SANUS.2025;10:e517
DOI: https://doi.org/10.36789/sanusrevenf..vi21.517
www.sanus.unison.mx

REVIEW

Risk factors for perinatal death: systematic review of literature

Factores de riesgo en la muerte perinatal: revisión sistemática de la literatura

Fatores de risco na morte perinatal: uma revisão sistemática da literatura

Daryl Alejandra Jácquez-Sáenz [1*]
https://orcid.org/0009-0005-2645-6238

Marily Daniela Amaro-Hinojosa [2]
https://orcid.org/0000-0002-3250-492X

Vicente Jiménez-Vázquez [3]
https://orcid.org/0000-0001-5661-494X

Claudia Orozco-Gómez [4]
https://orcid.org/0000-0001-9432-6404

Claudia Gabriela Paredes-Morín [5]
https://orcid.org/0009-0002-3570-5951

1. Master in Nursing, Facultad de Enfermería y Nutriología, Universidad Autónoma de Chihuahua, Chihuahua, México.
2. Doctor of Science in Nursing, Facultad de Enfermería y Nutriología, Universidad Autónoma de Chihuahua, Chihuahua, México.
3. Doctor of Science in Nursing, Facultad de Enfermería y Nutriología, Universidad Autónoma de Chihuahua, Chihuahua, México.
4. Doctor of Science in Nursing, Facultad de Enfermería y Nutriología, Universidad Autónoma de Chihuahua, Chihuahua, México.
5. Master in Nursing, Facultad de Enfermería y Nutriología, Universidad Autónoma de Chihuahua, Chihuahua, México.

* Author for correspondence: Alejandrasaenz_92@hotmail.com

Received: 02/05/2024
Accepted: 25/01/2025

ISSN: 2448-6094
Universidad de Sonora

Abstract

Introduction: Perinatal death occurs from 28 weeks of gestation until the first 28 days of life. Between 2000 and 2019, the annual rate of reduction in the perinatal mortality rate was only 5.2 %. In Mexico, about 38,297 perinatal deaths were recorded. **Objective:** To identify risk factors that influence perinatal death in women of reproductive age through a systematic review of literature. **Methodology:** This study used a systematic review according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. A sample of 24 articles was used, considering literature published between 2018 and 2024 in English, Spanish and Portuguese languages. The databases used were PubMed, Virtual Health Library and Science Direct. Studies in which the cause of death was trauma and induced abortion were excluded. The Review Manager tool and the Strengthening the Reporting of Observational Studies in Epidemiology guide were used for literature selection. **Results:** Risk factors with higher prevalence were: low birth weight, 34.1 %; maternal age ≥ 35 years, 28 %; and not attending prenatal consultations, 25.6 %. In addition, antepartum haemorrhage, asphyxia and the distance to health facilities influenced the perinatal mortality. **Conclusions:** Women are not attending prenatal consultations despite this being a strategy to reduce perinatal mortality. Further research is recommended on this modifiable and highly prevalent risk factor.

Keywords: Perinatal death; Risk factors; Causes of death (DeCS).

Resumen

Introducción: La muerte perinatal ocurre a partir de las 28 semanas de gestación hasta los 28 primeros días de vida. Entre el año 2000 y 2019, el índice anual de reducción de la tasa de muertes perinatales fue tan solo de 5.2 %. En México se registraron alrededor de 38,297 muertes perinatales. **Objetivo:** Identificar factores de riesgo que influyen en la muerte perinatal en mujeres de edad reproductiva, a través de la revisión sistemática de literatura. **Metodología:** Revisión sistemática siguiendo las directrices Preferred Reporting Items for Systematic Reviews and Meta-Analyses, en una muestra de 24 artículos, se consideró literatura entre el año 2018 al 2024 en idioma inglés, español y/o portugués, las bases de datos utilizadas fueron PubMed, Biblioteca Virtual en Salud y Science Direct. Se excluyeron estudios donde la causa de muerte fueron lesiones de trauma y abortos inducidos. Para la selección de literatura se utilizó la herramienta Review Manager, y la guía Strengthening the Reporting of Observational Studies in Epidemiology. **Resultados:** Los factores de riesgo que prevalecieron fueron: bajo peso al nacer 34.1 %, edad materna ≥ 35 años 28 % y el no acudir a consultas prenatales 25.6 %. Además, la hemorragia anteparto, la asfixia al nacer y la distancia de la institución de salud influyen en la muerte perinatal. **Conclusiones:** Las mujeres no acuden a consultas prenatales a pesar de ser una estrategia para disminuir la mortalidad perinatal, se recomienda realizar mayor investigación alrededor de este factor de riesgo modificable y de mayor prevalencia.

Palabras clave: Muerte perinatal; Factores de riesgo; Causas de muerte (DeCS).

Abstrato

Introdução: A morte perinatal ocorre desde a 28ª semana de gestação até os primeiros 28 dias de vida. Entre 2000 e 2019, a taxa anual de redução na taxa de mortes perinatais foi de apenas 5,2 %. Cerca de 38.297 mortes perinatais foram registradas no México. **Objetivo:** identificar fatores de

risco que influenciam a morte perinatal em mulheres em idade reprodutiva por meio de uma revisão sistemática da literatura. **Metodologia:** o tipo de estudo foi uma revisão sistemática seguindo as diretrizes do Preferred Reporting Items for Systematic Reviews and Meta-Analyses. A amostra foi composta por 24 artigos, considerando a literatura de 2018 a 2024 em inglês, espanhol e/ou português. As bases de dados utilizadas foram PubMed, Biblioteca Virtual de Saúde e Science Direct. Foram excluídos os estudos em que a causa da morte foram lesões traumáticas e abortos induzidos. Para a seleção da literatura, foi utilizada a ferramenta Review Manager fornecida pela Cochrane para avaliar o risco de viés nas informações e as diretrizes Strengthening the Reporting of Observational Studies in Epidemiology. **Resultados:** Os fatores de risco que prevaleceram foram: baixo peso à nascença 34,1 %, idade materna ≥ 35 anos 28 % e não comparência a consultas pré-natais 25,6 %. Além disso, a hemorragia anteparto, a asfixia ao nascer e a distância da instituição de saúde influenciaram a morte perinatal. **Conclusões:** As mulheres não comparecem às consultas pré-natais, apesar de essa ser uma estratégia para reduzir a mortalidade perinatal. Recomenda-se mais pesquisas sobre esse fator de risco modificável e mais prevalente.

Palavras-chave: Morte perinatal; Fatores de risco; Causas de morte (DeCS).

Introduction

Globally, perinatal death (PD) is currently a sign of the health situation in any country, since it generates a negative impact on the mental health of mothers, who subsequently experience anxiety and depression primarily [(1)]. It is worth noting that perinatal death is the death of a baby between the 28th week of pregnancy and the first 28 days of life [(2)].

Worldwide, alarming figures have been reported for perinatal mortality between 2000 and 2019, as the reduction in the perinatal mortality rate was only 5.2 %, with a fetal mortality rate of 2.3 % and a neonatal mortality rate of 2.9 % [(3)]. In Mexico, a developing country, there were 23,000 fetal deaths and a rate of 8 neonatal deaths per 1000 live births in 2021, or approximately 38,297 cases of perinatal death [(4-6)]. This situation is a problem that occurs in Mexico and other developing countries and those considered low-income [(3)], which may indicate that there are specific socioeconomic factors that influence high rates of perinatal mortality. However, these are not the only factors; there are other causes that influence this health situation, which may be related to the mother, the child or independent factors. Moreover, it is important to mention that the perinatal stage (antepartum, intrapartum or postpartum in which the dyad (mother-child) is found, which

makes it vulnerable to presenting factors that influence perinatal death, so health professionals need available and up-to-date evidence on these risk factors in this population in order to make timely interventions and prevent or reduce perinatal death [1,2].

Therefore, it is important to have systematic reviews that consider the factors that may be associated with perinatal death, taking into account the perinatal period and not just one of the stages. Currently, in the literature, reviews were found that focused on neonatal death or fetal death, and not on the perinatal stage; therefore, it is considered relevant to assess which are the main factors influencing perinatal death in women of reproductive age.

As a result, identification of the risk factors for perinatal death will allow the development of strategies and interventions to prevent or reduce this problem and to promote a healthy lifestyle among women, providing timely and updated information and recommendations that can be given before conception and during pregnancy, that is, to achieve a better quality of life during this period. With this, a secondary impact can be achieved and the prevalence of pathological grief and depression of women facing this situation can be prevented [7]. Therefore, the following PICO question was proposed: What are the risk factors (mother/fetal/other) that most influence perinatal death in women of reproductive age? Thus, the objective was to identify the risk factors that influence perinatal death in women of reproductive age, through a systematic review of the literature.

Methodology

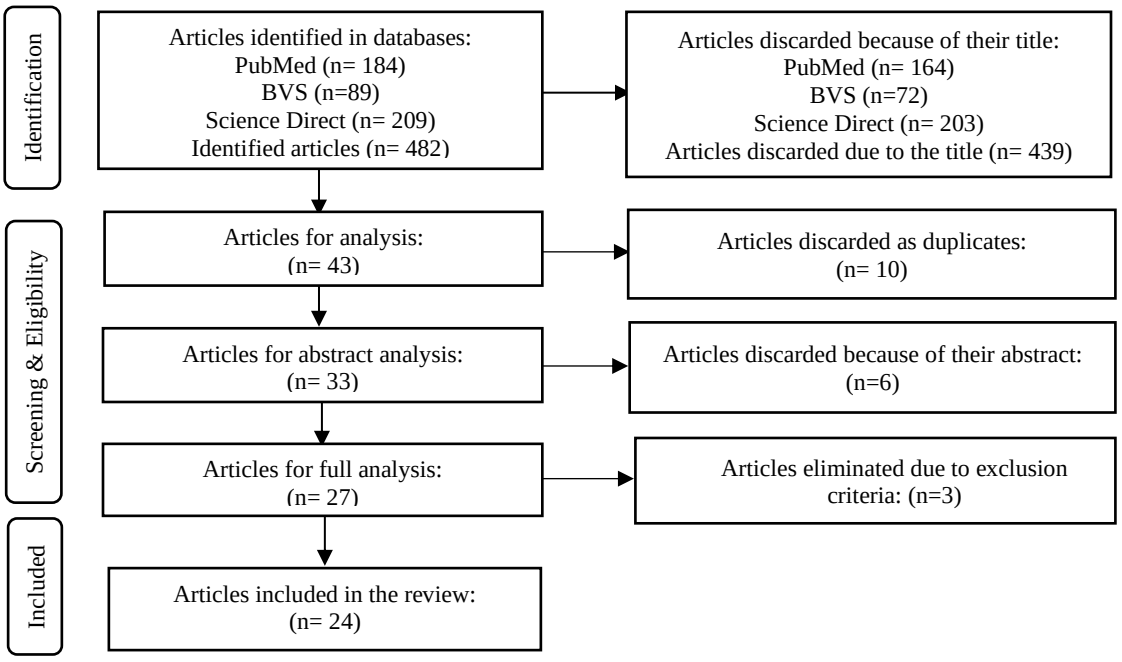
A systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, based on the PICO question: What are the risk factors (maternal/fetal/other) that most influence perinatal death in women of reproductive age? Quantitative, descriptive, case-control and cohort studies were included, as well as English, Spanish or Portuguese-language papers and full-text articles published between 2018 and 2024 that

obtained their data from hospital records. Studies in which the causes of perinatal death were attributed to traumatic injuries and induced abortions, with or without medical conditions, were excluded.

The search was performed in various databases such as PubMed, Virtual Health Library (VHL) and Science Direct. The Boolean operators “AND” and “OR” were used, as well as the MeSH descriptors “Perinatal death” and “Risk factors”.

To select the literature, the titles of the articles found were evaluated, discarding those that were duplicates or did not address the variables of interest. Subsequently, the abstract of each article was reviewed, eliminating those that did not meet the eligibility criteria, and the full text of those articles that met the inclusion criteria was examined in detail, discarding those with inconsistencies not previously identified, (Figure 1).

Figure 1. PRISMA flow chart, 2024



Source: Self-developed

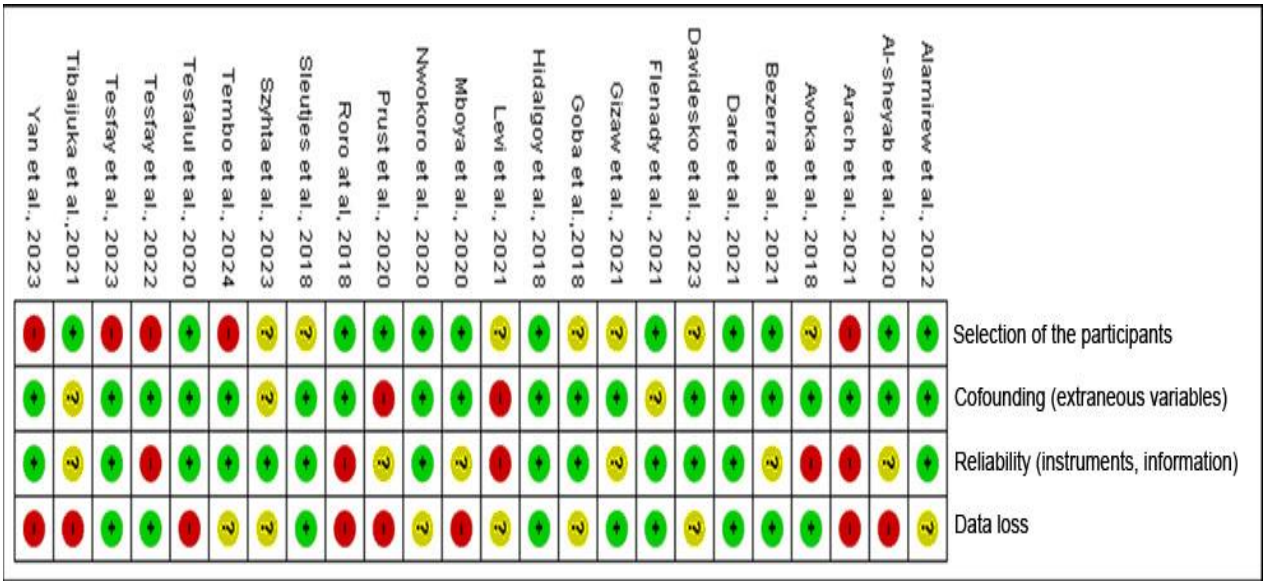
A data matrix and summary tables were created to analyze the information from the selected articles. The Review Manager tool provided by Cochrane was also used to assess the risk of bias in the information, allowing some aspects of the methodology to be qualified with scales of low risk, unclear risk and high risk of bias.

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guide was used to assess the quality of evidence, using a 22-point checklist to check for the presence of items such as objective, justification, sample, sampling, inclusion criteria, exclusion criteria, methodological clarity, congruence with results, etc. High-quality evidence was considered to be that which scored between 22 and 18 points, medium-quality evidence between 17 and 14 points, and low-quality evidence of 13 points or less. The final sample consisted of 24 articles.

Results

According to the STROBE checklist, the selected studies provided good quality evidence; 62.5 % were of high quality and 37.5 % of moderate quality. Two articles had low bias in terms of participant selection, confounding, reliability and data loss, as shown in Figure 2 below.

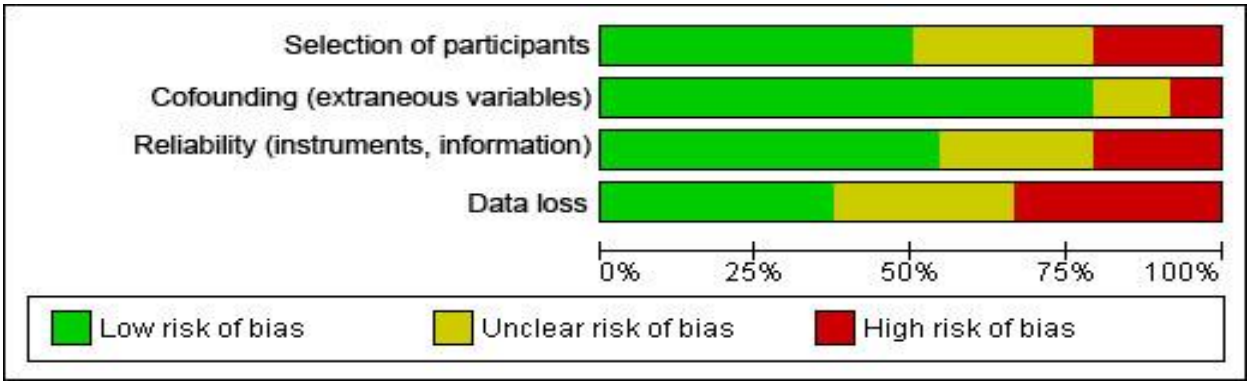
Figure 2. Bias assessment by author, 2024 (n=24)



Source: Self-developed.

Approximately 79 % of the articles had low confounding bias and the highest prevailing bias was due to data loss, (Figure 3).

Figure 3. Summary of the bias assessment, 2024 (n=24)



Source: Self-developed.

29.1 % of the articles were published in 2021, 20.8 % in 2019 and 2020, and 16.6 % in 2023. In addition, publications from different countries were included in this review, 25 % of the articles were published in Ethiopia, 12.5 % in Uganda and Brazil, and 8.3 % in Ghana and Israel. The articles also consisted of different types of studies, 62.5 % were cohort studies, 29.1 % were case-control studies, and 8.3 % were explanatory models.

With regard to the characteristics of the population included in the studies, most participants (75 %) were pregnant women aged 20-34 years, and the most common marital status was married or living with a partner (55 %).

Regarding the risk factors associated with perinatal death, some researchers have reported up to 9 different factors [24] and others 8 different factors [22], of which antepartum haemorrhage, asphyxia and distance to health facilities were consistent; these articles mentioned factors different from the categories used in this study. The most common categories were fetal risk factors with 41.7 % [8,9,12,13,15,24-27,31], independent factors with 29.1 % [11,16,17,20,23,28,29] and maternal factors with 16.7 % [14,18,19,22]; only 12.5 % of the articles did not mention any category [10,21,30], (Table 1).

Among the fetal risk factors, low birth weight (34.1 %) [8,10,12-16,23-26,27,29,30], prematurity (31.7 %) [8,9,12-17,23,26-31] and asphyxia (12.1 %) [19,22,24-26] prevailed. In the category of maternal causes, the predominant risk factors were maternal age equal to or greater than 35 years (28 %) [9,10,14,16,19,24,25], preeclampsia and eclampsia (17.8 %) [14-16,21,31] and antepartum haemorrhage (14. 2 %) [8,14,22,25], and of independent causes, the most common risk factors were not attending prenatal checkup (25.6 %) [11,12,16,20,25-30], Low education level of the mother (21 %) [16,20,23,24,28,29], and place of residence (12.8 %) [11,16 19 25,28].

Table 1. Data matrix, 2024 (n=24)

	Risk factors	Articles							
		Tesaful, et al., 2020 [8]	Roro, et al., 2018 [9]	Avoka, et al., 2018 [10]	Alamirew, et al., 2022 [11]	Sleutjes, et al., 2018 [12]	Al-sheyab, et al., 2020 [13]	Goba, et al., 2018 [14]	Levi, et al., 2021 [15]
Maternal	Antepartum haemorrhage	X						X	
	Cord prolapse	X							
	Age ≥ 35 years old		X	X				X	
	Previous perinatal death				X	X			
	Preeclampsia and eclampsia							X	X
	Hypertensive disorders								
	Nulliparity								
	Diabetes								
	Smoking								
	Ethnicity								
Fetal	Prematurity	X	X			X	X	X	X
	Low birth weight	X		X		X	X	X	X
	Malpresentation	X							
	Male		X		X				
	Hypoxia/Asphyxia								
	Cesarean section delivery	X							
	Gestational age			X					
Other/ Independent	Absence of prenatal care				X	X			
	Distance to health facilities				X				
	Attention in public institutions						X		
	Place of residence				X				
	Low education level								
	Delay in receiving care								
	Multiple birth								
	Low income level				X				

Table 1. Data matrix, 2024 (n=24) (continued)

	Risk factors	Articles							
		Mboya, et al., 2020 (16)	Tesfay, et al., 2022 (17)	Prust, et al., 2020 (18)	Arach, et al., 2021 (19)	Dare, et al., 2021 (20)	Gizaw, et al., 2021 (21)	Flenady, et al., 2021 (22)	Hidalgo, et al., 2018 (23)
Maternal	Antepartum haemorrhage							X	
	Cord prolapse							X	X
	Age ≥ 35 years old	X			X				
	Previous perinatal death								
	Preeclampsia and eclampsia	X					X		
	Hypertensive disorders			X				X	
	Nulliparity				X				
	Diabetes							X	
	Smoking							X	
Fetal	Ethnicity			X					
	Prematurity		X						X
	Low birth weight	X							X
	Malpresentation	X					X		
	Male					X			
	Hypoxia/Asphyxia				X			X	
	Cesarean section delivery						X		
	Gestational age								X
Other/ Independent	Absence of prenatal care	X				X			
	Distance to health facilities		X					X	
	Attention in public institutions								
	Place of residence	X			X				
	Low education level	X				X			X
	Delay in receiving care		X					X	
	Multiple birth					X			
	Low income level								X

Table 1. Data matrix, 2024 (n=24) (continued)

Risk factors		Articles							
		Bezerra, et al., 2021 [24]	Nwokoro , et al., 2020 [25]	Tibaijuka, et al., 2021 [26]	Szyhta, et al., 2023 [27]	Tesfay, et al., 2023 [28]	Yan, et al., 2023 [29]	Tembo, et al., 2024 [30]	Davidesko, et al., 2023 [31]
Maternal	Antepartum haemorrhage		X						
	Cord prolapses								
	Age ≥ 35 years old	X	X						
	Previous perinatal death						X		
	Preeclampsia and eclampsia								X
	Hypertensive disorders								
	Nulliparity								
	Diabetes								
	Smoking								
	Ethnicity								
Fetal	Prematurity			X	X		X	X	X
	Low birth weight	X	X	X	X		X	X	
	Malpresentation		X						X
	Male		X						
	Hypoxia/Asphyxia	X	X	X					
	Cesarean section delivery								
	Gestational age								
Other/ Independent	Absence of prenatal care		X	X	X	X	X	X	
	Distance to health facilities		X						
	Attention in public institutions					X		X	
	Place of residence		X			X			
	Low education level	X				X	X		
	Delay in receiving care					X			
	Multiple birth						X		
	Low income level								

Source: Self-developed

Discussion

In the process of identifying the risk factors for perinatal death in women of reproductive age, this systematic review found that maternal age was a risk factor for perinatal death, particularly in women aged 35 years or older; these findings are consistent with those of other authors who have shown that women aged over 40 years have a significant risk of fetal mortality [32,33]. There is no theoretical pathophysiological consensus to explain why pregnant women aged 35 years or older are at greater risk of perinatal death, but one of the accepted explanations is that women's ovarian reserve and oocyte quality decline with age, and myometrial perfusion decreases [34].

Similarly, there are more chronic degenerative diseases in women over the age of 35, which may influence this situation [35], which in itself is problematic, since the literature indicates that

motherhood has been delayed compared to previous years. However, it is important to note that it is not only the woman's age that matters, as an older pregnant woman with no co-morbidities, a healthy lifestyle and good habits during pregnancy could have a successful delivery [35].

Another of the predominant risk factors found in this study, which is consistent with the findings of other authors [36], was low birth weight and prematurity, which are related; newborns with low birth weight (<2,500 g) are 5.6 times more likely to die, and preterm birth has a 2.6 times higher risk of fetal death than term birth. This may be related to the fact that preterm infants are susceptible to certain morbidities due to the immaturity of their organs and systems [37,38].

A third important point to highlight from this review is that none or few prenatal checkup visits is a risk factor classified as independent and associated with perinatal death. This is in line with a study from Mexico [39], which showed that lack of adherence to prenatal checkup by pregnant women creates a risk of complications that can lead to perinatal death. Several authors suggest that this is due to the failure to detect maternal and fetal complications in time. It also prevents the prevention of various risk factors and increases the likelihood of perinatal death by up to 9 times compared to women who attend their prenatal checkup visits; in addition, the literature indicates that prenatal checkup monitoring is associated with a reduction in the perinatal mortality rate [40-43].

There are maternal and fetal factors associated with perinatal death, which are variables that are difficult to change, such as maternal age; however, it is through adherence to prenatal checkup [39] (independent factor) that the factors that stand out in this review can be identified, such as maternal factors (smoking, diabetes, hypertensive disorders, among others), fetal factors (low weight, poor presentation, sex) and even other independent factors (place of residence, care in public health facilities, etc.).

Although the factors are interrelated, the classification presented in this review shows that there are maternal-fetal factors, i.e. the woman and her child have their own characteristics that make them vulnerable to perinatal death, but there are also factors that relate to the society and economy of countries, such as the level of education, the number and proximity of places where prenatal checkup is provided. It is therefore necessary to collaborate in the prevention of perinatal death through strategies that health professionals can use to raise awareness and implement actions that facilitate access to quality health care. It is important to recognize that individuals are not solely responsible for their health, but that the environment in which they live influences whether or not they are at risk of perinatal death.

Likewise, it is important to mention that this study had some limitations, such as the inclusion of literature from a limited number of databases and available or open access articles, so only potentially eligible studies were included, as well as studies conducted in different countries; however, it is recommended to perform reviews that show the context of perinatal death in Latin America, in order to generate evidence that represents the needs and factors that influence perinatal death in this population, since they share similar personal, cultural and/or social characteristics.

Conclusions

Perinatal death is multifactorial and can be divided into different classifications. In this study, fetal factors were the most prevalent; however, independent risk factors, such as non-adherence to prenatal checkup, are considered to be among the most important because interventions can be made with the mother during pregnancy to reduce or eliminate the other risk factors, as prenatal checkup is considered to be a central factor in risk management.

Nonetheless, despite the fact that prenatal checkup is a health program that can identify risk factors in time and save the lives of mothers and their babies, although it has been introduced in several countries many women do not follow it, resulting in a worrying persistence of perinatal mortality.

Consequently, it would be very useful to study the factors that influence adherence to prenatal checkup, which should be a topic for future systematic reviews, and thus generate evidence to design more effective interventions. It is clear that despite the work that has been done in this area, there are still areas that have not been addressed.

Perinatal death is a complex phenomenon and it is essential to approach it from a psychosocial perspective. This review shows that risk factors are not only of an individual nature, since health institutions and health professionals may or may not favor the occurrence of some of the risk factors in this situation. Health professionals need to be aware of the risk factors that influence perinatal death in order to identify those that can be modified or influenced. Hence, further research to address areas of opportunity in the health system to ensure maternal and fetal health in dignified settings is recommended.

Conflict of interest

The authors state that they have no conflict of interest.

Funding

The authors state that no funding has been received.

Artificial intelligence

The authors state that they have not used any artificial intelligence resources in any of the sections of this manuscript.

Bibliographical references

1. Calderer A, Obregón N, Cobo J, Goberna J. Muerte perinatal: acompañamiento a mujeres y parejas. Matronas profesión [Internet]. 2018 [cited 26 mar 2024];19(3):41-47. Available at: https://diposit.ub.edu/dspace/bitstream/2445/126587/1/682987.pdf
2. Organización Mundial de la Salud (OMS). Para que cada bebé cuente. Auditoría y examen de las muertes prenatales y neonatales. Biblioteca de la OMS [Internet]. Suiza; 2016 [cited 26 mar 2024]. Available at: https://iris.who.int/bitstream/handle/10665/258931/9789243511221-spa.pdf?sequence=1
3. Fondo de las Naciones Unidas para la Infancia. Comunicado de prensa: Cada 16 segundos se produce una muerte fetal según las primeras estimaciones conjuntas de las Naciones Unidas. Comunicado de prensa [Internet]. 2020 [cited 26 mar 2024]. Available at:

https://www.unicef.org/es/comunicados-prensa/cada-16-segundos-produce-muerte-fetal-estimaciones-Naciones-Unidas
4. Instituto Nacional de Estadística y Geografía. Estadísticas de los nacimientos registrados 2021 [Internet]. México; 2021 [cited 27 mar 2024]. Available at: https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2022/NR/NR2021.pdf
5. Instituto Nacional de Estadística y Geografía. Defunciones fetales registradas en México durante 2021 [Internet]. México; 2021 [cited 27 mar 2024]. Available at: Comunicado, Características de las defunciones fetales registradas en México durante 2021 (inegi.org.mx)
6. Banco Mundial. Tasa de mortalidad neonatal [Internet]. 2021 [cited 30 mar 2024]. Available at: https://acortar.link/D1xVXE
7. Páez CM, Arteaga HL. Duelo por muerte perinatal: Necesidad de una atención diferencial e integral. Manzinales [Internet]. 2019 [cited 01 apr 2024];19(1):32-45. Available at: https://doi.org/10.30554/archmed.19.1.2853.2019
8. Tesfalul MA, Natureeba P, Day N, Thomas O, Gaw SL. Identifying risk factors for perinatal death at Tororo District Hospital, Uganda: a case-control study. BMC Pregnancy and Childbirth [Internet]. 2020 [cited 30 mar 2024];20(1):1-6. Available at: https://doi.org/10.1186/s12884-020-2727-3
9. Roro EM, Sisay MM, Sibley LM. Determinants of perinatal mortality among cohorts of pregnant women in three districts of North Showa zone, Oromia Region, Ethiopia: Community based nested case control study. BMC Public Health [Internet]. 2018 [cited 02 apr 2024];18(1):888. Available at: https://doi.org/10.1186/s12889-018-5757-2
10. Avoka JA, Adanu RM, Wombeogo M, Seidu I, Dun-Dery EJ. Maternal and neonatal characteristics that influence very early neonatal mortality in the Eastern Regional Hospital of Ghana, Koforidua: a retrospective review. BMC Res Notes [Internet]. 2018 [cited 02 apr 2024];11(1):91-96 Available at: https://doi.org/10.1186/s13104-018-3196-x
11. Alamirew WG, Belay DB, Zeru MA, Derebe MA, Adegeh SC. Prevalence and associated factors of neonatal mortality in Ethiopia. Sci Rep [Internet]. 2022 [cited 02 apr 2024];12(1):12-24. Available at: https://doi.org/10.1038/s41598-022-16461-3
12. Sleutjes FC, Parada CM, Carvalhaes MA, Temer MJ. Risk factors for neonatal death in an inland region in the State of São Paulo Brazil. Cien Saude Colet [Internet]. 2018 [cited 02 apr 2024]; 23(8):2713-2720. Available at: https://doi.org/10.1590/1413-81232018238.15142016
13. Al-Sheyab N, Khader YS, Shattnawi KK, Alyahya MS, Batieha A. Rate, risk factors, and causes of neonatal deaths in Jordan: Analysis of data from Jordan stillbirth and neonatal surveillance system (JSANDS). Front Public Health [Internet]. 2020 [cited 05 apr 2024];30(8):595379. Available at: https://doi.org/10.3389/fpubh.2020.595379
14. Goba GK, Tsegay H, Gebregergs GB, Mitiku M, Kim KA, Alemayehu M. A facility-based study of factors associated with perinatal mortality in Tigray, northern Ethiopia. Int J Gynaecol Obstet [Internet]. 2018 [cited 05 apr 2024];141(1):113-119. Available at: https://doi.org/10.1002/ijgo.12438
15. Levi R, Pariente G, Sheiner E, Wainstock T. Identifying risk factors for perinatal mortality from a preceding pregnancy without perinatal mortality. Int J Gynaecol Obstet [Internet]. 2022 [cited 05 apr 2024];156(2):336-340. Available at: https://doi.org/10.1002/ijgo.13680
16. Mboya IB, Mahande MJ, Obure J, Mwambi HG. Predictors of perinatal death in the presence of missing data: A birth registry-based study in northern Tanzania. PloS One [Internet]. 2020 [cited 05 apr 2024];15(4):1-22. Available at: https://doi.org/10.1371/journal.pone.0231636
17. Tesfay N, Tariku R, Zenebe A, Dejene Z, Woldeyohannes F. Cause and risk factors of early neonatal death in Ethiopia. PloS One [Internet]. 2022 [cited 05 apr 2024];17(9):e0275475.

Available at: https://doi.org/10.1371/journal.pone.0275475
18. Prüst ZD, Verschueren KJ, Bhikha-Kori G, Kodan LR, Bloemenkamp KW, Browne JL, Rijken MJ. Investigation of stillbirth causes in Suriname: application of the WHO ICD-PM tool to national-level hospital data. Glob Health Action [Internet]. 2020 [cited 05 apr 2024];13(1):1794105. Available at: https://doi.org/10.1080/16549716.2020.1794105
19. Arach AA, Tumwine JK, Nakasujja N, Ndeezi G, Kiguli J, Mukunya D, et al. Perinatal death in Northern Uganda: incidence and risk factors in a community-based prospective cohort study. Glob Health Action [Internet]. 2021 [cited 10 apr 2024];14(1):1859823. Available at: https://doi.org/10.1080/16549716.2020.1859823
20. Dare S, Oduro AR, Owusu-Agyei S, Mackay DF, Gruer L, Manyeh AK, et al. Neonatal mortality rates, characteristics, and risk factors for neonatal deaths in Ghana: analyses of data from two health and demographic surveillance systems. Glob Health Action [Internet]. 2021 [cited 10 apr 2024];14(1):1938871. Available at: https://doi.org/10.1080/16549716.2021.1938871
21. Gizaw W, Feyisa M, Hailu D, Nigussie T. Determinants of stillbirth in hospitals of North Shoa Zone, Oromia region, Central Ethiopia: A case control study. Heliyon [Internet]. 2021 [cited 10 apr 2024];7(5):e07070. Available at: https://doi.org/10.1016/j.heliyon.2021.e07070
22. Flenady V, Kettle I, Laporte J, Birthisel D, Hardiman L, Matsika A, et al. Making every birth count: Outcomes of a perinatal mortality audit program. Aust N Z J Obstet Gynaecol [Internet]. 2021 [cited 17 apr 2024];61(4):540-547. Available at: https://doi.org/10.1111/ajo.13325
23. Hidalgo-Lopez P, Cobo-Cuenca AI, Carmona-Torres JM, Luque-Carrillo P, Rodríguez-Muñoz PM, Rodríguez-Borrego M. Factors associated with late fetal mortality. Arch Gynecol Obstet [Internet]. 2018 [cited 17 apr 2024];297(6):1415-1420. Available at: https://doi.org/10.1007/s00404-018-4726-4
24. Bezerra IM, Ramos JL, Pianissola MC, Adami F, Rocha JB, Ribeiro MAL, et al. Perinatal Mortality Analysis in Espírito Santo, Brazil, 2008 to 2017. Int J Environ Res Public Health [Internet]. 2021 [cited 17 apr 2024];6;18(21):1-19. Available at: https://doi.org/10.3390/ijerph182111671
25. Nwokoro UU, Dahiru T, Olorukooba A, Daam CK, Waziri HS, Adebowale A, et al. Determinants of perinatal mortality in public secondary health facilities, Abuja Municipal Area Council, Federal Capital Territory, Abuja, Nigeria. Pan Afr Med J [Internet]. 2020 [cited 17 apr 2024];(37)114:1-12. Available at: https://doi.org/10.11604/pamj.2020.37.114.17108
26. Tibaijuka L, Bawakanya SM, Owaraganise A, Kyasimire L, Kumbakumba E, Boatin AA, et al. Incidence and predictors of preterm neonatal mortality at Mbarara Regional Referral Hospital in South Western Uganda. PLoS One [Internet]. 2021 [cited 17 apr 2024];16(11):1-17. Available at: https://doi.org/10.1371/journal.pone.0259310
27. Szyhta CC, Silva ZP, Alencar GP, Almeida MF. Risk factors for perinatal death in high-risk pregnant women at a tertiary hospital in Curitiba-PR, Brazil: a case-control study. Cien Saude Colet [Internet]. 2023 [cited 17 apr 2024];28(4):1043-1058. Available at: https://doi.org/10.1590/1413-81232023284.16042022
28. Tesfay N, Tariku R, Zenebe A, Hailu G, Taddese M, Woldeyohannes F. Timing of perinatal death; causes, circumstances, and regional variations among reviewed deaths in Ethiopia. PLoS One [Internet]. 2023 [cited 17 apr 2024];18(5):e0285465. Available at: https://doi.org/10.1371/journal.pone.0285465
29. Yan T, Mullany LC, Subedi S, Hazel EA, Khatry SK, Mohan D, et al. Risk factors for neonatal mortality: an observational cohort study in Sarlahi district of rural southern Nepal. BMJ Open [Internet]. 2023 [cited 17 apr 2024];13(9):1-15. Available at: https://doi.org/10.1136/bmjopen-

2022-066931
30. Tembo D, Abobo FD, Kaonga P, Jacobs C, Bessing B. Risk factors associated with neonatal mortality among neonates admitted to neonatal intensive care unit of the University Teaching Hospital in Lusaka. Sci Rep [Internet]. 2024 [cited 17 apr 2024];14(1):1-12 Available at: https://doi.org/10.1038/s41598-024-56020-6
31. Davidesko S, Levitas E, Sheiner E, Wainstock T, Pariente G. Critical analysis of risk factors for intrapartum fetal death. Arch Gynecol Obstet [Internet]. 2023 [cited 17 apr 2024];308(4):1239-1245. Available at: https://doi.org/10.1007/s00404-022-06811-x
32. Saccone G, Gragnano E, Ilardi B, Marrone V, Strina I, Venturella R, et al. Complicaciones maternas y perinatales según la edad materna: Revisión sistemática y metaanálisis. Int J Gynaecol Obstet [Internet]. 2022 [cited 05 sep 2024];159(1):43-55. Available at: https://doi.org/10.1002/ijgo.14100
33. Magnus MC, Wilcox AJ, Morken NH, Weinberg CR, Håberg SE. Role of maternal age and pregnancy history in risk of miscarriage: prospective register-based study. BMJ [Internet]. 2019 [cited 24 apr 2024];364:l-8. Available at: https://doi.org/10.1136/bmj.l869
34. Fuentes A, Sequeira K, Tapia-Pizarro A. Efectos demográficos, clínicos y biológicos de la postergación de la maternidad. Revista Médica Clínica Las Condes [Internet]. 2021 [cited 05 sep 2024];32(2):146-160. Available at: https://doi.org/10.1016/j.rmclc.2020.10.002
35. Flores-López B, Naves-Sánchez J, Sosa-Bustamante GP, González AP, Luna-Anguiano JL, Paque-Bautista C. Morbilidades materna y perinatal asociadas a edad avanzada en gestantes. Rev Med Inst Mex Seguro Soc [Internet]. 2023 [cited 05 sep 2024];18;61(Suppl 2):S83-S89. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10761194/pdf/04435117-61-Suppl2-S83.pdf
36. Calle JS, Mesa IC, Ramírez AA, Moyano BG. Factores de riesgo de mortalidad neonatal: revisión sistemática. Revista de Producción, Ciencias e Investigación. Pro Sciences. [Internet]. 2021 [cited 03 feb 2025]:5(40):312-329. Available at: https://doi.org/10.29018/issn.2588-1000vol5iss40.2021pp312-329
37. Castellanos-Flores E. Mortalidad perinatal en el municipio de Panchimalco, San Salvador: una serie de casos. Rev Peru Med Exp Salud Pública [Internet]. 2024 [cited 05 sep 2024];41(1):83-88. Available at: https://doi.org/10.17843/rpmesp.2024.411.13335
38. Teklay G, Teshale T, Tasew H, Mariye T, Berihu H, Zeru T. Risk factors of preterm birth among mothers who gave birth in public hospitals of central zone, Tigray, Ethiopia: unmatched case-control study 2017/2018. BMC Res Notes [Internet]. 2018 [cited 24 apr 2024];11(2018):1-7. Available at: https://doi.org/10.1186/s13104-018-3693-y
39. Camargo RA, Estrada ES, Reveles IJ, Manzo CJ, De Luna LM, Flores PL. Factores de riesgo de complicaciones perinatales en el embarazo de adolescentes. Ginecología y Obstetricia de México [Internet]. 2022 [cited 03 feb 2025];90(06):496-503. Available at: https://doi.org/10.24245/gom.v90i6.6818
40. Geiger CK, Clapp MA, Cohen JL. Association of prenatal care services, maternal morbidity, and perinatal mortality with the advanced maternal age cutoff of 35 years. JAMA Health Forum [Internet]. 2021 [cited 05 sep 2024];2(12):e214044. Available at: https://doi.org/10.1001/jamahealthforum.2021.4044
41. Martínez LA, Vargas HJ, Mini DE. Asociación entre los factores sociodemográficos, obstétricos y patológicos con la muerte fetal tardía: estudio de casos y controles en un hospital de Perú. Anales de la Facultad de Medicina [Internet]. 2019 [cited 24 apr 2024];80(3):322-326. Available at: http://dx.doi.org/10.15381/anales.803.16855
42. Mendoza LJ, Anaya GA, Hernández VL, Jiménez HJ, Fragozo SF, Hernández AF. Estudio

clínico factorial del riesgo de muerte fetal tardía en el hospital Juárez de México. Revista del Hospital Juárez de México [Internet]. 2019 [cited 24 apr 2024];86(3):116-124. Available at: https://www.medigraphic.com/pdfs/juarez/ju-2019/ju193c.pdf

43. Betancourt RA, García MY. Factores asociados a la no adherencia del control prenatal en gestantes. Revista Arbitrada Interdisciplinaria de Ciencias de la Salud. Salud y Vida [Internet]. 2020 [cited 24 apr 2024];4(7):74-96 Available at: https://doi.org/10.35381/s.v.v4i7.646

How to cite this article: Jácquez-Sáenz D, Amaro-Hinojosa M, Jiménez-Vázquez V, Orozco-Gómez C, Paredes-Morín C. Risk factors for perinatal death: systematic review of literature. SANUS [Internet]. 2025 [cited dd mmm yyyy];10:e517. Available at: DOI/URL.