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Semantic analysis of healthcare workers' perceptions of neonatal mortality in Tshopo Province, Democratic Republic of the Congo

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ABSTRACT

Introduction

Neonatal mortality remains a major public health concern in the Democratic Republic of the Congo, particularly in Tshopo Province. While quantitative evidence is widely available, few studies have explored how healthcare workers interpret neonatal death within its sociocultural context.

Purpose

This study aimed to explore healthcare workers' perceptions of neonatal mortality in Tshopo Province using semantic analysis.

Methods

A qualitative descriptive study was conducted in June 2025 among 25 healthcare workers (doctors, nurses, midwives, community health workers, and matrons) from four health zones in Tshopo Province (Lubunga, Yahisule, Makiso-Kisangani, and Yakusu). Data were collected through semi-structured interviews conducted in French, Lingala, and Swahili. Audio recordings were transcribed and analyzed manually using a semantic analysis approach grounded in social construction theory, based on a predefined coding framework.

Results

Participants perceived neonatal mortality as a major and persistent community problem. Cultural interpretations were prominent, with neonatal deaths frequently explained as God's will or attributed to witchcraft and misfortune. Respondents also identified health system and socioeconomic factors, including inadequate antenatal follow-up, poor quality of care, limited financial resources, delayed care-seeking, and insufficient parental awareness. Proposed strategies emphasized improving access to maternal and neonatal care, strengthening community education and awareness, enhancing staff training, and ensuring institutional support through better equipment provision, drug availability, and government involvement.

Conclusion

Healthcare workers' perceptions of neonatal mortality in Tshopo Province reflect an interaction between sociocultural beliefs and structural barriers to care. Reducing neonatal mortality requires integrated interventions combining culturally sensitive health education, improved healthcare quality, strengthened antenatal follow-up, and stronger institutional commitment

INTRODUCTION

Neonatal mortality remains a major public health issue, particularly in countries with weak health systems. According to the World Health Organization (WHO, 2024), the number of neonatal deaths was 2.3 million in 2022 and 2.28 million in 2023 (Cao et al., 2025), with significant regional disparities (Gu et al., 2026).

In sub-Saharan Africa, the neonatal mortality rate was approximately 28 per 1,000 live births in 2021 (Zoungrana-Yameogo et al., 2021), which is higher than in other regions of the world. Although neonatal mortality is recognized as a key indicator of the quality of prenatal and perinatal care (Kalonji, 2021), its prevalence remains very high in the Democratic Republic of the Congo (Atuba et al., 2023), with an estimated rate of 47 per 1,000 live births (Mabola Tsinu et al., 2024). This places the country among those with the highest neonatal mortality rates worldwide, exceeding even some neighboring countries such as Uganda, which reported a rate of 20 per 1,000 in 2018 (Roed et al., 2021).

Furthermore, research shows that neonatal death (death within the first 28 days of life) is not random. Several causes are medically preventable, including pregnancy-related complications and congenital malformations (Kalonji, 2021), especially when managed by qualified healthcare personnel (Berg et al., 2022; Mizerero et al., 2021). However, other determinants require a broader perspective, including sociocultural factors such as beliefs and family convictions.

Targeted research aimed at improving neonatal survival is essential for achieving the Sustainable Development Goals (SDGs), particularly Goal 3, which focuses on ensuring health and well-being for all through improved maternal, newborn, and child health (L'Agenda 2030 en France, 2025).

However, in both global and Democratic Republic of Congo contexts, most studies on neonatal mortality are quantitative in nature. Few studies explore the meanings attributed to neonatal death by the general population and healthcare providers. Moreover, qualitative research on cultural interpretations of neonatal mortality among healthcare professionals in eastern DRC remains limited.

This study therefore explores the meanings, cultural beliefs, and emotions associated with neonatal mortality in Tshopo Province through semantic analysis. It aims to better understand community challenges and identify strategies to improve neonatal health in the province.

Its importance lies in analyzing perceptions among actors directly and indirectly involved in healthcare, while integrating sociocultural factors (e.g., beliefs and fatalism) that influence care-seeking behavior and clinical practice. These insights are essential for identifying local challenges and informing context-specific interventions for policymakers.

Thus, this study addresses the following research question: What are healthcare workers' perceptions of neonatal mortality in Tshopo Province?

METHODS

Study design

This is a qualitative descriptive study grounded in a constructivist epistemological approach. It explores healthcare workers' perceptions of neonatal mortality in Tshopo Province.

Study setting and rationale

The study was conducted in Tshopo Province, located in the northern part of the Democratic Republic of the Congo. Since 2015, following the decentralization of the former Orientale Province, Tshopo has been one of the 26 provinces of the DRC. Its capital is Kisangani. The province is divided into seven territories and 23 health zones, five of which were selected for this study.

Tshopo Province exhibits high infant mortality rates (Vanzwa et al., 2025), justifying the need for this study. The diversity of healthcare providers and practices, combined with culturally embedded beliefs, enriches the analysis. In addition, collaboration with local institutions facilitated the identification of specific needs and the formulation of appropriate interventions to improve maternal and child health outcomes.

Selection of key informants

Healthcare providers directly involved in maternal and neonatal care were interviewed. These included doctors, nurses, midwives, administrators, community health

workers, and traditional birth attendants (matrons). This diversity allowed for multiple perspectives on neonatal mortality. Their clinical experience and central role in care delivery make their participation essential for developing relevant interventions.

Inclusion criteria

Participants were included if they:

- were healthcare professionals involved in neonatal care (e.g., doctors, nurses, midwives, matrons, or community health workers);
- had at least six months of professional experience in the health sector;
- worked or resided in the selected health zones of Tshopo Province;
- provided free and informed consent to participate.

Exclusion criteria

Participants were excluded if they:

- were unable to understand or communicate in French, Lingala, or Swahili;
- were unable to provide relevant information due to cognitive or cultural constraints;
- did not understand the implications of participation in the study.

Sampling procedure

A non-probability convenience sampling method was used. Four health zones in Tshopo Province (Lubunga, Yahisule, Makiso-Kisangani, and Yakusu) were selected to ensure geographical representation. Local authorities identified eligible healthcare professionals, including doctors, nurses, midwives, and community health workers. Initial visits were conducted to schedule interviews, and appointments were agreed upon with participants regarding time, date, and location.

Sample size

A total of 25 healthcare professionals involved in neonatal care participated in the study. This sample size was justified by the balance between diversity and feasibility in qualitative research. It allowed for the exploration of varied perspectives while ensuring manageable data collection and analysis.

Thematic saturation was achieved, as recurring concepts such as "divine will" and "socioeconomic barriers" reappeared consistently across interviews. The diversity of participants ensured a comprehensive understanding of perceptions and barriers related to neonatal mortality.

Interview technique

Data were collected using semi-structured interviews. This approach was selected for its flexibility, allowing both guided questioning and in-depth exploration of emerging themes. It facilitated rich interaction and encouraged participants to share experiences openly.

Interviews were audio-recorded using an Android smartphone. Interviews were conducted in French, Lingala, and Swahili:

- French: the official language used in administration and education in the DRC;
- Lingala: a widely spoken national language, particularly in northern regions;
- Swahili: a major national language widely used in eastern DRC.

These languages were selected to ensure effective communication with participants.

Data collection

After administrative authorization, participants were contacted, and the study purpose was explained. Informed consent was obtained prior to interviews. Face-to-face interviews were conducted to build trust. Each interview lasted approximately 10 minutes. Audio recordings ensured accurate data capture. Interviews were conducted in comfortable and neutral locations to reduce bias and encourage open discussion.

Role of the researcher

Researchers established rapport based on trust to encourage honest responses. Active listening and respect for participants' experiences were prioritized. Confidentiality was strictly maintained, and reflexive practices were adopted to minimize bias. This relationship strengthened data quality and facilitated collaboration.

Data processing

All interviews were audio-recorded with participant consent and fully transcribed. A semantic analysis

approach grounded in social construction theory was used.

Data were analyzed manually by two independent researchers. A coding framework was applied to ensure consistency and validity. To maintain confidentiality, participants were coded as "Pers01," "Pers02," etc.

Semantic analysis approach

Semantic analysis was selected to explore the meanings embedded in participants' responses within their sociocultural context. This approach enabled identification of recurring themes and enriched interpretation.

A predefined coding framework was used, consisting of six main sub-themes:

1. **Perception of neonatal illnesses**: symptoms (fever, persistent crying, pallor, fatigue) and perceived causes (congenital diseases, birth complications, witchcraft).
2. **Barriers to healthcare access**: socioeconomic constraints (poverty, lack of money), structural barriers (distance, poor service quality), and alternative practices (traditional medicine, excessive prayer).
3. **Attitudes toward illness and care-seeking**: self-medication, delayed consultation, and hospital use.
4. **Relationships with caregivers**: positive perceptions (competence, welcoming attitude) and negative perceptions (neglect, misdiagnosis).
5. **Roles of caregivers**: family care support and community health monitoring.
6. **Suggestions for improving care**: free healthcare, government support, and regular staff remuneration.

Validity and reliability

Data validity was ensured through triangulation of sources (formal healthcare workers and traditional birth attendants). Cross-coding by another researcher ensured consistency in interpretation. Member checking was used to validate findings, strengthening credibility.

Ethics and informed consent

Informed consent was obtained from all participants. They were informed about the study purpose, anonymity, and their right to withdraw at any time. Ethical approval was obtained from the Ethics Committee of the Higher Institute of Medical Techniques of Kinshasa under references 055/ESU/ISTM/DG/2022 (06/10/2022) and 0024/CBE/ISTM/KIN/RDC/PMBBL/2023 (29/11/2023).

Reflexivity

Reflexivity involved recognizing researcher bias and its potential influence on data collection and interpretation. Researchers reflected on their positionality and adjusted interactions accordingly. Reflexive journaling was used throughout the study. Peer debriefing was conducted to enhance rigor and minimize subjective bias.

RESULTS

In addition to the respondents' sociodemographic characteristics described above, the main results of this study focus on healthcare workers' perceptions of neonatal mortality, perceived contributing factors, and proposed strategies for reducing neonatal deaths among infants under one month of age in Tshopo Province.

Sociodemographic characteristics of respondents

The study participants, aged 21 to over 60 years, included both women (midwives and nurses) and men (nurses, doctors, and community health workers). They were recruited from several health zones within the Tshopo Provincial Health Division, including Lubunga, Yahisule, Makiso-Kisangani, and Yakusu. Professional experience varied, with most participants reporting more than 10 years in service.

Notably, midwives reported fewer cases of assisting neonatal deaths, whereas all conventional healthcare professionals reported having encountered such cases.

Table 1:
Sociodemographic characteristics of respondents

ID	Age	Gender	Health zone	Occupation	Years of experience	Witnessed neonatal death
Pers01	–	Female	Yakusu	Midwife	–	No
Pers02	–	Female	Yahisule	Midwife	–	No
Pers03	52	Female	Yahisule	Midwife	~10 years	No
Pers04	41	Male	Yahisule	Community health worker	10 years	Yes
Pers05	45	Male	Yakusu	Nurse	20 years	Yes
Pers06	36	Male	Yakusu	Nurse	10 years	Yes
Pers07	–	Female	Yakusu	Midwife	>30 years	No

ID	Age	Gender	Health zone	Occupation	Years of experience	Witnessed neonatal death
Pers08	62	Female	Yakusu	Midwife	34 years	Yes
Pers09	25	Male	Yakusu	Nurse	6 months	Yes
Pers10	45	Female	Yakusu	Nurse	7 years	Yes
Pers11	45	Male	Yakusu	Nurse	24 years	Yes
Pers12	51	Female	Lubunga	Nurse administrator	2.5 years	Yes
Pers13	—	Female	Makiso	Nurse (DN)	>10 years	Yes
Pers14	21	Male	Lubunga	Midwife	2 years	Yes
Pers15	41	Male	Lubunga	Midwife	6 years	Yes
Pers16	40	Male	Yakusu	Community worker	—	Yes
Pers17	26	Male	Yakusu	Nurse	2 years	Yes
Pers18	23	Male	Lubunga	Community health worker	13 years	Yes
Pers19	40	Female	Makiso-Kisangani	Midwife	—	Yes
Pers20	27	Male	Yakusu	Civil authority	2 years	Yes
Pers21	38	Male	Makiso	Doctor	3 years	Yes
Pers22	25	Female	Makiso	Nurse	4 years	Yes
Pers23	32	Male	Yakusu	Community worker	1.5 years	Yes
Pers24	25	Male	Yakusu	Community worker	2 years	Yes
Pers25	27	Male	Yakusu	Community worker	>10 years	Yes

Note. Respondents who did not report their age were generally older participants.

Semantic analysis of healthcare workers' perceptions of neonatal mortality

Perception of neonatal mortality

Neonatal mortality is perceived as a major public health problem in the community.

Table 2:
Perception of neonatal mortality

Concept	Meaning	Verbatim
Major community problem	Neonatal mortality reflects newborn vulnerability and weaknesses in the health system.	"Neonatal mortality is a major problem in our community." (Pers04)

Factors related to neonatal mortality

From a cultural perspective, neonatal mortality is perceived both as God's will and as the result of misfortune or witchcraft. Responsibility is perceived as shared among caregivers, families, and the health system. Respondents also identified factors such as poor antenatal care, low quality of care, financial constraints, ignorance among parents, and poorly managed congenital conditions.

Table 3:
Causes or factors of neonatal mortality

Concept	Meaning	Verbatims
Divine will	Death is perceived as a divine decision beyond human control, reinforcing fatalism.	"In the fear of God, I cannot explain these factors… death did not begin today." (Pers01); "It is God who gives and takes away." (Pers04)
Witchcraft	Cultural belief attributing neonatal deaths to supernatural forces.	"If a newborn dies, it is not without reason—it is witchcraft." (Pers06)
Shared responsibility	Neonatal outcomes depend on both families and health workers.	"Is it the caregivers' fault or the mothers' fault?" (Pers04); "We, the RECOs, do not prepare pregnant women well." (Pers25)
Poor quality of care	Inadequate clinical services during pregnancy and delivery.	"Sometimes care is not of good quality." (Pers03)
Lack of follow-up	Insufficient antenatal monitoring and home deliveries.	"Some mothers give birth at home." (Pers14)
Financial constraints	Inability to afford healthcare services or medicines.	"Families cannot buy prescribed drugs." (Pers05)
Ignorance	Lack of awareness of antenatal care importance.	"Much of this is due to ignorance." (Pers21)
Untreated maternal conditions	Poorly managed infections and pregnancy complications.	"Untreated malaria or infections can cause neonatal death." (Pers22)

Proposed strategies for reducing neonatal mortality

Respondents emphasized improved access to care, health education, and institutional support.

Table 4:
Proposed strategies for reducing neonatal mortality

Concept	Meaning	Verbatims
Access to care	Encouraging timely antenatal care and hospital delivery.	"Pregnant women should go to the hospital for antenatal care." (Pers07); "They should avoid home births." (Pers14)
Health education	Raising awareness of maternal and neonatal health.	"We must educate the community." (Pers14); "Awareness should reach all populations." (Pers21)
Institutional support	Government support, training, and medical supplies.	"The government must provide equipment." (Pers06); "Health workers need support and training." (Pers11)

DISCUSSION

Perception of neonatal mortality

Healthcare workers in Tshopo Province perceive neonatal mortality as a major public health issue.

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This finding aligns with global evidence indicating higher neonatal mortality in low- and middle-income countries compared to developed regions (Parmigiani & Bevilacqua, 2022). Similarly, Ogallo et al. (2021) note that many countries remain off-track in achieving global targets for reducing preventable neonatal deaths. Globally, neonatal deaths contribute to nearly five million deaths annually when combined with maternal mortality and stillbirths (Boerma et al., 2023).

Factors related to neonatal mortality

Sociocultural beliefs and neonatal mortality

Neonatal mortality was often interpreted as divine will or witchcraft, which influences care-seeking behavior.

Similar findings were reported in Angola, where cultural beliefs affected maternal healthcare utilization (Avelino et al., 2024). In Ethiopia, stigma and religious interpretations of adverse outcomes were shown to reduce healthcare-seeking behavior (Belachew et al., 2022). In India, traditional beliefs also discouraged use of modern healthcare services (Meitei & Singh, 2024).

These findings highlight the need for culturally sensitive health interventions.

Lack of antenatal care

Participants reported insufficient antenatal follow-up as a major contributor to neonatal deaths.

This aligns with evidence from Ethiopia showing higher neonatal mortality among women with fewer antenatal visits (Belachew et al., 2022). WHO recommends at least four antenatal visits during pregnancy to reduce maternal and neonatal risks.

Access to quality care

Respondents also highlighted poor-quality care and financial barriers.

Similar findings have been reported in India, where institutional delivery reduces neonatal mortality compared to home births (Meitei & Singh, 2024). Quality of care during pregnancy and childbirth is essential for improving neonatal survival (Lethro et al., 2023; Duangkum et al., 2025).

Proposed strategies

Participants emphasized improved healthcare access, awareness, and institutional support.

These findings are consistent with previous studies recommending strengthened health systems, maternal education, and skilled birth attendance (Avelino et al., 2024; WHO, 2024). Improved maternal education and access to care are key determinants of neonatal survival (Avelino et al., 2025; Kalonji, 2021).

Limitations and strengths of the study

A limitation of this study is the relatively small sample size, which may not capture the full diversity of healthcare workers' perceptions across Tshopo Province. In addition, selection bias may be present because participants were those available and willing to participate, which may limit generalizability.

However, the study has notable strengths. The qualitative design using semi-structured interviews allowed for an in-depth exploration of perceptions. Furthermore, semantic analysis grounded in social construction theory enabled a rich interpretation of meanings associated with neonatal mortality.

CONCLUSION

Healthcare workers in Tshopo Province perceive neonatal mortality as a major public health challenge influenced by cultural beliefs, socioeconomic barriers, and health system limitations. These perceptions highlight both structural and sociocultural dimensions of neonatal mortality, including beliefs in divine will and witchcraft.

Key contributing factors include limited access to quality care, insufficient antenatal follow-up, and financial constraints. Proposed solutions focus on improving healthcare access, strengthening awareness, and enhancing institutional support.

Overall, the findings emphasize the need for integrated, culturally sensitive, and system-strengthening interventions to reduce neonatal mortality in Tshopo Province.

Ethical Approval: Ethical approval was obtained from the Ethics Committee of the Higher Institute of Medical Techniques of Kinshasa under references 055/ESU/ISTM/DG/2022 (06/10/2022) and 0024/CBE/ISTM/KIN/RDC/PMBBL/2023 (29/11/2023).

Conflicts of Interest: None declared.

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