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PRETERM BIRTH AS A GLOBAL PUBLIC HEALTH CHALLENGE- EPIDEMIOLOGY AND RISK FACTORS

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ABSTRACT

Preterm birth remains a major global public health challenge and is one of the leading causes of neonatal mortality and morbidity worldwide. Although advances in neonatal care have improved survival rates, the global prevalence of preterm birth has not declined and, in many settings, continues to rise. This highlights the persistent and multifactorial nature of its underlying causes. This study aims to identify and summarize the main epidemiological characteristics and risk factors associated with preterm birth in order to support preventive strategies. A narrative review of the literature was conducted using databases such as PubMed, Google Scholar, and ScienceDirect. Eligible studies included peer-reviewed original research articles in English that addressed the prevalence and risk factors of preterm birth. Data from selected studies were extracted and synthesized qualitatively. The findings indicate that the prevalence of preterm birth varies significantly across regions, with higher rates observed in low- and middle-income countries. Socioeconomic inequalities and limited access to healthcare services play a crucial role in increasing the risk of preterm birth. **Conclusions:** Preterm birth is strongly associated with a combination of socioeconomic, demographic, and medical factors. Strengthening antenatal care services and addressing modifiable risk factors are essential steps toward reducing its global burden.

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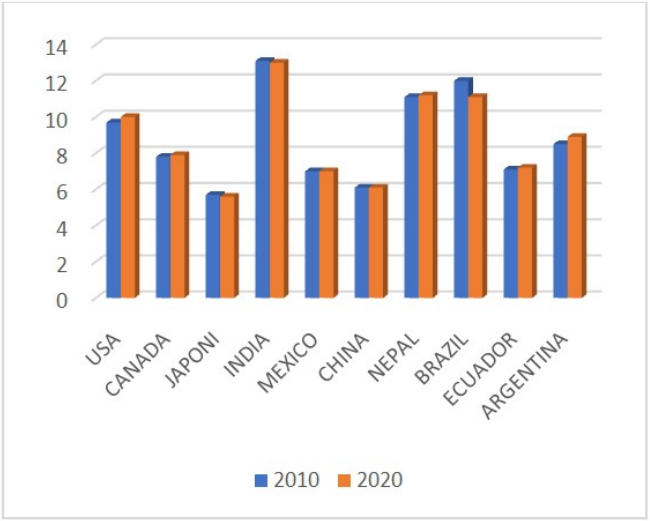
INTRODUCTION

According to WHO, preterm birth is defined as the birth of a baby before the completion of 37 weeks of gestation. Premature birth, usually used as a synonym for premature birth, refers to the birth of a baby whose organ development has not matured sufficiently to adapt to and survive extrauterine life. Premature births are an important Public Health issue worldwide as the prevalence of preterm births is high in many countries (WHO, 2012). They constitute a significant global problem for infant health, with a particular impact on poor and middle-income countries. Global statistics on premature births show that each year, about 130 million babies are born worldwide and of these, 15 million are born prematurely (Perin *et al*., 2022). This is a high number that shows how widespread the problem of premature births is. Prematurity is a leading cause of neonatal mortality and morbidity. This means that many babies born prematurely are more likely to die or develop health problems in the first weeks of life (Chawanpaiboon *et al*.2019). Premature birth is also a cause of long-term health problems, including the possibility of developing chronic diseases or stunted growth in babies (Okwaraji *et al*., 2024; Fogh *et al*., 2025; Martines *et al*. 2005).

Prematurity is a major obstacle to achieving a country's development goals, which are related to reducing infant mortality (United Nations; 2000). This goal is difficult to achieve because of the high contribution of preterm birth to infant mortality.The risk of neonatal death varies by region, and the chances of survival for premature babies vary depending on the country where they are born. For example, babies in Africa are 12 times more likely to die from the consequences of premature birth than babies in Europe (Chawanpaiboon *et al*. 2019; Perin *et al*., 2022). This highlights the huge disparities that exist between developed and developing countries, as well as the limited support that these babies can receive in countries with fewer resources. Premature birth is a global problem, with prevalence ranging from 5% to 18% in 184 different countries. This shows that the problem is widespread in many parts of the world. The regions with the highest rates of premature birth are Sub-Saharan Africa and Asia. These regions account for almost half of the world's births, and they have more than 60% of premature babies and over 80% of neonatal deaths from complications of premature birth (Okwaraji *et al*., 2024). Many countries, especially low- and middle-income countries, do not have reliable data on preterm birth. However, reliable data that do exist show a steady increase in the incidence of preterm birth over the past two decades.

Data from the 65 countries with reliable data show that almost all of them have experienced an increase in preterm birth rates (Adugna *et al*., 2022; Martines *et al*., 2005). A WHO analysis from 2010 to 2020 shows that the burden of preterm birth is disproportionately concentrated in Africa and Asia. However, it should be noted that the high prevalence rates of preterm birth in developing regions are associated with the higher number of births in those regions. While the low prevalence of preterm birth in developed countries is related to the use of more accurate diagnostic methods that enable the identification of pregnancies at risk for preterm birth and the highest levels of neonatal intensive care in hospitals in these countries. The data reported by this source are presented in Figure 1, which shows the trend in the prevalence of preterm birth in several major countries in the world. A comparison of the incidence of preterm birth figures shows that from 2010 to 2020, 84% of these countries had an increase or stagnation in the prevalence of preterm birth and 16% of them reported a decrease during this decade.Furthermore, there are inequalities between developed and developing countries regarding the chances of survival of a baby born prematurely (Lawn *et al*. 2009). In many developing countries, infants weighing less than 2000 g or, in the absence of intrauterine growth retardation, at about 32 weeks of gestation have a lower chance of survival. In contrast to developing countries, in developed countries, the survival rate of infants born prematurely (e.g., at 32 weeks) is higher, and this is probably due to advances in health care and medical technology. There have been advances in the care of premature infants, but this has not reduced the prevalence of preterm birth, which tends to increase even more (Farr, 2021). This shows that, while the treatment of premature babies has advanced, the cause of premature births has not been adequately addressed. In the majority of cases of spontaneous premature births, the cause remains unknown, and the mechanisms leading to premature birth are still poorly understood. This shows that there is much that is still unknown about this phenomenon and that requires further research.



Source: www.who./data/preterm-birth-rate-per-100-live-births

Chart 1: Comparison of the incidence of Preterm Birth in 2010 and 2020 in several different countries in the world

METHODOLOGY

Search strategy: For this study, available data on preterm birth, its prevalence and associated epidemiological issues, as well as the importance of identifying and documenting factors contributing to preterm birth were searched. Searches were conducted in PubMed, Google Scholar and ScienceDirect for articles published between 2000 and 2024 in peer-reviewed journals, using a combination of keywords such as: “preterm birth”, “epidemiology of preterm birth”, “obstetric causes of preterm birth”, “social and economic factors”, and “causes of preterm parturition”. In addition, the reference lists of included studies were also searched for a critical review and to retrieve additional studies.

Inclusion/exclusion criteria: Inclusion/exclusion criteria were defined prior to the literature search. Duplicate studies were excluded after the retrieved studies were exported to citation management software (Zotero). Studies had to meet the following eligibility criteria: peer-reviewed original research articles, including case-control, cross-sectional, and other observational study designs; published in English; addressing preterm birth in terms of prevalence and associated socioeconomic factors, and accessible in full text.Studies were excludes if they were not available in full text, were not in English,or if they were reviewarticles, commentaries, government or organizational reports, or clinical case studies were excluded from the analysis. For this narrative review, studies that were considered most relevant to the topic were selected.

RESULTS

As a result of the search in Google Scholar, PubMed, ScienceDirect, as well as the search in the reference list of the included studies, a total of 194 research articles were found. Of these articles, 12 articles were removed due to duplication and 182 articles remained, which passed the inclusion/exclusion criteria filter that was defined in the search strategy. Thus, 39 articles were available only in abstract and not in full text, 38 articles were review type, 2 articles were not in English, 5 were case study titles, reports, comments. After this filtering, the remaining articles were read and 77 articles had data not suitable for our study (complications, management, association with low birth weight, mode of premature birth, association with Sectio Caesarea, etc.), thus resulting in a total of 21 articles included in our study. Data from these articles were extracted and put into a summary table (Table 1), from which later analyses were carried out and conclusions were drawn.

DISCUSSION

Main findings: The most common study design is the cross-sectional study, used in most studies (e.g., Muhumed *et al*., 2021; Adugna *et al*.2022, Ayele *et al*. 2023; Ndeki *et al*. 2022; Negesse *et al*. 2023 etc.), followed by case-control studies (e.g., Mwansa *et al*.2020; Sureshbabu *et al*., 2021; Regasa *et al*. 2021; Arora *et al*. 2015 etc.). However, studies, such as Pradhan *et al*.(2020), that used prospective observational methods were also included, while others, such as Leal *et al*.(2016), used secondary observational analysis of the trial. The prevalence of preterm birth varies greatly between studies. The highest prevalence recorded is 35.8% in the study by Etil *et al*. (2023), while the lowest is 4.97% in the study by Regasa *et al*. (2021). Most studies report prevalences around 5-15%, such as Mwansa *et al*. (2020) at 7.7%, Regasa *et al*. (2021) at 4.97%, and Muhumed *et al*. (2021) at 12.3%.

Geographical differences play a role in the prevalence of preterm birth and the factors associated with it. For example, Sub-Saharan Africa (e.g., Mwansa *et al*., 2020; Alamneh *et al*., 2021) shows high prevalence and associations with socioeconomic status, rural residence, and limited access to health care. Studies have identified a variety of socioeconomic factors associated with preterm birth. Several socio-demographic factors are associated with preterm birth in these studies. These include maternal age, educational level, history of preterm birth, and antenatal care visits. Factors that increase the risk of preterm birth include: Lower levels of maternal education (Mwansa *et al*., 2020; Alamneh *et al*., 2021); Lack of antenatal care or inadequate visits (Regasa *et al*., 2021; Muhumed *et al*., 2021); Previous preterm birth (Wagura *et al*., 2024; Negesse *et al*., 2023); Multiple pregnancies (Zhang *et al*., 2022; Ayele *et al*., 2023); Hypertensive disorders (Hakizimana *et al*., 2023; Adugna *et al*., 2022); Maternal infections (Regasa *et al*., 2021; Hanif *et al*., 2020). Protective factors include: Higher maternal education (Mwansa *et al*., 2020; Negesse *et al*., 2023); Access to early and

Table 1. Summary data from the review of included articles

Author, year	Country/Region of study	Type of study	Number of sample taken in the study (women/live births)	Prevalence %	Associated characteristics
Mwansa et al.(2020)	University Teaching Hospital, Lusaka Zambia	case-control	210 (105 preterm and 105 ne term)	7.7% (p=0.06)	Being single, low educational level, low family income, occasional alcohol consumption, and fewer antenatal visits were significantly associated with preterm birth.
Regasa et al. (2021)	Western Ethiopia	case-control	358 (72 cases and 286 controls)	4.97% (95% CI and P-value <0.05)	Lack of antenatal care visit, previous history of preterm birth, short interpregnancy interval, reproductive tract infections and obstetric complications were found to be predictors of preterm birth.
Muhumed et al. (2021)	Somali	cross-sectional	600/74	12.3% (95% CI and P-value <0.05)	rural resident, history of abortion, hypertensive disorder of pregnancy; (being female and low birth weight of the newborn were found to be significantly associated with preterm birth.
Alamneh et al. (2021)	SubSaharianAfrica	-	172774	5.33% (95%CI 5.23, 5.44%)	Being in a rural area, low education, substance use, multiple pregnancy, current history of labor, history of pregnancy termination and previous cesarean delivery, primiparity, and short birth interval were associated with higher odds of preterm birth among women of reproductive age. However, having a better wealth index, being married, desired pregnancy, and having four or more antenatal care visits were associated with lower odds of preterm birth among women of reproductive age.
Hakizimana et al. (2023)	Gahini Hospital Rwanda	cross-sectional retrospective	312 total/30 preterm bith	9.6%	Prevalence of preterm birth among women of reproductive age and independently associated factors included maternal age >35, being unmarried, and maternal BMI of 25–30.
Adugna et al. (2022)	Ethiopia	cross-sectional	482 total	11.41% (95% CI: 8.9, 14.6%);	Maternal age < 20 years, preeclampsia, premature rupture of membranes, chronic medical illness, and history of stillbirth were significantly associated with preterm birth.
Wagura et a. (2024)	Nairobi, Kenya	cross-sectional descriptive	322 total	18.3%.	Maternal age, parity, previous preterm birth, multiple pregnancy, pregnancy-induced hypertension, antepartum hemorrhage, antepartum rupture of membranes, and urinary tract infections were significantly associated with preterm birth (p = < 0.05)
Pradhan et al. (2020)	Bhutan	prospective observational	4618 total/291 preterm birth	6.4%.	Most mothers were younger than 30, housewives, and had secondary education..
Subedi et al. (2022)	Nepal	secondary observational analysis of trial	31 851 total / 4792 PTBs	14.5%	(0.5% non-spontaneous). Characteristics that did not change in pregnancy associated with increased risk of preterm birth were maternal age under 18 years, being Muslim, first pregnancy, multiple births, and male child.
Hanif et al. (2020)	Pakistan	analytical cross-sectional study	1,691 total /366 preterm birth	(21.64%).	The five main risk factors identified were Placenta Previa, maternal thyroid disease, fetal distress, and maternal asthma.
Leal et al. (2016)	Brazil	secondary observational analysis of trial	23,447 total (20667 term birth +2771 preterm birth)	11.5 %,	Socio-demographic factors associated with spontaneous preterm birth were teenage pregnancy, low total years of schooling, and inadequate prenatal care. Other risk factors were previous preterm birth, multiple pregnancy, placenta abruptio, and infections.
Ayele et al. (2023)	Gojjam zone, Ethiopia	cross-sectional	615 total	13.2%	Antenatal care, mother's educational status, husband's educational status, average monthly family income, family size, multifetal pregnancy, rupture of membranes, history of chronic disease, being HIV positive, Ante-Partum Haemorrhage, pregnancy-induced hypertension were found to be significantly associated with preterm birth.
Katebi et al. (2022)	Ostad Motahari Hospital in Jahrom	retrospective descriptive-cross sectional study.	512 total	9.5%.	rupture of membranes (p = 0.001), multiple pregnancy (p = 0.005), preeclampsia (p = 0.004), history of urinary tract infections during pregnancy (p = 0.001), vaginal bleeding during the first trimester (p = 0.001), history of surgery during the first trimester of pregnancy (p = 0.002) and also history of smoking in the spouse (p = 0.015). There was no significant difference in maternal substance abuse between the two groups.
Zhang et al. (2022)	China	descriptive cross-sectional	215,254 total births/15,833 preterm births	7.4%	High risk factors for PTB were placental abruption, placenta previa, chorioamnionitis, and hypertensive disorders of pregnancy, Intrahepatic cholestasis of pregnancy. Gestational diabetes mellitus (GDM) was significantly associated with PTB only at 34-36 weeks.
Ndeki et al. (2022)	Eastern Tanzania	cross-sectional	422 total	19.91%.	Previous preterm birth, short interpregnancy interval, follow-up ANC <4 contacts, antepartum hemorrhage, premature rupture of membranes, multiple pregnancy, and urinary tract infection were independent factors associated with preterm birth.
Etil et al. (2023)	Lira Regional Referral Hospital	analytical cross-sectional	590	35.8%.	Maternal employment status had a statistically significant association with preterm birth, having a low birth weight baby and experiencing preeclampsia were also identified as significant predictors of preterm birth.

Sureshbabu et al. (2021)	Tertiary Care Hospital in South India:	case control	191 cases and 200 controls		Factors for preterm birth. Pregnancy-induced hypertension, abnormal amniotic fluid volume, preterm rupture of membranes, previous history of preterm birth, history of urinary tract infection (UTI) during pregnancy, systemic diseases, anemia have been found to be independent risk factors.
Salama E et al. (2021)	Qatar	case control	5430 preterm / 53878 full-term,	The prevalence of preterm birth was 9%.	Employment, smoking, pregnancies with assisted conception, women without antenatal care, are variables that were found to be higher in the preterm birth group than in the term birth group. There were no differences between the two groups regarding religion, maternal education level, family income, family ties, early birth severity and nutritional status.
Negesse et al. (2023)	Southeast Ethiopia	cross-sectional	n/a	20.6%	Being a rural resident, not having access to antenatal care services, hypertensive disorders of pregnancy, birth spacing less than 2 years, premature rupture of membranes, and intimate physical violence were risk factors for preterm birth.
Chang et al. (2020)	Taiwan	cross-sectional	A total of 130,362 live births from 2004 to 2013	rritje 5.3% (from 3.33% in 2004 to 5.11% in 2013)	Nulliparous women, multifetal pregnancies, advanced maternal age, history of preterm birth, history of maternal drug abuse/dependence, and maternal medical complications were positively associated with an increased risk of preterm birth (all p values < 0.05).
Arora et al. (2015)	Czech Hungary (Budapest) Hungary (Pecs) Romania Slovakia Ukraine	case control	37 661 lindje total, (33 794 ne term dhe 3867 preterm).	10.67 12.75 16.53 13.26 4.86 6.23	The countries participating in the study were classified according to the World Bank classification as high-income countries (HIC) – Czech Republic and Slovakia; middle-income countries (UMC) – Hungary and Romania; low- and middle-income countries (LMC) – Ukraine; and low-income countries (LIC) – none. The study identified BMI, smoking, anemia, and iron supplementation as the most important factors associated with preterm birth in Central and Eastern Europe.

frequent antenatal care visits (Mwansa *et al*., 2020; Ayele *et al*., 2023); Being married (Alamneh *et al*., 2021); Optimal maternal BMI (Hakizimana *et al*., 2023). Mothers who are employed may have a lower risk of preterm birth in some studies (Etil *et al*., 2023). A higher educational status is often associated with a lower risk of preterm birth (e.g., Ayele *et al*., 2023). Higher income, as well as better living conditions, are associated with a lower risk of preterm birth. This has been noted in studies such as Alamneh *et al*., 2021 and Regasa *et al*., 2021. Mothers living in rural areas have a higher risk of preterm birth (e.g. Muhumed *et al*., 2021, Negesse *et al*., 2023). This may be related to the lack of access to high-quality healthcare and antenatal care services. Conditions such as hypertension, preeclampsia, infections and chronic diseases are often important factors associated with preterm birth. This has been documented in many studies, such as Adugna *et al*., 2022 and Sureshbabu *et al*., 2021. Studies from South Asia (e.g., Hanif *et al*., 2020; Sureshbabu *et al*., 2021) highlight the importance of maternal health conditions such as placenta previa and pre-eclampsia. Sample sizes vary widely, from small studies (e.g., 210; 312) to very large ones (e.g., 31,851; 215,254). Larger sample sizes generally provide more statistical power and reliability, especially for identifying trends across populations. Many studies are based in African countries (Zambia, Ethiopia, Tanzania), with others from South Asia (India, Pakistan), Southeast Asia (Nepal); Latin America (Brazil), and Eastern and Central Europe. This diversity provides a comprehensive picture of the global prevalence and factors associated with preterm birth.

Limitations: This review has limitations that are mainly related to the studies analyzed. Due to high methodological heterogeneity a meta-analysis or meta-regression was not performed. This highlights the need for new studies with more homogeneous designs to more precisely assess the association between the risks of preterm birth.

Recomandations: In the majority of cases of spontaneous premature births, the cause remains unknown, and the mechanisms leading to premature birth are still poorly understood. This shows that there is much that is still unknown about this phenomenon and that requires further research.

CONCLUSIONS

The prevalence of preterm birth is variable and closely related to socioeconomic and health factors. Rural areas, low educational status, and lower income are factors associated with a higher prevalence of preterm birth. Many studies emphasize the importance of prenatal care and maternal health factors as potential preventive measures. From the studies analyzed, several common factors related to preterm birth emerge. Socioeconomic status and access to health care, especially antenatal care, are strongly correlated. Maternal health conditions such as hypertension, infections, and previous history of preterm birth are important risk factors. There are significant geographical differences in both the prevalence and risk factors associated with preterm birth.

Ethical Considerations: The authors confirm that all relevant ethical principles and guidelines were observed in the conduct and reporting of this study. As this review did not involve human or animal participants, approval from an ethics committee was not required. All the sources used in the review are cited.

***Conflict of Interest*:** The authors declare that there is no conflict of interest.

Author contributions: All authors have made significant contributions to the research process and the drafting of the article, and have expressed full agreement with its content. Conception and design (AX, AS), data analysis and interpretation (AX, EQ, BM), manuscript draft (AX), critical revision of the manuscript (AX, EQ, AS), final approval of the manuscript (AX, EQ).

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