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Governance of hospital information on maternal death: a systematic review

Gobernanza de la información hospitalaria sobre la muerte materna: una revisión sistemática

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Abstract

Maternal mortality constitutes a crucial public health challenge and, at the same time, represents a relevant indicator of social development. In this context, the present study aimed to analyze how hospital information management impacts maternal mortality care from the perspective of healthcare personnel in Ecuador. To this end, a descriptive qualitative methodology was used based on a systematic review of the scientific literature published between 2019 and 2024. The search was conducted in databases such as PubMed, Scopus, Web of Science, Scielo, and Google Scholar, following specific inclusion criteria and the PRISMA protocol. A total of 18 studies were selected that provided relevant data on risk factors, national prevalence, information management processes in hospitals, and public policies. The results show that maternal mortality is determined by both clinical factors and structural social conditions, including poverty, residence in rural areas, and difficulties accessing specialized health services. Weaknesses in inter-institutional communication and fragmented information systems were also identified. Although public policies and technical advances exist, these have not yet been effectively and sustainably integrated. Consequently, the findings underscore the need to strengthen hospital management, optimize clinical data management, and implement policies with a territorial and intercultural approach.

Keywords: maternal mortality, health policies, information systems.

Resumen

La mortalidad materna constituye un desafío crucial para la salud pública y, al mismo tiempo, representa un indicador relevante del desarrollo social. En este contexto, el presente estudio tuvo como objetivo analizar cómo la gestión de la información hospitalaria incide en la atención de la mortalidad materna, desde la perspectiva del personal sanitario en Ecuador. Para ello, se empleó una metodología cualitativa descriptiva basada en una revisión sistemática de la literatura científica publicada entre 2019 y 2024. La búsqueda se realizó en bases de datos como PubMed, Scopus, Web of Science, Scielo y Google Académico, siguiendo criterios de inclusión específicos y el protocolo PRISMA. En total, se seleccionaron 18 estudios que aportaron datos relevantes sobre factores de riesgo, prevalencia nacional, procesos de gestión de la información en hospitales y políticas públicas. Los resultados evidencian que la mortalidad materna está determinada tanto por factores clínicos como por condiciones sociales estructurales, entre ellas la pobreza, la residencia en áreas rurales y las dificultades de

acceso a servicios de salud especializados. Asimismo, se identificaron debilidades en la comunicación interinstitucional y una fragmentación en los sistemas de información. Si bien existen políticas públicas y avances técnicos, estos aún no se han integrado de manera efectiva y sostenida. En consecuencia, los hallazgos subrayan la necesidad de fortalecer la gestión hospitalaria, optimizar el manejo de datos clínicos e implementar políticas con enfoque territorial e intercultural.

Palabras clave: mortalidad materna, políticas sanitarias, sistemas de información.

Introduction

Maternal deaths do not occur in isolation; they represent a significant tragedy in public health that must be addressed from both quantitative and qualitative perspectives. It is estimated that approximately 600,000 women die each year due to pregnancy and childbirth-related causes. For instance, in 2001, Latin America and the Caribbean reported between 20,000 and 30,000 maternal deaths, with Mexico alone accounting for 1,253 fatalities (Elu & Santos, 2004). Although there was a downward trend in maternal mortality rates in previous decades, this rate has remained relatively stable over the last twelve years (Gutiérrez, 2022).

This situation is particularly alarming considering that, according to the World Health Organization (WHO), most of these deaths could be prevented with the current resources and level of development in many countries. Furthermore, for every woman who dies, between 30 and 100 more suffer from disabling sequelae, many of whom do not receive timely medical attention. Each year, more than 50 million women are affected by maternal health-related complications, many experiencing lasting and debilitating consequences.

In this context, Gutiérrez (2022) emphasizes that maternal mortality (MM) is a critical indicator of a country's social and health development, as it reflects the quality of medical care provided to women throughout all stages of the reproductive cycle: prenatal, natal, and postnatal. In fact, the care a woman receives during pregnancy is indicative of the value that a society places on female life and well-being.

From a conceptual standpoint, it is important to note that maternal mortality is defined, according to the International Classification of Diseases, as the death of a woman during pregnancy or within 42 days of its termination, regardless of the duration or location of the pregnancy, and caused by any reason related to or aggravated by the pregnancy or its management, but not due to accidents. Additionally, various studies indicate that gender-based violence constitutes a significant indirect factor in maternal mortality (Rodríguez et al., 2023).

The COVID-19 pandemic has exacerbated this issue. Although maternal deaths had previously been significantly reduced, from 543,000 to 287,000 annually, the global health crisis reversed these advances, primarily affecting countries with vulnerable health systems. According to UN estimates, approximately 20 million women in the Americas lost access to contraception during the pandemic, either due to a lack of services or economic constraints (Gutiérrez, 2022).

Therefore, both maternal mortality and perinatal mortality (PM) are positioned as essential indicators for assessing the state of public health in any region. These figures are closely linked to maternal and child health, which is a priority on health systems' agendas and is conditioned by socioeconomic and demographic factors, as well as the access to and quality of health services (Faneite, 2010).

Different indicators are used for analysis. Among these, Faneite (2010) highlights the maternal mortality ratio (MMR), which refers to the number of maternal deaths per 100,000 live births, and the maternal mortality rate, expressed per 100,000 women of reproductive age. The MMR is particularly useful for identifying obstetric risk during pregnancy, while the maternal mortality rate incorporates variables such as fertility and access to adequate health services.

From this perspective, the following research questions arise: What factors influence maternal mortality from the viewpoint of healthcare personnel? What patterns of prevalence at the national level have been documented? What communication strategies and information flows regarding these cases have been described by healthcare staff, and what are their strengths and weaknesses? Finally, what public policies and institutional interventions related to the governance of hospital information have been implemented, and what has been their impact on reducing maternal mortality?

Based on these inquiries, the present study aims to analyze, through a systematic review, the role of hospital information governance in addressing maternal mortality from the perspective of healthcare personnel between 2010 and 2025. Specifically, it seeks to identify the main associated risk factors, analyze the prevalence of reported cases at the national level, systematize communication strategies and information flows, evaluating both their strengths and weaknesses, as well as assess the interventions and public policies implemented and their impact on reducing maternal mortality. Based on these findings, concrete recommendations will be formulated to enhance institutional responses and decrease the incidence of this preventable phenomenon.

Methodology

This study was developed under a qualitative and descriptive approach, focused on document analysis through a systematic review of the scientific literature. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology was employed, facilitating a deep understanding of the issue of maternal mortality and its associated factors from the perspective of healthcare personnel in the context of hospital governance. This methodology also ensures the objectivity, transparency, and replicability of the research process.

The systematic review was structured in four main phases: search, evaluation, analysis, and synthesis, aiming to collect, filter, and process relevant scientific information published between 2019 and 2024.

Phase 1: Search

A structured search was conducted in recognized scientific databases, such as PubMed, Scopus, Web of Science, Scielo, and Google Scholar. Specific keywords were used, including "maternal mortality," "obstetric emergencies," "health governance," "Ecuador," "public health policies," and "health system."

The inclusion criteria applied were:

- Articles published between 2019 and 2024.
- Studies written in Spanish or English.
- Original scientific research or review articles.
- Publications in journals indexed in Scielo, PubMed, Scopus, Redalyc, and other recognized academic repositories.

Exclusions included:

- Thesis reports or non-peer-reviewed works.
- Studies outside the publication range or in languages other than those mentioned.
- Duplicate publications or those with evident methodological inconsistencies.

Phase 2: Screening

The titles and abstracts of the retrieved documents were evaluated for relevance to the stated objectives. After eliminating irrelevant studies, 18 articles that met all established criteria were selected from an initial total of approximately 310 reviewed documents.

Phase 3: Selection

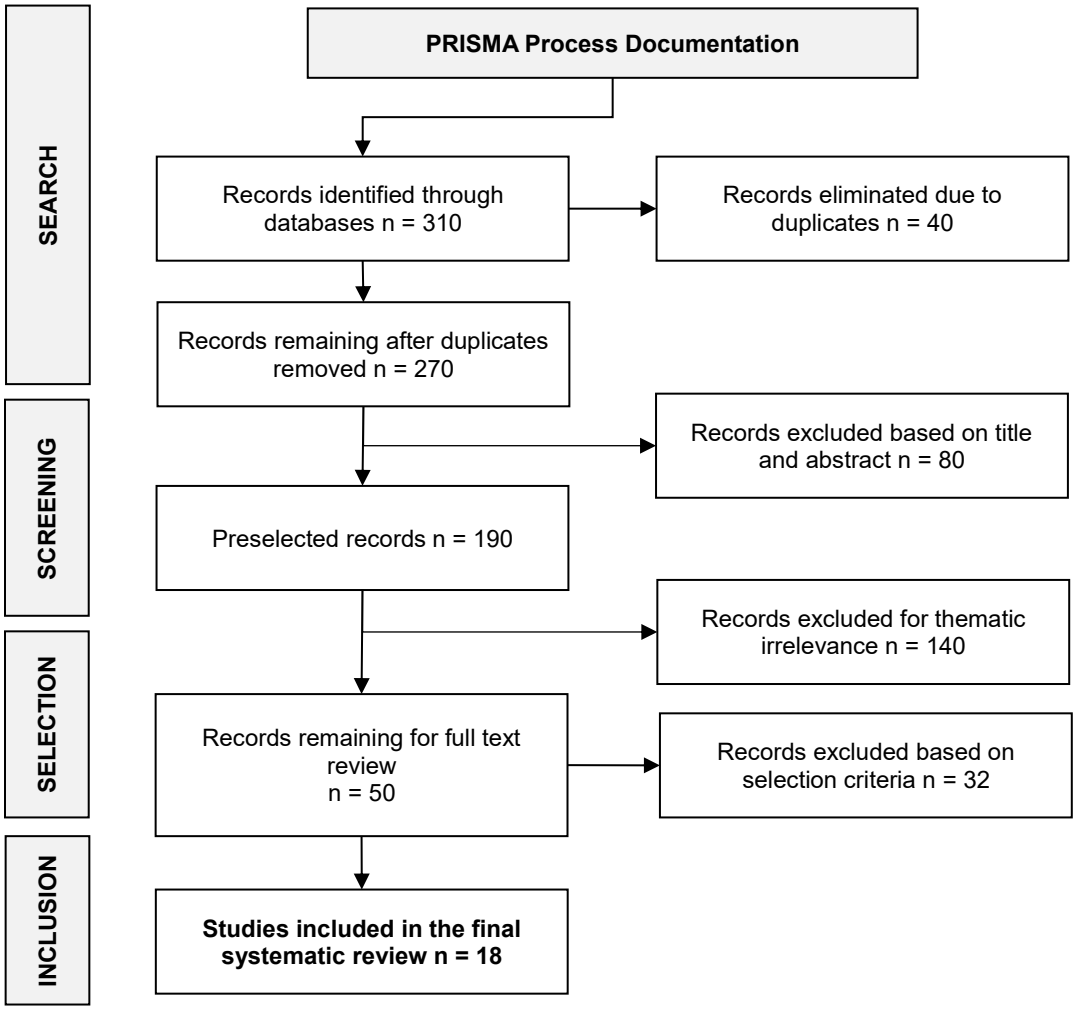
A detailed reading of each article was conducted to extract key information related to the research objectives.

Phase 4: Inclusion

Finally, the findings were thematically integrated, classifying the studies by author, year, title, methodology, and main results, to provide a solid understanding of the investigated issue.

Below is a diagram summarizing the process described in these phases, facilitating a clear and organized visualization of the methodology followed.

Figure 1
PRISMA diagram



Results and discussion

The results are presented in an organized and schematic manner in a table, structured according to the four specific objectives of the study.

a) Main risk factors associated with maternal mortality

In relation to this objective, five authors were reviewed who provide relevant information. The following table systematizes and organizes the findings obtained:

Table 1
Risk factors associated with maternal mortality

No.	Author/Year	Title	Methodology	Results
1	(Mora, 2022)	Validation of the instrument to assess risk factors for maternal morbidity and mortality	Document and bibliographic review	Identified risk factors before childbirth—including multiple pregnancy, post-term pregnancy, premature rupture of membranes, and abnormal fetal presentation—as well as during childbirth, including amniotic fluid embolism, shoulder dystocia, umbilical cord prolapse, and uterine rupture.

2	(Paucar et al., 2022)	Obstetric risk factors associated with maternal mortality in patients from Cebadas Chimborazo Health Center, August 2021 - January 2022	Mixed descriptive cross-sectional research	46% of pregnant women were minors, 72% were in a labor risk situation, 40% had multiparity, and another 40% did not attend prenatal check-ups. The most frequent medical factors included hemorrhages (48%), infections (32%), and hypertensive disorders (20%).
3	(De Mucio et al., 2023)	Extremely severe maternal morbidity: a key step to reducing maternal death	Normative and conceptual review (WHO/PAHO)	The main associated risk factors identified included shock, cardiac arrest, respiratory failure, renal failure, severe hemorrhage, eclampsia, hepatic failure, and coma.
4	(Torres et al., 2025)	Maternal social determinants of health: the hidden face of perinatal mortality in Mexico	Prospective cohort study with logistic regression	Conditions such as elevated pregestational body mass index (BMI), antiphospholipid syndrome, preeclampsia, fetal growth restriction, as well as social factors like poverty, overcrowding, and gender-based violence were detected.
5	(Serván et al., 2025)	Health system financing fragmentation and maternal mortality transition in Mexico, 2000–2022	Longitudinal ecological study (2000–2022) in 32 states of Mexico	Identified risk factors included lack of social security, young maternal age, low educational level, single marital status, residence in rural areas, indigenous origin, and high social marginalization.
6	(Sánchez et al., 2023)	An approach to maternal death in the Ecuadorian Amazon from 2017-2022	Quantitative, descriptive, cross-sectional non-experimental research	Risk factors included low educational level, lack of paid employment, residence in dispersed rural areas, insufficient attendance at prenatal check-ups, and multiparity.
7	(Alcoser et al., 2023)	Sociodemographic and clinical factors affecting maternal death in Napo province, 2021-2022	Mixed, descriptive, cross-sectional non-experimental research	Maternal age, educational level, marital status, ethnicity, and occupation were considered sociodemographic variables linked to maternal mortality and associated comorbidities.
8	(Dávila et al., 2023)	Maternal mortality and prenatal care	Non-experimental, cross-sectional, and correlational research	Hypertension and hemorrhages were the main clinical factors related to a maternal mortality rate close to 102 per 100,000 live births. Specifically, mortality was 41% among women without prenatal check-ups, in contrast to 7% among those who had four or more check-ups.
9	(Gutiérrez, 2022)	Maternal mortality: did causality change in 2021?	Systematic literature review	Identified preeclampsia, hemorrhages, and COVID-19 as the main causes of maternal death in Peru during the period 2020–2021.

As for the results, authors such as Mora (2022) and Dávila et al. (2023) agree in highlighting that clinical complications, such as hemorrhages, hypertension, and embolisms, are direct risk factors for maternal mortality. However, Torres et al. (2025) and Serván et al. (2025) expand this perspective by demonstrating that social conditions such as poverty, gender-based violence, low educational levels, and ethnic origin significantly increase the risk, even when women have access to medical services. This view contrasts with that of Paucar et al. (2022), who focus their analysis on individual variables such as maternal age and multiparity.

b) Prevalence of reported cases of maternal mortality at the national level

To fulfill this objective, the following studies were analyzed:

Table 2
National prevalence of maternal deaths

No.	Author/Year	Title	Methodology	Results
1	(Lapo, 2024)	Nationwide study of in-hospital maternal mortality in Ecuador, 2015–2022	Analysis of official INEC data from 2015 to 2022	In-hospital maternal mortality in Ecuador increased from 3.7 per 100,000 live births in 2015 to 18.9 in 2022, peaking at 32.2 in 2020 during the pandemic. Manabí province recorded the highest rate, with 84.8 deaths per 100,000 live births. Increased risk was observed among women from ethnic minorities and in private hospitals, highlighting the influence of socioeconomic and structural factors on this rise.
2	(Peñarreta et al., 2025)	Maternal and neonatal health in Ecuador during the COVID-19 pandemic: epidemiological perspectives from 2020-2023	Analysis of official data from the Ecuadorian Ministry of Public Health, 2020-2023, on pregnant women and newborns affected by COVID-19	During the pandemic, 16,556 infected pregnant women and 5,706 affected newborns were reported, with a total of 183 maternal deaths and 428 neonatal deaths. The health crisis caused significant deficits in prenatal (46%), childbirth (28%), and postnatal (38%) care. Common comorbidities included ICU admissions (45.2%), vertical transmission of the virus (34.9%), prematurity (26.8%), and fetal distress (21.9%). Among infected newborns, 25% presented fever, 14.2% had tachypnea and dyspnea, 37% showed lymphocytosis, and 7.1% exhibited bilateral pulmonary opacities. These data underscore the urgency of improving prenatal and neonatal care to reduce associated complications.
3	(Sánchez et al., 2023)	An approach to maternal death in the Ecuadorian Amazon from 2017-2022	Quantitative, descriptive, cross-sectional non-experimental research	Between 2017 and 2022, 73 maternal deaths were recorded in the Amazon region, distributed by province as follows: Morona Santiago with 20 deaths (27%), Pastaza with 16 (22%), Orellana with 12 (16%), Sucumbíos with 11 (15%), Napo with 9 (12%), and Zamora Chinchipe with 5 (7%). Morona Santiago had the highest rate in the region.
4	(Rodríguez et al., 2020)	Levels of maternal mortality risk in Ecuador	Qualitative and quantitative research. Bibliographic review and field study at Ambato General Teaching Hospital	The maternal mortality rate in Ecuador showed an irregular trend, with 117.2 per 100,000 live births in 1990 and 52.46 in 2007. The main causes were obstetric hemorrhages (43.3%), especially postpartum (31.8%), eclampsia (32.7%), and sepsis (1.7%). 75.9% of births occurred in health institutions, while 24.1% took place at home, with 15% assisted by unqualified midwives or family members.
5	(Revista Gestión, 2024)	Maternal mortality: Ecuador improves but not enough	Document and statistical analysis of national and regional sources (2008-2023)	In 2020, the national maternal mortality rate was 65.7 per 100,000 live births, lower than the regional average of 87.6. However, significant disparities persist: 59.55% of deaths occurred in urban areas and 40.45% in rural areas. The Amazon region recorded the highest rates between 2008 and 2022, facing geographical and socioeconomic barriers to accessing health services. In contrast, the Sierra region showed a decreasing trend, while the Coast experienced fluctuations with a notable increase in 2020.

6	(Labanda & Narea, 2024)	Maternal and child morbidity and mortality in Ecuador from 2000 to 2017 and the Sustainable Development Goals (SDGs)	Retrospective analysis of time series with national secondary sources (2000–2017)	Maternal mortality maintains an average of 168.25 deaths per year, showing no significant reduction in the last 18 years. Additionally, between 2000 and 2014, 30,165 fetal deaths were recorded. Neonatal mortality decreased from 9.3 in 2000 to 6.3 per 1,000 live births in 2010, while the birth rate fell from 35.13 in 2000 to 16.4 in 2017.

Concerning the prevalence of maternal mortality cases, Lapo (2024) documents a sustained increase in deaths from 2015 to 2022, with a notable peak during the pandemic. This phenomenon is supported by Peñarreta et al. (2025), who indicate significant interruptions in prenatal and hospital care during that period. Sánchez et al. (2023) add that the prevalence is particularly high in the Amazon region due to geographical barriers and institutional weaknesses that hinder access to health services. Although the publication by Revista Gestión (2024) recognizes improvements at the national level, it also warns that significant disparities persist between urban and rural areas, casting doubt on the territorial effectiveness of the implemented interventions.

c) Communication strategies and hospital information flows: strengths and weaknesses

In relation to the third objective of the study, the reviews provide the following findings:

Table 3

Hospital information flows

No.	Author/Year	Title	Methodology	Results
1	(Merialdi, 2023)	Generating clinical evidence for innovation in maternal and neonatal health: the OdonAssist™ inflatable device for assisted vaginal delivery	Preclinical and clinical studies, pilot phase, and post-market surveillance	Results indicate that the collection and flow of structured clinical information were fundamental for validating the device, highlighting the importance of having clinical surveillance systems, standardized protocols, and effective communication between different hospital levels.
2	(Bula & Urzola, 2020)	Absent mothers: the voice of health professionals regarding maternal deaths in Córdoba Department, Colombia	Interpretative and descriptive qualitative research, narrative design	Through interviews with health personnel, the study highlights the existing fragmentation in inter-hospital communication, weak feedback in ethics committees, and the lack of common protocols that unify procedures.
3	(Sánchez et al., 2023)	An approach to maternal death in the Ecuadorian Amazon from 2017-2022	Quantitative, descriptive, cross-sectional non-experimental research	The study indicates that maternal deaths in the Amazon are closely linked to the lack of fluid information between care levels. There is an absence of early warning systems and a lack of clear protocols that articulate coordination between rural and urban hospitals. Additionally, registration systems show a lack of uniformity, complicating proper case follow-up and hindering long-term decision-making.
4	(Suárez et al., 2024)	Maternal deaths as a public health problem in Ecuador: a review	Qualitative documentary research	It is noted that levels of inequality in health service provision contribute to a high risk of maternal mortality, largely due to delays in care caused by deficiencies in communication and hospital information management. Failures in traceability and information flows affecting the timeliness and quality of care provided are identified.

Regarding information flows and hospital communication, Bula and Urzola (2020) and Sánchez et al. (2023) criticize the segmentation between different hospital levels, the absence of standardized protocols, and the fragility of early warning systems. On the other hand, Suárez et al. (2024) emphasize that these traceability deficiencies directly impact the quality and timeliness of treatment provided to patients. In contrast, Merialdi (2023) demonstrates that the implementation of structured clinical information systems, such as the development of the OdonAssist™ device, has allowed for significant advances in obstetric safety, indicating that improvement relies more on efficient management than solely on the technology employed.

d) Analysis of interventions and public policies in reducing maternal mortality

Finally, addressing the fourth specific objective, the systematic review identified the following findings:

Table 4

Interventions and public policies

No.	Author/Year	Title	Methodology	Results
1	(Vélez, 2025)	Maternal mortality in Ecuador: Progress and challenges in public health policies	Document review (2020–2024)	The author describes various interventions, notably intercultural childbirth, which assisted 49,000 deliveries and improved access for indigenous populations, although full integration was not achieved; Obstetric Keys, which expedited care in obstetric emergencies but still require updates; the Health Booklet, which detected risks but had limited coverage; the 1,000 Days Bonus, which increased the number of prenatal checks but lacks rigorous evaluation of its impact; the National Neonatology Plan, which strengthened perinatal monitoring but faced delays in implementation; the CONE Network, which improved coordination among services but did not achieve total interoperability; and the DAIA, which expanded access to contraceptive methods, though logistical challenges remain.
2	(Merialdi, 2023)	Generating clinical evidence for innovation in maternal and neonatal health: the inflatable device	Preclinical and clinical studies, pilot phase, and post-market surveillance	The OdonAssist™ device was proposed as an innovation for assisting vaginal deliveries. Clinical trials demonstrated its effectiveness in preventing the use of forceps and reducing the need for emergency cesarean sections, significantly improving maternal and neonatal safety. Although it has not yet been formally incorporated into public policy, the study provides clinical evidence supporting its future inclusion in hospital protocols.
3	(Labanda & Narea, 2024)	Maternal and child morbidity and mortality in Ecuador from 2000 to 2017 and the Sustainable Development Goals (SDGs)	Retrospective analysis of time series with national secondary sources (2000–2017)	The analysis focuses on the national policy aimed at achieving the Millennium Development Goals and subsequently the Sustainable Development Goals, with an emphasis on reducing maternal mortality. However, there is an absence of effective continuity plans and sustained budget allocation due to political instability, lack of comprehensive health management, and weak intersectoral policies.
4	(Sánchez et al., 2023)	An approach to maternal death in the Ecuadorian Amazon from 2017-2022	Quantitative, descriptive, cross-sectional non-experimental research	Among the regulations and plans identified that have contributed to the gradual reduction of hospital maternal mortality are the Free Maternity Law of 1994, the National Plans of 2005 and 2008, and the ESAMyN technical standard of 2022. However, marked regional differences persist, reflecting ongoing challenges regarding the quality of care and coverage.

In analyzing the implemented interventions and public policies, Vélez (2025) notes that initiatives such as intercultural childbirth, Obstetric Keys, and the Health Booklet have contributed to reducing maternal mortality; however, concerns remain about the lack of rigorous evaluation and continuity in their application. In this regard,

Labanda and Narea (2024) concur, stating that political instability hinders the consolidation of sustainable intersectoral policies. Sánchez et al. (2023) confirm that while a gradual reduction has been observed in certain contexts, this improvement has not been uniform across the country.

Conclusions

The study on the governance of hospital information related to maternal mortality, from the perspective of medical personnel, reveals that the causes of this problem extend beyond the clinical realm. They are closely linked to structural, social, and organizational factors. The systematic review evidences that clinical risks, such as hypertension, hemorrhages, and infections, are exacerbated by social conditions such as poverty, gender-based violence, ethnicity, and the particularities of living in rural areas. Therefore, it is essential to cease viewing maternal mortality solely as a medical issue and adopt a comprehensive perspective that acknowledges the decisive influence of social conditions on pregnancy outcomes.

Additionally, a marked geographic inequality in maternal mortality rates is identified, with a higher incidence in Amazonian and rural regions. In these territories, access barriers, insufficient infrastructure, a lack of trained personnel, and the absence of specialized services create a scenario of high vulnerability. This reality questions the effectiveness of national policies that do not incorporate a territorial equity perspective, underscoring the urgency of strengthening health systems with an intercultural and differentiated approach that responds to the specific needs of each community.

Regarding information governance, the review concludes that the dispersion of data channels, the absence of standardized protocols, and poor clinical traceability present significant obstacles to the timely prevention and management of obstetric emergencies. Although there are promising experiences based on innovative technologies and the systematization of data collection, these have yet to be coherently institutionalized within public health systems, thus limiting their reach and effectiveness.

Moreover, the public policies and interventions analyzed reflect multiple efforts but often lack coordination. Strategies such as intercultural childbirth, the Health Booklet, and care bonuses have shown progress, but their sustainability is threatened by the lack of ongoing evaluations, the absence of universal coverage, and minimal intersectoral integration. This highlights that the issue of maternal mortality lies not only in the absence of policies but also in their weak implementation, limited continuity, and low adaptability to territorial particularities.

Finally, it is essential to promote research that more closely integrates elements of institutional governance, community participation, and health equity. Additionally, studies exploring the experiences of women using the system should be encouraged, incorporating their voices into the design and evaluation of public policies. A more detailed analysis of the interoperability of hospital systems, real-time traceability of cases, and the potential impact of artificial intelligence on predicting and preventing maternal deaths is also needed, thus opening new avenues for future research.

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