu FT, Nyabunze A, Okova D. Evaluating value-based maternal healthcare in Sub-Saharan Africa: a systematic review. Women. 2024;4(3):226-240. doi:10.3390/women4030017
27. Azaare J, Akweongo P, Aryeteey GC, Dwomoh D. Evaluating the impact of maternal health care policy on stillbirth and perinatal mortality in Ghana: a mixed method approach using two rounds of Ghana demographic and health survey data sets and qualitative design technique. PLoS One. 2022;17(9):e0274573. doi:10.1371/journal.pone.0274573
28. Johnson LJ, Schopp LH, Waggie F, Frantz JM. Challenges experienced by community health workers and their motivation to attend a self-management programme. Afr J Prim Health Care Fam Med. 2022;14(1):1-9. doi:10.4102/phcfm.v14i1.2911
29. Heo CY, Kim B, Park K, Back RM. A comparison of Best-Worst Scaling and Likert Scale methods on peer-to-peer accommodation attributes. J Bus Res. 2022;148:368-377. doi:10.1016/j.jbusres.2022.04.064
30. Heaman MI, Sword WA, Akhtar-Danesh N, et al. Quality of prenatal care questionnaire: instrument development and testing. BMC Pregnancy Childbirth. 2014;14(1):188. doi:10.1186/1471-2393-14-188
31. Wakelin KJ, McAra-Couper J, Fleming T. Using an online platform for conducting face-to-face interviews. Int J Qual Methods. 2024;23:1-9. doi:10.1177/16094069241234183
32. Sialubanje C, Kaiser JL, Ngoma T, et al. Postnatal care services in rural Zambia: a qualitative exploration of user, provider, and community perspectives on quality of care. BMC Pregnan Childb. 2023;23(1):213. doi:10.1186/s12884-023-05350-w
33. Dankar FK, Gergely M, Dankar SK. Informed consent in biomedical research. Comput Struct Biotechnol J. 2019;17:463-474. doi:10.1016/j.csbj.2019.03.010
34. Kitui J, Lewis S, Davey G. Factors influencing place of delivery for women in Kenya: an analysis of the Kenya demographic and health survey, 2008/2009. BMC Pregnancy Childbirth. 2013;13(1):40. doi:10.1186/1471-2393-13-40
35. MacDonald TM, Walker SP, Hannan NJ, Tong S, Kaitu'u-Lino TJ. Clinical tools and biomarkers to predict preeclampsia. EBioMedicine. 2021;75:103780. doi:10.1016/j.ebiom.2021.103780
36. Yoseph A, Teklesilasie W, Guillen-Grima F, Astatkie A. Community-based health education led by women's groups significantly improved maternal health service utilization in Southern Ethiopia: a cluster randomized controlled trial. Healthcare. 2024;12(10):1045. doi:10.3390/healthcare12101045
37. Yahaya H, Adeyemo QE, Kumah A. Adverse perinatal outcomes and their associated determinants in Sub-Saharan Africa. J Med Surg Public Health. 2024;3:100124. doi:10.1016/j.glmedi.2024.100124
38. Bedwell C, Blaikie K, Actis Danna V, et al. Understanding the complexities of unexplained stillbirth in sub-Saharan Africa: a mixed-methods study. BJOG. 2021;128(7):1206-1214. doi:10.1111/1471-0528.16629
39. Mina MN, Nuruzzaman M, Habib MN, et al. The effectiveness of adequate antenatal care in reducing adverse perinatal outcomes: evidence from a low- or middle-income country. Cureus. 2023;15(12):e51254. doi:10.7759/cureus.51254
40. Arsenault C, Mfeka-Nkabinde NG, Chaudhry M, et al. Antenatal care quality and detection of risk among pregnant women: an observational study in Ethiopia, India, Kenya, and South Africa. PLoS Med. 2024;21(8):e1004446. doi:10.1371/journal.pmed.1004446
41. Mira-Catalá P, Hernández-Aguado I, Chilet-Rosell E. Respectful maternity care interventions to address women mistreatment in childbirth: what has been done. BMC Pregnancy Childbirth. 2024;24(1):1-11. doi:10.1186/s12884-024-06524-w
42. Sarikhani Y, Najibi SM, Razavi Z. Key barriers to the provision and utilization of maternal health services in low- and lower-middle-income countries: a scoping review. BMC Womens Health. 2024;24(1):325. doi:10.1186/s12905-024-03177-x

43. Van der Pijl MSG, Verhoeven CJM, Verweij R, et al. Disrespect and abuse during labour and birth amongst 12,239 women in the Netherlands: a national survey. Reprod Health. 2022;19(1):160. doi:10.1186/s12978-022-01460-4
44. Dolatabadi Z, Amiri Farahani L, Zargar Z, Haghani S, Mousavi SS. Disrespect and abuse during childbirth and associated factors among women: a cross-sectional study. Research Square. 2024:1-22. doi:10.1186/s12884-025-07369-7
45. Lateef MA, Kuupiel D, Mchunu GG, Pillay JD. Utilization of antenatal care and skilled birth delivery services in Sub-Saharan Africa: a systematic scoping review. Int J Environ Res Public Health. 2024;21(4):440. doi:10.3390/ijerph21040440
46. Chauke L. Improving access to emergency obstetrics care in low- and middle-income countries. Best Pract Res Clin Obstet Gynaecol. 2024;98:102572. doi:10.1016/j.bpobgyn.2024.102572
47. Tony-Igwe C, Udeani K, Udeichi N, Ugwu E. Knowledge, attitude, and practice of birth preparedness and complication readiness among women attending antenatal clinic in Enugu metropolis. medRxiv. 2024:1-33. doi:10.1101/2024.10.06.24314964
48. Kaewkiattikun K, Lekbornvornwong T. Awareness of obstetric danger signs and associated factors among pregnant women attending antenatal care at the Faculty of Medicine Vajira Hospital. Vajira Med J. 2019;63(2):75-84. doi:10.14456/vmj.2019.8
49. Kassa BG, Tiruneh GA, Abayneh AS. Delay in reaching health facilities and its associated factors among mothers giving birth in South Gondar Zone Hospitals, Northwest Ethiopia, 2020: a facility-based cross-sectional study. Front Glob Womens Health. 2023;4:1-7. doi:10.3389/fgwh.2023.916978
50. Gwako GN, Were F, Obimbo MM, Kinuthia J, Gachuno OW, Gichangi PB. Association between utilization and quality of antenatal care with stillbirths in four tertiary hospitals in a low-income urban setting. Acta Obstet Gynecol Scand. 2021;100(4):676-683. doi:10.1111/aogs.13956
51. Berhe TT, Modibia LM, Sahile AT, Tedla GW. Does quality of antenatal care influence antepartum stillbirth in Hossana City, South Ethiopia? PLOS Glob Public Health. 2023;3(1):e0001468. doi:10.1371/journal.pgph.0001468
52. Abdiwali SA, Adesina OA, Fekadu GA, Geta TG. Barriers and facilitators to antenatal care services utilisation in Somaliland: a qualitative study. BMJ Open. 2024;14(11):e085073. doi:10.1136/bmjopen-2024-085073
53. Mahada T, Tshitangano TG, Mudau AG. Strategies to reduce maternal death rate and improve the provision of quality healthcare services in selected hospitals of Vhembe District, Limpopo Province. Nurs Rep. 2023;13(3):1251-1270. doi:10.3390/nursrep13030107
54. Vousden N, Bunch K, Kenyon S, Kurinczuk JJ, Knight M. Impact of maternal risk factors on ethnic disparities in maternal mortality: a national population-based cohort study. Lancet Reg Health Eur. 2024;40:1-12. doi:10.1016/j.lanepe.2024.100893
55. Hand T, Rosseau NA, Stiles CE, Sheih T, Ghandakly E, Oluwasanu M, et al. The global role, impact, and limitations of community health workers (CHWs) in breast cancer screening: a scoping review and recommendations to promote health equity for all. Glob Health Action. 2021;14(1):1-17. doi:10.1080/16549716.2021.1883336