CAUSES/RISK FACTORS OF MATERNAL MORTALITY IN BRAZIL: A SCOPING REVIEW

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ABSTRACT

The objective of this article is to identify the causes of maternal death in Brazil in the last four decades, to promote public policies to cope with it. To this end, a scoping review was carried out in the Medline, CINAHL, LILACS, WOS, SCOPUS, and Embase databases, and the descriptors were cross-referenced in health sciences. A total of 891 articles were identified, and after analysis according to inclusion and exclusion criteria, 29 were obtained to be included in this study. Among the results, maternal mortality is directly related to social vulnerability, with low schooling being the most prevalent factor, followed by low or non-prenatal care, with hypertensive diseases: preeclampsia and eclampsia, and diseases of the circulatory system as direct and indirect causes, respectively. Over the course of 40 years of studies, the causes of mortality continue to require intersectoral interventions and awareness of health workers about the set of social determinants.

Keywords: Maternal Mortality. Maternal Death. Risk Factors. Causality. Determinants of Mortality.

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INTRODUCTION

Maternal mortality is one of the main global public health challenges and is considered one of the most serious human rights violations, being unacceptable, especially in cases of women with social vulnerability and due to the high potential avoidability of these deaths (Ferraz; Bordignon, 2012; Fernandes, 2015; Picoli; Cazola; Lemos, 2017; Moraes *et al.,* 2019).

According to the World Health Organization, maternal mortality is defined as the death of a woman during pregnancy or within a period of 42 days after the end of pregnancy, regardless of the duration or location of the pregnancy, due to any cause related to or aggravated by pregnancy or by measures taken (or not) in relation to it, accidental or incidental causes are excluded (Fernandes, 2015).

Maternal mortality can be classified as related to direct and indirect obstetric causes (World Health Organization, 2023). The direct causes result from complications at any time of pregnancy, childbirth and puerperium related to interventions, omissions or incorrect treatments due to these situations. Indirect diseases are related to preexisting diseases or those developed during the pregnancy period and that were aggravated by the effects of pregnancy.

According to the United Nations (UN) Trends in Maternal Mortality 2000 to 2020 report, it was estimated that in 2020 there would be 287,000 maternal deaths of women in the world, representing 800 maternal deaths per day, or approximately one every two minutes. The maternal mortality ratio was estimated at 223 per 100,000 live births, which is considered very high (United Nations, 2015).

With this epidemiological scenario, the UN has made a commitment to reduce this rate since the agreement of the Millennium Development Goals (MDGs) that was in force from 2000 to 2015. However, many countries, including Brazil, did not meet the targets. In 2015, a new global agenda was agreed: the Sustainable Development Goals (SDGs), in which the goal is to reduce the maternal mortality rate by 2030 to less than 70 deaths per 100,000 live births (Rodrigues; L; Francis, 2023).

By 2030, Brazil needs to achieve goals to reduce the maternal and infant mortality ratio (target 3.1 of the Sustainable Development Goals – SDGs), to a maximum of 30 deaths per 100,000 live births. However, in 2021, with closed data, according to the Brazilian Obstetric Observatory, approximately 1,518 pregnant women died as a result of

COVID-19, and the maternal mortality ratio was 107.53 per 100 thousand live births (LB), a fact that had not been recorded since the 1990s (Galvão; Pereira, 2022).

The permanent challenge faced by the health system, as well as by the services and workers of the Unified Health System, to cope with maternal mortality and the need to consolidate and constantly review the causes and risk factors for maternal mortality in Brazil is evident.

The objective of this article is to provide subsidies in order to know the health factors/determinants that influence maternal and infant mortality in the state and to develop tools that support intervention in maternal and infant mortality in order to bring rationality, efficiency and impact.

METODOLOGY

This is a scoping review study, which aims to map what research exists on the subject, a scientific investigation in order to recognize which knowledge obstacles require decision-making (Leite *et al.*, 1985).

The methodological path was carried out in different stages: a) construction of the research protocol; b) formulation of the question; c) search for studies according to the search strategies of the descriptors; d) selection and review of studies according to the inclusion and exclusion criteria; e) critical evaluation of the articles; f) data collection based on an instrument and g) synthesis of results and/or data, grouping similarities between the studies.

The research began with the construction of the guiding question: What are the determining factors that led to the increase in maternal mortality in Brazil? For this, the Protocol with the PVO strategy was used – Population: women of childbearing age; Variables: determinant factors and Outcomes: maternal mortality.

The inclusion criteria were: full articles available in any language. It was decided not to use a publication time frame in order to cover a greater variability of determining factors. Review articles, editorials, letters to the editor, abstracts, expert opinions, reviews, books, book chapters, theses, dissertations, monographs, and course completion papers were excluded.

The search for articles was carried out between January and April 2023, using the CAPES Portal – Portal of Journals of the Coordination for the Improvement of Higher Education Personnel in the databases of the Medical Literature Analysis and Retrieval

System Online (Medline/PUBMED); Cumulative Index to Nursing and Allied Health (CINAHL); Virtual Health Library Latin American and Caribbean Literature on Health Sciences (VHL/LILACS); Web of Science (WoS) and SCOPUS.

The descriptors in Health Sciences were: maternal mortality, risk factors; determinants and the MeSH terms: maternal mortality, maternal death, risk factors, causality and determinants. The crossing took place mediated by the Boolean operator "and".

Initially, 891 articles were identified, which were defined primarily by reading the titles and the abstract with analysis of the inclusion and exclusion criteria, leaving 21, as defined in Chart 1.

An instrument was developed for data extraction divided into 6 items related to the characterization data of the articles: article title, objective, design and context, participants, state size, and factors related to maternal mortality, according to the PRISMA 2020 methodological framework (Preferred Reporting Items for Systematic and Meta-Analyses).

For data analysis, it was decided to analyze the results from four categories, the first refers to mortality related to individual factors, which includes biological aspects of the individual; factors associated with the service, i.e., physical structure, workforce and access, and finally factors related to direct and indirect causes of maternal mortality.

Figure 1. Flowchart of the search and selection process of primary studies
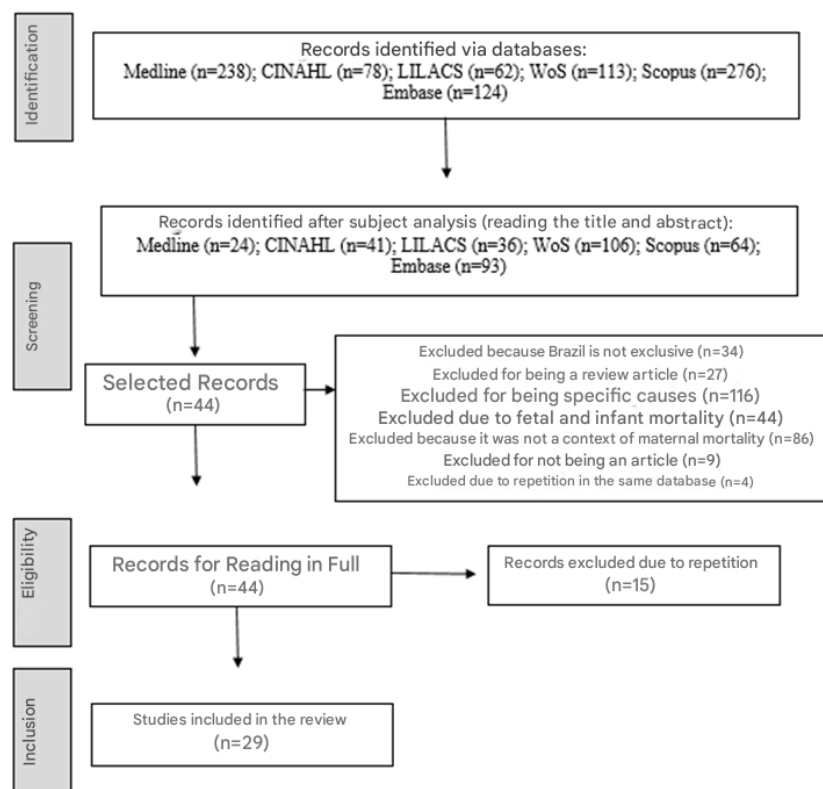
Source: Prepared by the authors

For this research, there was no need for evaluation by the Ethics Committee because it is a scoping review, and access to the data is public.

RESULTS AND DISCUSSION

The search in the database, following the defined criteria, obtained 29 articles for analysis and discussion. Among the selected articles, most of them were published in public health and maternal and child health journals, with four articles published in the journal Cadernos de Saúde Pública, three in the Journal of Nursing UFPE online, three in the Journal of Public Health, two in the Brazilian Journal of Maternal and Child Health, two in Epidemiology and Health Services, and one in each journal mentioned below: BMC Health Services Research, BMC Public Health, Ciência & Saúde Coletiva, Esc Anna Nery R Enferm, International Journal for Equity in Health, International Journal of Women's Health and Reproduction, J Health Popul Nutr, Maternal and child health journal, On Line Brazilian Journal Nursing, Plos one, Reprod Health Matters, Reprod Health Matters, Revista Baiana de Saúde Pública, Revista Gaúcha de Enfermagem, Revista Medicina Minas Gerais.

In the studies analyzed, there was a predominance of studies carried out in the Brazilian Northeast (n=9), followed by studies that cover the entire national territory (8). The research aimed to describe, characterize and analyze the sociodemographic health profile of maternal mortality and its variables.

The descriptive, retrospective cross-sectional study was the predominant methodology, followed by ecological studies in time series. The data collected varied between the Death Certificate forms, as well as data from the Mortality Information System (SIM) and analysis of medical records.

As for the results found, for a more didactic view of the factors and determinants of maternal mortality, it was decided to present them in 4 sub-items: Individual, related to the Service, Direct and Indirect Causes, as shown in Chart 2.

Chart 2 – Distribution of articles according to title and factors related to maternal mortality.

Title and author	Factors Related to Maternal Mortality			
	Individual	Service	Direct Cause	Indirect Cause
Risk factors for maternal mortality in an urban area of Northeast Brazil (Theme-Filha, Silva, Noronha, 1999).	Age between 16 and 43 years; most lived in a stable union; brown color; did not have a paid activity and had less schooling.	They did not receive prenatal care or have six or more consultations.	Hypertensive diseases, infections, hemorrhages, postpartum cardiomyopathies and miscarriages	AIDS, infections and preexisting heart diseases.
Maternal mortality in the city of Rio de Janeiro, 1993 to 1996 (See also, 1986)	Age group from 20 to 29 years, higher rates in the extremes, increasing gradient in the higher ranges. The risk of a woman over 40 years of age dying from maternal causes was 5 times higher than in the 20 to 29 age group. Risk inversely proportional to the number of years of schooling.	No information.	Arterial hypertension, followed by complications of the puerperium and hemorrhages. Irregularly distributed abortions	Indirect causes, with irregular distribution.
Maternal mortality in Brazil: a reality that needs to improve (Ferraz, Bordignon, 2012)	The variable mother's education level was ignored. The North Region had the highest proportion of maternal deaths in single women. Age group 20 to 29 years, followed by	No information.	Eclampsia; gestational hypertension with significant proteinuria; postpartum hemorrhage; puerperal infection; Premature placental displacement. In the	In the Northeast, Southeast, South and Midwest, the causes that prevailed were other diseases of the mother, classified elsewhere, but

	the group between 30 and 39 years. However, in the North region, the percentage of adolescents was considerable.		North, the main cause was eclampsia. Second cause in three regions, except in the South, which had postpartum hemorrhage as the second main cause.	which complicate pregnancy, childbirth and the puerperium.
Maternal mortality according to race/color, in Mato Grosso do Sul, Brazil, from 2010 to 2015 (Picoli, Cazola, Lemos, 2017)	Slight oscillations with predominance in the puerperal period for brown race/color. Maternal deaths of indigenous people among women with less than 3 years of schooling for and for the brown race/color, for those without schooling.	No information.	Complications of labor and delivery, indigenous and white races/color predominated, and those related to edema, proteinuria and hypertensive disorder gravidarum childbirth and puerperium, black race/color.	Among the indirect ones, the State recorded percentages similar to those of indigenous, white and brown races/color.
Adolescent Mortality with Special Reference to Maternal Mortality, Brazil, 1980 (Ambrósio, Castro, Quirino, 2005)	The mortality of women aged 15 to 19 years was only higher than that of women aged 20 to 29 years, which was considered more favorable for human reproduction. The relative risk of adolescents is lower than that of the population of pregnant women as a whole.	Ill-defined symptoms, signs and conditions, resulting from the quality of the information and care provided. The lethality of eclampsia increases with age. Higher proportional mortality due to arterial hypertension should not be attributed to the possible greater severity of toxemia, but to problems in prenatal care.	Arterial hypertension, followed by puerperal infection. Thirdly, bleeding followed by abortion. Toxemia due to the proportion of primiparous women in the population of pregnant adolescents is higher than in relation to the other ages of the reproductive period. Expressive mortality from abortion.	No information.
Maternal mortality in Uberlândia, Minas Gerais, Brazil, in 1998 and 1999 (Duarte *et al.*, 2020)	Age group from 20 to 29 years old; married women; lived in peripheral neighborhoods and had low schooling.	Fewer than 4 antenatal visits and predominance of cesarean section	Pulmonary embolism and toxemia; HELLP syndrome, puerperal infection, placenta accreta and indeterminate.	No information.
Maternal mortality and social vulnerability in the state of Alagoas in northeastern	Range 40 to 49 years old. The 15 to 19 age group with a growing trend; black and brown races; low or no schooling; widowed women.	No information.	Edema, proteinuria and hypertensive disorders in pregnancy, childbirth and puerperium" and	Other diseases of the mother, classified elsewhere, but which complicate with pregnancy,

			"complications of labor and delivery.	childbirth and the puerperium"
Brazil: a spatio-temporal approach (Carvalho, 2020)				
Sociodemographic and care profile of maternal death in Recife, 2006-2017: a descriptive study (Feitosa-Assis, Santana, 2020)	Age of 20 and 39 years; black, lived without their partner, studied until elementary school or high school and were housewives. No maternal deaths were recorded in indigenous and yellow women.	Among those who did not undergo prenatal care are those who died in the puerperium. Among those who attended up to three consultations, five died during pregnancy. Most of the prenatal consultations in FHS units received the prenatal card and had high blood pressure in the consultation. No record of anamnesis or partogram. There was no presence of a companion.	Complications in the puerperium, due infections, hemorrhages and cardiovascular problems. Without treatment. Almost half of the bodies were autopsied, and of these, the uterus and appendages were examined.	Diseases of the circulatory system complicating pregnancy, childbirth and the puerperium.
Maternal Occupation and Mortality in Brazil (Carreno, Bonilha, Costa, 2014)	Age group from 20 to 34 years; 8 to 11 years of schooling, single and brown; domestic workers; agricultural workers; manicurists, commercial representatives and nursing technicians. The data of occupation registered as "housewife" was the most frequent in both SIM and SINASC.	No information.	Eclampsia, postpartum hemorrhage, gestational hypertension, obstetric embolism, uterine contraction abnormalities, infection, postpartum complications, placental abruption, other complications of labor and delivery, genitourinary tract infections, ectopic pregnancy, and abortion.	Infectious and parasitic maternal diseases and other maternal diseases that complicate pregnancy.
Epidemiological research of the maternal deaths and compliance with the fifth millennium development	White women; with a partner, some type of education, although it should be emphasized that there were medical records that did not contain these data.	Most had prenatal care; Some of the medical records did not contain data regarding prenatal care and types of	Hypertension.	One to three previous pregnancies; 1 to 3 previous births and had no previous abortions;

		previous deliveries.		respiratory diseases.
goal (Fernandes *et al.*, 2015)				
Temporal evolution and spatial distribution of maternal death (Costa, *et al.*, 2013)	40 and 49 years old; no schooling; white color; black and brown women fluctuated over the years.	No information.	Arterial hypertension and hemorrhage; puerperal infection.	No information.
Maternal mortality in a regional health jurisdiction in the Brazilian state of Maranhão: a retrospective study (Gomes JO, *et al.*, 2018)	21 and 25 years old, they were brown, had high school education and were housewives; Single.	All occurred in a hospital environment, mostly in the public health network.	Gestational hypertension is the main cause, followed by hemorrhages and infections.	Heart disease; neoplasms, respiratory diseases, endocrine diseases; nutritional issues.
Sociodemographical and clinical profile of maternal mortality (Alves, 2007)	Age group from 20 to 29 years old; brown women followed by black women; women with four to seven years of schooling. High percentage of ignored schooling.	The place of occurrence with the highest number of deaths was the hospital environment.	Eclampsia and abortion.	No information.
Maternal mortality in Pernambuco, Brazil: what has changed in ten years? (Carvalho *et al.*, 2016).	The risk is seven times higher for women under 16 and 12 times higher for those over 40. Brown (mixed-race) and black women Black women, five times more likely to die. Less than three years of study and single.	Failure to perform prenatal care or inadequate prenatal care. Hospital and inadequate deliveries. Half of the women had to try more than one hospital before being admitted.	Pregnancy-induced hypertension.	Primigestas, followed by women with multiple pregnancies. Diseases of the respiratory circulatory system.
Gestational risk classification based on the profile of maternal deaths that occurred from 2008 to 2013: an experience report in the municipality of	Age group from 30 to 39 years, with 8 to 11 years of schooling, brown.	With 4 to 6 prenatal consultations.	Most of them due to direct obstetric causes.	No information.

Porto Seguro, Bahia (Gomes, *et al.*, 2019)				
Characteristics of maternal deaths in a brazilian northeastern municipality (Mascarenhas, *et al.*, 2017)	Women with 4-11 years of schooling; dark color.	Hospitals are the places of greatest occurrence.	Edema and transient proteinuria, followed by abortion and hypertensive diseases of pregnancy (preeclampsia).	Prevalent hypertensive disorders.
Analysis of maternal mortality (Costa, Figueiredo, 2017)	Women with up to three years of schooling, brown and single.	No information.	No information.	No information.
Relationship between income inequality, socioeconomic development, vulnerability index, and maternal mortality in Brazil, 2017 (Esteves-Pereira, *et al.*, 2016)	the per capita income index was related to the MMR in Brazil, 2017. HDI as a predictor of maternal and infant mortality is strongly related.	No information.	No information.	No information.
Caesarean Delivery and Postpartum Maternal Mortality: A Population-Based Case Control Study in Brazil (Soares, Azevedo, Watanabe, 2016)	No information.	Cesarean.	No information.	No information.
Underreporting of maternal mortality in the State of Paraná, Brazil: 1991-2005 (Silva, 1992)	No information.	Undetermined causes due to lack of data in the medical records.	Specific hypertension in pregnancy (preeclampsia, eclampsia) followed by obstetric embolisms with puerperal infection.	Diseases of the circulatory system: diseases of the respiratory system; another group of causes related to the digestive system.
Maternal Mortality: Assessment of the Situation in	Illiteracy; low female participation in the economically active population (EAP);	No information.	No information.	No information.

Rio de Janeiro, from 1977 to 1987 (Motta, Moreira, 2021)	low remuneration of work (less than a minimum wage).			
Will Brazil meet SDG 3.1 of the 2030 Agenda? An analysis of maternal mortality, from 1996 to 2018 (Simões, Almeida, 2014)	The increase in age; low education; black women had a risk seven times higher than white or brown women; insecure marital situation and family abandonment.	Women had their children in health institutions; Linking the pregnant woman to a hospital is considered inappropriate. Hypermedicalization of childbirth. Ilinitiation of late prenatal care (after 12 weeks).	Bleeding disorders, hypertensive syndromes, and postpartum infections. Hypertension is the first cause of maternal death. Abortion is among the top five causes.	Multiple pregnancy, previous hypertension, and history of miscarriage.
Maternal mortality and accessibility to health services by means of transit-network estimated traveled distances (Kale, Almeida, 2014)	No information.	Non-specialized hospitals were at lower risk.	Abortion.	The average distance covered was 13.65 km and hypertension.
Maternal Deaths in the City of Rio de Janeiro, Brazil, 2000–2003 (Guerra, *et al.*, 2009)	Between 20 and 39 years old; non-white, single and had 4 to 11 years of schooling. Data on years of schooling were missing in almost a quarter of the death certificates. They were predominantly brown or mixed-race and had less schooling.	Lack of information about the period in which the death occurred and incorrect data on the death certificate.	Hypertensive disorders were followed by preeclampsia and eclampsia. Abortion was the third leading cause of death.	It represented a lower percentage.
Can the primary health care model affect the determinants of neonatal, post-neonatal and maternal mortality? A study from Brazil (Barbosa, *et al.*, 2018)	No information.	HDI, implementation of ESF, reduction of the birth rate contribute to the reduction of maternal and infant mortality. The rate of cesarean deliveries increased.	No information.	No information.
Clinical characteristics and Mortality of	No information.	No information.	Hypertensive diseases of pregnancy and	Clinical diseases tend to generate complications at

			related complications. Sepsis was the second leading cause of hospitalization, and patients suffered hemorrhage.	a later stage of pregnancy. Fulminant hepatitis.
Obstetric Patients Admitted to a Tertiary Intensive Care Unit in the Brazilian Northeast (Nascimento, *et al.*, 2007)				
Profile of maternal mortality in a public maternity hospital in Teresina-PI, Brazil, from 1996 to 2000: a contribution from nursing (Haddad, Silva, 2000)	Women aged 19 to 24; married women who had incomplete elementary school; family income, between one and two minimum wages; and they were home.	Less than six prenatal consultations; most deaths in the first 24 hours; includes those coming from hospitals in the interior; few had undergone surgery; few evolved in labor; 70.8% were evaluated without a partogram.	Pregnancy-specific hypertensive diseases.	Less than half were pregnant two to four times and had 1 to 3 children.
Female mortality of reproductive age in the State of São Paulo, Brazil, 1991-1995: underlying causes of death and maternal mortality (Figueiredo, *et al.*, 2018)	For the age groups of 25 to 29, 30 to 34 and 35 to 39 there is a tendency for the coefficients to increase.	Insufficiency of adequate and extensive prenatal care; deficiencies in childbirth and postpartum care.	Pregnancy-related complications (hypertension complicating pregnancy, childbirth, and puerperium), followed by complications that occurred during labor and delivery (postpartum hemorrhage and abnormality of uterine contraction during labor). In third place are the complications of the puerperium (puerperal infection, obstetric pulmonary embolism) and finally the pregnancy ending in abortion. Illegally induced abortions must certainly be underestimated	Benign essential hypertension. Other cardiovascular diseases, anemia, other nutritional deficiencies, diabetes mellitus, congenital cardiovascular disorders;
Actions of primary health care professionals to reduce	Women in suburban areas and rural communities; under 15 and over 35 years old; illiterate	Health promotion strategies, health education, multi and interdisciplinary	No information.	No information.

maternal mortality in the Brazilian Northeast (Mendes, 2011)	women; with low education; white, single and abandoned.	work, home visits, postpartum follow-up at home, active search, prenatal consultations, risk stratification and access to specialized services, humanized approach.		

Source: Prepared by the authors.

All factors related to socioeconomic and demographic aspects were defined as individual causes, according to the model of the Social Determinants of Health of Dahlgreen and Whitehead, in which the causes of the health-disease process are grouped in overlapping layers, with the proximal layers being those related to age, sex and hereditary factors and the most distal those related to macrodeterminants such as living conditions. work, access to essential environments and services such as health and education (Botelho *et al.*, 2014).

Infrastructure, access to different levels of health care, interventionist professional profile, which excessively uses hard technologies and medicalization of the type of delivery, work process, especially in labor and birth care and health care practices, inaccurate and poorly investigated/monitored health data leading to underreporting and/or underreporting were the aspects categorized as causes related to the service (Oliveira *et al.*, 2014).

Obstetric complications that occur during pregnancy, childbirth, or postpartum related caused by interventions, missions, or incorrect treatment or to a chain of resulting events have been categorized into direct causes. Indirect causes, on the other hand, are those that existed before pregnancy or during the period, but were aggravated by the effects of pregnancy (Fernandes *et al.*, 2015).

The present study systematized the publications of the last 40 years in which the causes/determinants of maternal mortality in Brazil were presented. In all the articles, this public health problem is seen as something unacceptable due to its avoidable aspect in 92% of cases, and being associated with socioeconomic aspects that make inequalities in the country explicit (Ferraz, Bordignon, 2012; Fernandes *et al.*, 2015; Duarte, 2020; Feitosa-Assis, Santana, 2020; Costa *et al.*, 2013; Gomes *et al.*, 2018; Mascarenhas *et al.*,

2017; Esteves-Pereira *et al.*, 2016; Motta; Moreira, 2021; Simões; Almeida, 2014; Haddad; Silva, 2000).

Among these factors, low schooling emerges as a preponderant factor in 72% of the studies (Ferraz; Bordignon, 2012; Fernandes *et al.*, 2015; Moraes *et al.*, 2019; Theme-Child; Silva; Noronha, 1999; See; Tanaka, 1980; Ambrose; Castro; Quirino, 2005; Duarte *et al.*, 2020; Carvalho *et al.*, 2020; Feitosa-Assis; Santana, 2020; Carreno; Bonilha; Costa, 2014; Coast; Figueiredo, 2017; Motta; Moreira, 2021; Simões; Almeida, 2014; Guerra *et al.*, 2009; Haddad; Silva, 2000; Figueiredo *et al.*, 2018; Mendes, 2011). This factor contributes to other socioeconomic causes such as employment and income.

Another study correlates maternal schooling with improved obstetric indicators. In an analysis of the maternal mortality ratio (MMR) in Brazil, in the period from 2023 to 2021, for women with less than eight years of schooling, the ratio was 116.3 per 100,000 live births, in contrast to the MMR for women over 8 years of age, 45.6 (Melo, 2023).

Black and brown skin color, despite being a non-modifiable biological factor, is associated with social inequality and in this study, 45% of the studies associated it with a higher risk of unfavorable outcomes (Picoli; Cazola; Lemos, 2017; Theme-Child; Silva; Noronha, 1999; Carvalho *et al.*, 2020; Theme-Child; Silva; Noronha, 1999; See; Tanaka, 1980; Ambrose; Castro; Quirino, 2005; Duarte *et al.*, 2020; Carvalho *et al.*, 2020; Alves, 2007; Carvalho *et al.*, 2016; Mascarenhas *et al.*, 2017; Coast; Figueiredo, 2021; Simões; Almeida, 2014; Guerra *et al.*, 2019; Pacheco *et al.*, 2018). Marital status also appears in 25% of the articles during the gestational period (Ferraz; Bordignon, 2012; Fernandes *et al.*, 2015; Theme-Child; Silva; Noronha, 1999; Duarte *et al.*, 2020; Carvalho *et al.*, 2020; Carreno; Bonilha; Costa, 2014; Mascarenhas, 2017; Coast; Figueiredo, 2017; Simões; Almeida, 2014; Guerra *et al.*, 2019; Mendes 2011; Pacheco *et al.*, 2018).

Pacheco *et al.* (2018), in turn, in their study on the influence of race/color on unfavorable obstetric and neonatal outcomes, present that race/color behaves as a variable that can influence health conditions as a social determinant, but in this study black pregnant women did not present a higher risk for an unfavorable outcome, as they are black, however, those with low schooling, previous hypertension and multiparous women prevailed with greater significance.

The study by Oliveira (2023) shows that the MMR for black women is 139.7 per 100 thousand LB, followed by indigenous women with 117.6; white women, on the other hand, appear with 64.1. Reinforcing the gaps arising from public policies for the health of women

of childbearing age, pregnant and postpartum women that do not guarantee their access to sexual and reproductive health services.

Although the articles selected for this scoping review cover a period of about 40 years, it can be seen that in studies published in 2023, social vulnerability continues to be prominent and as a result, women with low education, brown, aged between 20 and 29 years continued to be the most affected, requiring the health service to have direct contact between a multiprofessional team in primary health care, offering comprehensive care and treatment during the gestational and puerperal period (Teixeira *et al.*, 2023).

Not having prenatal care or the number of consultations below the recommended number of 7 consultations, followed by low quality of this procedure, were more frequent (31%) among the causes related to the service. Although the indicators show an increase in access to services for prenatal care, there are still barriers to the diagnostic and therapeutic care system, especially in the performance of established routine exams (Theme-Filha; Silva; Noronha, 1999; Duarte *et al.*, 2020; Feitosa-Assis; Santana, 2020; Carvalho *et al.*, 2016; Simões; Almeida, 2014; Haddad; Silva, 2000; Figueiredo *et al.*, 2018; Mendes, 2011).

A recent study corroborates the low number of prenatal consultations or absence, as described by Teixeira, *et al.* (2023), despite the improvement in the adequacy of access to prenatal care, brown and black women still have the worst estimates than white women. Unlike the study by Soares (2023), which shows a high number of pregnant women with prenatal consultations, but considered inadequate, in addition to the high rate of cesarean deliveries, high number of infectious and parasitic diseases, and reduced population coverage of Family Health Teams. According to Carmo (2023), most pregnant women have more than six prenatal consultations, as recommended by the Ministry of Health, but even with access, complications in the gestational and puerperal period are still high. Reduced rates of prenatal consultations were observed in the north and northeast regions of Brazil.

It is worth noting that the low quality of the records/notifications is a fundamental factor, as detailed information can contribute to a more qualified investigation, leading to the formulation of appropriate measures for maternal care, since its determinants can be identified (Fernandes, *et al.*, 2015; Feitosa-Assis, Santana, 2020). This information is the basis for the work of the committees for the prevention of maternal and infant mortality, which may propose recommendations for dealing with the causes (Silva, 1992). Carvalho (2023) showed that these committees, when active, have the potential to qualify the causes

of maternal mortality (Ranzani; Marine; Bierrenbach, 2023). Ranzani (2023) identifies inconsistencies between diagnoses and procedures in 83% of hospitalizations with deaths studied in Brazil.

There is a consensus that hypertensive diseases are the direct causes of maternal death; 68% of the studies chosen pointed to preeclampsia and eclampsia as the main cause of maternal death in Brazil, due to severe complications. Classification and correct diagnosis are essential for the follow-up of pregnant women (Ferraz; Bordignon, 2012; Fernandes *et al.*, 2015; Picoli; Cazola; Lemos, 2017; Theme-Child; Silva; Noronha, 1999; See; Tanaka, 1986; Ambrose; Castro; Quirino, 2005; Duarte *et al.*, 2020; Carvalho *et al.*, 2020; Carreno; Bonilha; Costa, 2014; Costa *et al.*, 2013; Gomes *et al.*, 2018; Alves 2007; Carvalho 2016; Mascarenhas *et. al.*, 2017; Silva, 1992; Simões; Almeida, 2014; Guerra et. al., 2019; Haddad; Silva, 2000; Figueiredo *et al.*, 2018).

Gestational hypertension is related to the quality of prenatal care. The barrier in accessing the service can lead to the most severe forms, causing numerous complications, which can be hepatic, cardiac or renal and is responsible for a 71% increase in the risk of death from cardiovascular diseases. There is still underreporting of these deaths, especially in areas of lower socioeconomic status (Souza *et al.*, 2023).

Hemorrhages, puerperal infections and miscarriage are the other causes that appear most frequently in studies. Postpartum hemorrhages are also prevented in prenatal care, in addition to appropriate measures in the intra- and postpartum periods, such as elimination of anemia in prenatal care, routine episiotomy, early clamping of the umbilical cord, use of oxytocin in appropriate doses (Ferraz; Bordignon, 2012; Theme-Child; Silva; Noronha, 1999; See; Tanaka, 1986; Ambrose; Castro; Quirino, 2005; Carreno,; Bonilha; Costa, 2014; Costa *et al.*, 2014; Gomes *et al.*, 2018; Mascarenhas *et al.*, 2017; Simões; Almeida, 2014; Figueiredo *et al.*, 2018). For this, it is necessary to implement care protocols (Pacheco *et al.*, 2023).

According to Souza, (2023), about 810 women die daily from obstetric complications and postpartum hemorrhage is the largest cause of maternal mortality worldwide and in Brazil it is the second cause. The delay in the diagnosis/identification and obstetric management of hemorrhage, in addition to organizational problems, can lead to the death of parturient and puerperal women. The main cause of postpartum hemorrhage is uterine atony.

Puerperal infection is related to very common risk factors such as extremes of age, obesity and overweight, sexually transmitted infections, chronic diseases such as hypertension and diabetes, and bacterial infections. Women who undergo cesarean section are at 5 times greater risk. The reduction in maternal deaths associated with puerperal infection is also related to a quality of prenatal, delivery and postpartum care and abortion (Ferraz; Bordignon, 2012; Theme-Child; Silva; Noronha, 1999; Ambrose; Castro; Quirino, 2005; Duarte *et al.*, 2020; Carreno; Bonilha; Costa, 2014; Costa *et al.*, 2014; Gomes *et al.*, 2018; Mascarenhas *et al.*, 2017; Silva, 1992; Simões; Almeida, 2014; Nascimento *et al.*, 2007; Figueiredo *et al.*, 2018).

Pacheco *et al.* (2023), confirm that puerperal infections are responsible for 10 to 15% of deaths worldwide. In Brazil, it represents the third cause of maternal death, 73% of direct obstetric causes. Also known as maternal sepsis, genital sepsis, puerperal fever and puerperal sepsis. The main cause is physiological or iatrogenic trauma: "chorioamnionitis, endometritis, surgical site infection (in the case of cesarean section), infection at the site of perineal trauma". Preterm or postterm deliveries, prolonged ruptured sac time, fetal or internal uterine monitoring, instrumentalized vaginal delivery, multiple touches, products of conception retained after delivery, manual removal of the placenta, use of a Foley tube and postpartum hemorrhage are also described in the literature as risk factors for puerperal infection.

Abortion can be subdivided into retained, unspecified, retained, or induced abortion and is related to social inequalities in the search for and access to health services and consequently associated with low education and color/race (Theme-Filha; Silva; Noronha, 1999; See; Tanaka, 1980; Ambrose; Castro; Quirino, 2005; Alves 2007; Mascarenhas *et al.*, 2017; Simões; Almeida, 2014; Kale, Costa, 2009; Guerra *et al.*, 2019; Figueiredo *et al.*, 2018; Costa *et al.*, 2016).

Moreira (2023) shows that although the fertility rate has reduced in poor women and increased access to sexual and reproductive health, there has been no reduction in the number of abortions in the Unified Health System (SUS), as a result of complications, especially in the northeast region of Brazil. It is also associated with conditions of sociocultural, economic and political vulnerability for women assisted by a low quality of care.

Among indirect causes, diseases of the circulatory system pre-existing to pregnancy were the most frequent causes in this study (Theme-Filha; Silva; Noronha, 1999; Feitosa-

Assis; Santana, 2020; Gomes *et al.*, 2018; Mascarenhas *et al.*, 2017; Simões; Almeida, 2014; Kale; Costa, 2009; Figueiredo *et al.*, 2018). These causes are responsible for two-thirds of maternal deaths, the opposite in developing countries such as Brazil (Oliveira, *et al.*, 2023).

Figueira *et al.* (2023), shows that of the indirect obstetric causes, 31.7% were caused by infectious and parasitic diseases (tuberculosis, viral diseases, diseases caused by protozoa) and 14.2% by diseases of the circulatory system. The care offered to pregnant women must maintain attention to these pre-existing conditions. These causes are associated with chronic-degenerative diseases, so it is necessary to plan and evaluate health actions, according to the reality of the territory.

CONCLUSION

This study confirms that the causes/determining factors for maternal deaths are intertwined and has socioeconomic aspects as the foundation that can modify the epidemiological situation, demonstrating that health beyond biological issues, investing in social and economic problems has a great impact on mortality indicators and improvement of the health conditions of a population.

Articles published over 40 years that portray the same mortality profile over the decades were included, despite the improvement in access and qualification of work processes, health services, especially those related to Primary Health Care, we highlight as a priority the need for interventions related to social vulnerability, reinforcing the need to sensitize health workers to a wide range of social determinants and their relationship with the aspects of health and illness, requiring intersectoral practices for the timely coping with maternal mortality.

ACKNOWLEDGMENTS

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