PIEKARSKA, Julia, SOLARZ, Justyna Maria, WAWRZYŃCÓW, Jakub Tomasz, CYRKLER, Weronika, ROBAK, Jakub, TELEGA, Stanisław, BOLLIN, Paweł, SZYMCZAK, Urszula, LACHÓR, Wojciech Wiesław and SOLARZ, Monika Barbara. Risk Factors for Preterm Birth: A Comprehensive Review of Current Evidence. Quality in Sport. 2025;40:59773. eISSN 2450-3118. https://doi.org/10.12775/OS.2025.40.59773 bttps://doi.org/10.12775/OS.2025.40.59773

https://apcz.umk.pl/QS/article/view/59773

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

© The Authors 2025;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Polan d

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (http://creativecommons.org/licenses/by-nc-sa/4.0/) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 26.03.2025. Revised: 02.04.2025. Accepted: 04.04.2025 Published: 14.04.2025.

Risk Factors for Preterm Birth: A Comprehensive Review of Current Evidence

Julia Piekarska, Justyna Maria Solarz, Jakub Tomasz Wawrzyńców, Weronika Cyrkler, Jakub Robak, Stanisław Telega, Paweł Bollin, Urszula Szymczak, Wojciech Wiesław Lachór, Monika Barbara Solarz

Julia Piekarska Medical University of Lodz, Poland <u>https://orcid.org/0009-0004-7164-2833</u> julia.piekarska@stud.umed.lodz.pl

Justyna Maria Solarz

Medical University of Silesia in Katowice, Poland https://orcid.org/0009-0002-8686-0142 s86199@365.sum.edu.pl

Jakub Tomasz Wawrzyńców Medical University of Lodz, Poland https://orcid.org/0009-0001-3716-4784 jakub.wawrzyncow@stud.umed.lodz.pl

Weronika Cyrkler

Medical University of Lodz, Poland https://orcid.org/0009-0002-1214-0249 weronika.cyrkler@stud.umed.lodz.pl

Jakub Robak

Medical University of Lodz, Poland https://orcid.org/0009-0009-8830-5717 jakub.robak1@stud.umed.lodz.pl

Stanisław Telega

Medical University of Lodz, Poland https://orcid.org/0009-0007-2355-5876 stanislaw.telega@stud.umed.lodz.pl

Paweł Bollin

Medical University of Lodz, Poland https://orcid.org/0009-0001-7687-4674 pawel.bollin@stud.umed.lodz.pl

Urszula Szymczak

Medical University of Lodz, Poland https://orcid.org/0009-0007-6560-6539 urszula.szymczak@stud.umed.lodz.pl

Wojciech Wiesław Lachór

Medical University of Lodz, Poland https://orcid.org/0009-0003-2017-4788 wojciech.lachor@stud.umed.lodz.pl

Monika Barbara Solarz

Medical University of Lodz, Poland https://orcid.org/0009-0008-4476-8755 monika.solarz@stud.umed.lodz.pl

Abstract

Preterm birth, defined as the termination of pregnancy before the completion of 37 weeks of gestation, remains one of the most critical challenges in contemporary perinatal care. High neonatal mortality rates, along with frequent neurological, respiratory, and developmental complications, underscore the importance of identifying risk factors associated with preterm labor. The aim of this review was to comprehensively synthesize current scientific evidence on the multifactorial etiology of preterm birth, encompassing biological, immunological, genetic, environmental, and socio-economic determinants.

A systematic literature search was conducted in PubMed during January and February 2025, covering peer-reviewed publications from 2020 to 2024. Included in the analysis were metaanalyses, cohort studies, case-control studies, systematic reviews, and population-based analyses.

The findings indicate a significant association between preterm birth and obstetric abnormalities, maternal comorbidities, inflammatory and genetic factors, as well as low socioeconomic status and limited access to prenatal care. In high-income countries, assisted reproductive technologies (ART), particularly fresh embryo transfer, continue to pose a considerable risk. The conclusions emphasize the need for an interdisciplinary approach to prevention, standardization of diagnostic criteria, and further development of biomarker-based tools and personalized strategies for perinatal care.

Keywords: Preterm birth, Risk factors, Obstetric complications, Maternal health, Pregnancy complications, Assisted reproductive technology (ART), Perinatal care

Introduction

Preterm birth, defined as the termination of pregnancy before the completion of 37 weeks of gestation, remains one of the most significant challenges in modern perinatal care-both clinically and socially. It is estimated that approximately 15 million infants are born prematurely each year worldwide, with preterm birth consistently being the leading cause of neonatal mortality and a major contributor to long-term disability in the pediatric population. Although advances in neonatology and progress in neonatal intensive care have significantly improved survival rates, the risk of persistent health complications—such as neurological impairments, cognitive disorders, and chronic respiratory diseases-remains high. Preterm birth impacts the quality of life for newborns, and its consequences can be long-lasting, affecting both physical and mental health. As the incidence of preterm birth continues to rise, it is increasingly clear that this issue requires urgent action and new solutions in terms of diagnostics and prenatal care. Current medical knowledge indicates a complex, multifactorial etiology of preterm birth. This process may be initiated by pathological mechanisms at the immunological and endocrinological levels, as well as by environmental, social, or genetic factors. In recent years, special attention has been given to the role of inflammation, oxidative stress, and placental barrier dysfunction as potential mechanisms leading to premature activation of labor. Genetic predisposition and molecular biomarkers have also emerged as significant areas of research, with the potential to serve as tools for the early identification of women at risk. The use of these tools may improve diagnostic accuracy and allow for quicker implementation of appropriate interventions, which could reduce the incidence of preterm birth.

Social and environmental conditions are also gaining increasing attention. Inadequate prenatal care, low educational levels, socioeconomic status, domestic violence, malnutrition and environmental pollution are just some of the factors that significantly increase the risk of preterm birth-particularly in low- and middle-income countries.

At the same time, the rising number of preterm births associated with infertility treatments and the use of assisted reproductive technologies (ART), such as in vitro fertilization, introduces new clinical and ethical challenges in managing high-risk pregnancies. While modern technologies are effective, they still carry certain risks that require ongoing evaluation and adaptation of care standards.

Given the rapidly evolving research on the pathophysiology of preterm birth and the complexity of its risk factors, there is an urgent need to deepen our understanding of the interactions between various determinants-biological, social, and environmental. Only a comprehensive approach, integrating insights from medicine, genetics, immunology, and public health, can enable more effective diagnostic and preventive measures. Continued development of diagnostic tools and a more personalized approach to treatment may contribute to improved health outcomes for mothers and newborns, reducing the number of preterm births and their long-term health consequences.

Objective of the article

The objective of this review is to provide a comprehensive analysis of the current scientific evidence regarding the risk factors for preterm birth, with particular emphasis on medical, obstetric, genetic, immunological, environmental, and socio-economic determinants. The analysis is based on studies published between 2020 and 2024, including meta-analyses, systematic reviews, cohort studies, case-control studies, and population-based analyses. The goal is not only to assess the significance of the individual risk factors but also to identify regional differences in the prevalence of preterm birth and to evaluate the impact of assisted reproductive technologies (ART) on the risk of this phenomenon.

Special attention is given to inflammatory and immunological mechanisms, genetic predispositions, and comorbidities that may contribute to spontaneous or medically induced preterm birth. The review also includes social determinants of health, such as maternal education level, access to prenatal care, and geographical context, which can significantly increase the vulnerability of certain populations. Furthermore, the potential use of biomarkers as tools for early identification of pregnancies at increased risk is discussed.

The article hypothesizes that preterm birth should be considered from an interdisciplinary perspective, taking into account both biological complexity and contextual factors. Effective prevention requires an individualized approach tailored to the specific characteristics of each population, as well as the optimization of prenatal care and ART procedures. The findings of the review aim not only to provide guidance for clinical practice and health policy but also to highlight areas requiring further research, particularly in the field of biomarkers and interventions adapted to local socio-health realities.

Methods

This review includes scientific articles published between 2020 and 2024, allowing for the incorporation of the most up-to-date data on risk factors for preterm birth. The literature search was conducted in January and February 2025 in the PubMed database, with a focus on peer-reviewed publications in English.

Inclusion criteria encompassed studies evaluating the relationship between preterm birth and medical, obstetric, genetic, immunological, environmental, and socio-economic factors. Opinion pieces, preliminary reports, articles lacking complete clinical data, and non-peer-reviewed publications were excluded from the review.

The selection process was conducted in several stages. In the first phase, publications were identified using keywords such as "preterm birth," "risk factors," "genetic markers," "inflammation," "ART," and "maternal comorbidities." Chronological (2020–2024), language (English), and quality (peer-reviewed articles) filters were then applied. In cases of duplicate topics, preference was given to newer studies or those involving larger populations.

Various types of studies were included in the analysis, such as meta-analyses, systematic reviews, cohort studies (prospective and retrospective), case-control studies, and populationbased analyses. Meta-analyses and systematic reviews provided generalized data on the scale and significance of individual risk factors, while cohort studies-both prospective and retrospective-enabled long-term observation of exposure to specific factors in different populations. Case-control studies allowed comparisons between women who experienced preterm birth and a control group, facilitating the identification of specific risk factors. Additionally, epidemiological and experimental studies were included, which provided information on global trends and potential risk biomarkers.

The gathered material underwent qualitative comparative analysis. Special emphasis was placed on identifying recurring patterns, assessing the consistency of conclusions, and determining the methodological limitations of individual studies. Discrepancies between results from different geographical regions were also considered, providing a deeper understanding of the impact of socio-economic and environmental contexts on preterm birth rates. This approach allowed for the creation of a synthesized overview of the current state of knowledge and the identification of areas requiring further investigation.

Results

The conducted review of scientific studies on the risk factors for preterm birth revealed a broad range of medical, genetic, environmental, and socio-economic conditions influencing the increased likelihood of this phenomenon. It has been demonstrated that preterm birth can result from both biological and external factors, highlighting the multifactorial etiology of this pregnancy complication.

Medical and Obstetric Factors

The literature analysis confirmed that numerous maternal diseases and obstetric history play a significant role in predisposing to preterm birth. Mitrogiannis et al. (2023) in their umbrella review identified seven well-documented risk factors, including exposure to amphetamines, a single umbilical artery, sleep-disordered breathing, and inadequate weight gain during pregnancy. Ji et al. (2022) demonstrated that cervical insufficiency (P < 0.001), multiple pregnancy (P < 0.01), and primiparity (P < 0.001) are significant risk factors for extreme preterm births, while for very preterm births, key predictors included gestational diabetes (P < 0.05), preterm premature rupture of membranes (P < 0.01), and pregnancy-induced hypertension (P < 0.001).

Studies also indicate a link between preterm birth and thyroid disorders. Torremante et al. (2023) found that regular monitoring of thyroid hormone levels and pregnancy-adapted therapy with L-thyroxine reduces the risk of preterm birth by up to 70% in women who started treatment before pregnancy and by 42% in those who initiated treatment after conception (P < 0.0001).

Genetic and Immunological Factors

A substantial body of evidence points to the significant role of immunological and genetic mechanisms in the etiology of preterm birth. Couceiro et al. (2021) emphasized that polymorphisms in genes regulating inflammatory responses (TNF α rs1800629, IL1 α rs17561, IL1RN rs2234663) may increase susceptibility to premature activation of labor mechanisms. These genes were also found to be associated with autoimmune diseases, such as rheumatoid arthritis and inflammatory bowel diseases, suggesting a common inflammatory mechanism leading to the premature initiation of labor.

Additionally, Khandre et al. (2022) highlighted the role of pro-inflammatory cytokines and chemokine receptors in inducing premature cervical maturation and rupture of the fetal membranes. These mechanisms appear particularly relevant in populations with a high burden of inflammatory and infectious diseases.

Social and Environmental Factors

Social and environmental factors also play a critical role in the occurrence of preterm birth. Bryce et al. (2022) in their systematic review indicated that in low- and middle-income countries, the most significant risk factors are maternal malnutrition (PAF = 17.5%), infections (PAF = 16.6%), and exposure to environmental factors (PAF = 16%). A similar relationship was found in the study by Zhang et al. (2022), where low maternal education (PAR% = 25.8%) and rural residence (PAR% = 24.4%) were key factors increasing the risk of preterm birth. Díaz-Rodríguez et al. (2021) reported that in the Dominican Republic, a family history of preterm births (p < 0.001; OR = 14.95), smoking (p < 0.001; OR = 6.65), and limited prenatal visits (p < 0.001) are significant risk factors, while regular prenatal care and appropriate weight gain during pregnancy can provide protective effects.

Regional Differences in Risk Factors

The analysis of studies shows that preterm birth risk factors vary by geographical region. In low- and middle-income countries (e.g., Ethiopia, Uganda), environmental and infectious factors, such as maternal malnutrition, maternal infections, and limited access to prenatal care, play a dominant role (Sendeku et al., 2021; Etil et al., 2023).

In developed countries, such as Japan and China, factors related to access to advanced medical care and lifestyle are more significant. In Japan, a key risk factor was the young age of the mother and a history of previous preterm births (Kinjyo et al., 2023), while in China, abnormalities of the placenta and pregnancy-induced hypertension were major contributing factors (Zhang et al., 2022).

Regional differences are also noticeable in Western populations. In European countries, factors associated with the use of assisted reproductive technologies (ART) play a larger role (Gervoise-Boyer et al., 2023), while in North America, race and its association with preterm birth risk is significant, which may stem from socio-economic factors and access to medical care (Tang et al., 2024).

The Impact of Assisted Reproductive Technology (ART)

The use of assisted reproductive technologies is a significant factor increasing the risk of preterm birth, though the results of studies in this area are not conclusive. Li et al. (2022) found that the main risk factors include maternal age below 25 years (OR = 2.125; P = 0.036) or above 39 years (OR = 1.504; P = 0.009), multiple pregnancy (OR = 9.780; P < 0.001), and placenta previa (OR = 14.954; P < 0.001).

Gervoise-Boyer et al. (2023) compared the risk of preterm birth following fresh and frozen embryo transfers. The results indicated that fresh embryo transfer was associated with a higher risk of preterm birth (7.7%) compared to frozen embryo transfer (6.2%) (P < 0.0001). The authors suggest that this could be due to the effects of intensive hormonal stimulation on endometrial quality and embryo implantation.

Discussion

The literature review confirms that preterm birth is a complex phenomenon, in which medical, genetic, immunological, environmental, and socio-economic factors interact with each other. The results of the analyzed studies highlight the critical role of obstetric abnormalities, such as cervical insufficiency, gestational diabetes, and pregnancy-induced hypertension (Ji et al., 2022). These disorders can lead to premature activation of labor mechanisms, which suggests the need for early recognition and the implementation of targeted medical interventions.

Early identification of women with these conditions is crucial, as it would allow for timely medical interventions that can significantly reduce the risk of preterm birth.

Increasing evidence also points to the role of genetic and immunological factors in the initiation of preterm birth. Couceiro et al. (2021) demonstrated that polymorphisms in genes regulating inflammatory responses may predispose individuals to earlier initiation of labor. This suggests that the inflammatory response, regardless of its initial trigger, may be a key mechanism leading to the shortening of pregnancy duration. Khandre et al. (2022) emphasized the importance of pro-inflammatory cytokines and chemokine receptors in inducing premature cervical maturation and rupture of membranes, which may be particularly significant in populations with high rates of inflammatory diseases.

These findings further suggest that interventions aimed at modulating the inflammatory response could significantly reduce the risk of preterm birth, potentially opening new therapeutic avenues for preventing premature labor.

A noteworthy aspect of the findings is the regional variation in risk factors. In low- and middleincome countries, maternal malnutrition, infections, and limited access to prenatal care are identified as key risk factors (Bryce et al., 2022; Sendeku et al., 2021). In contrast, in developed countries, risk is heightened due to delayed motherhood, the use of assisted reproductive technologies (ART), and chronic metabolic diseases such as gestational diabetes and hypertension (Zhang et al., 2022; Kinjyo et al., 2023). These differences highlight the importance of tailoring preventive measures to the specific needs of different populations.

Thus, preventive interventions must not only be adapted to the individual characteristics of women but also to the socio-economic context in which they live.

The conducted review significantly adds to the current knowledge, emphasizing the multifaceted nature of preterm birth risk factors. It has been confirmed that risk factors vary significantly depending on geographical regions and the level of healthcare system development. Additionally, the impact of ART on the risk of preterm birth remains unclear and requires further investigation, particularly in the context of different hormonal stimulation protocols and the choice of embryo transfer (Gervoise-Boyer et al., 2023).

It is also important to note that the ART-related results suggest the need for a more individualized approach to women undergoing in vitro fertilization, in order to optimize their chances of a healthy pregnancy.

Crucially, the studies also emphasize that the effectiveness of preventive strategies should be adapted to regional health conditions. In developing countries, the priority should be to improve access to prenatal care and infection treatment, whereas in high-income countries, the focus should be on implementing more precise diagnostic biomarkers for preterm birth risk and optimizing ART strategies.

On a global level, the implementation of international standards ensuring equal access to healthcare, especially in the context of new diagnostic and therapeutic technologies, is also necessary and would improve health outcomes in various countries.

Despite the broad scope of the conducted review, certain limitations must be acknowledged. One of the major issues is that most of the studies had a retrospective design, which complicates the establishment of clear cause-and-effect relationships. The results rely on the analysis of already existing data, which may lead to systematic errors. Additionally, differences in defining preterm birth between studies pose challenges in terms of comparability of results. In some studies, preterm birth was defined simply as delivery before 37 weeks of gestation (Mitrogiannis et al., 2023), while others only considered extremely preterm births before 32 weeks of gestation (Ji et al., 2022). Another issue is the heterogeneity of the populations studied and the lack of consideration of potential confounding factors such as economic status, BMI, stress exposure, or previous pregnancy history. Furthermore, in ART-related studies, there was often a lack of methodological standardization, which may have influenced differences in the reported results regarding fresh and frozen embryo transfers (Gervoise-Boyer et al., 2023).

Considering the results obtained and the indicated limitations, future research should focus on several key areas. First, there is a need for the standardization of diagnostic criteria for preterm birth and the implementation of multi-center prospective studies, which would provide more precise and comparable data. Second, research on immunological biomarkers should continue, as these could enable earlier identification of women at risk for preterm birth.

Specifically, the identification of specific inflammatory markers that could be incorporated into clinical predictive models is a promising direction. Another important issue is the optimization of ART protocols to minimize the risk of preterm births. Studies should focus on determining whether frozen embryo transfer is more beneficial for certain groups of patients and how different hormonal stimulation regimens impact embryo implantation. In the authors' opinion, comparative studies evaluating the impact of socio-economic and environmental factors on the frequency of preterm births in various populations should also be conducted. This would allow for better tailoring of preventive strategies to the specific characteristics of each region.

Furthermore, it is essential to continue exploring the interplay of environmental and socioeconomic factors, as addressing these broader issues may provide substantial long-term benefits for reducing preterm birth rates.

The findings obtained may have significant implications for clinical practice and health policy. In the authors' opinion, integrating genetic and immunological diagnostics with clinical assessment could enable earlier detection of preterm birth risk, allowing for the implementation of preventive measures at an earlier stage of pregnancy. In developing countries, the key action should be to increase access to prenatal care and health education, while in developed countries, greater emphasis should be placed on individualizing infertility treatment and monitoring women undergoing ART.

The integration of advanced medical knowledge into clinical practice, as well as responsible health policy, will form the foundation for effective preventive strategies in the 21st century. The conducted review highlights the importance of an interdisciplinary approach to preterm birth prevention, encompassing both biological and environmental aspects. Collaboration among specialists in maternal-fetal medicine, genetics, and epidemiology is crucial for more effective prevention of this phenomenon.

Conclusions

Based on the literature review conducted, preterm birth appears to be a complex phenomenon, involving the interplay of various biological, immunological, environmental, and socioeconomic factors. Consequently, effective prevention of this phenomenon must be based on a comprehensive approach that includes not only monitoring known risk factors but also implementing modern diagnostic methods based on inflammatory and genetic biomarkers. A key role in prevention is the recognition and management of medical factors such as cervical insufficiency, multiple pregnancies, gestational diabetes, and pregnancy-induced hypertension. These disorders are strong predictors of preterm birth, and early detection and appropriate medical intervention can significantly reduce the associated risks.

Increasing attention has also been paid to the importance of inflammatory mechanisms and genetic predispositions in the pathogenesis of preterm birth. This discovery opens new perspectives for the development of prognostic tools that could revolutionize the identification of at-risk women, enabling the earlier implementation of preventive and therapeutic actions. From a public health perspective, it is also crucial to address the socio-economic barriers that may limit access to prenatal care. In low-income countries, where access to proper care is limited, improving the availability of prenatal care and infection treatment is a key priority.

In higher-income countries, where technology and access to care are well-developed, it is necessary to implement more individualized diagnostic strategies based on modern biomarkers and optimize assisted reproductive technology (ART) protocols. The effectiveness of prevention will also depend on the application of modern technologies in the treatment and monitoring of pregnant women, especially those at higher risk.

Future research should focus on further standardizing the definition of preterm birth and validating predictive biomarkers that can improve the quality of diagnosis for this phenomenon. An important direction for development is also the creation of risk assessment tools that will integrate clinical, immunological, and genetic data. Additionally, research on the optimization of ART protocols, including the identification of the best patient groups for fresh or frozen embryo transfers, could further reduce the incidence of preterm birth.

Incorporating elements of health education and psychosocial support into comprehensive prenatal care will be critical to improving the effectiveness of preventive measures. Health education should focus on increasing women's awareness of the risk of preterm birth and the available prevention methods. Psychosocial support, on the other hand, may help women cope with stress and anxiety associated with pregnancy, which can also contribute to reducing the risk of preterm birth.

In summary, only an interdisciplinary approach-combining perinatal medicine, immunology, genetics, public health, and social sciences-has a real chance to effectively reduce the incidence of preterm births. The integration of advanced biomedical knowledge with clinical practice and responsible health policy should form the foundation of effective preventive strategies in the 21st century.

Disclosure

Author's Contribution

Conceptualization: Julia Piekarska, Wojciech Lachór, Justyna Solarz

Formal analysis: Wojciech Lachór, Monika Solarz, Justyna Solarz, Weronika Cyrkler

Investigation: Jakub Robak, Stanisław Telega, Justyna Solarz, Urszula Szymczak, Julia Piekarska

Writing rough preparation: Paweł Bollin, Julia Piekarska, Jakub Wawrzyńców, Stanisław Telega, Urszula Szymczak

Writing review and editing: Weronika Cyrkler, Jakub Robak, Paweł Bollin Supervision: Julia Piekarska, Monika Solarz

All authors have read and agreed with the published version of the manuscript.

Funding Statement

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article's bibliography.

Conflict of Interest Statement

The authors declare no conflict of interest.

References

1. Agarwal, R., & Agrawal, R. (2024). Exploring Risk Factors and Perinatal Outcomes of Preterm Birth in a Tertiary Care Hospital: A Comprehensive Analysis. *Cureus*, *16*(2), e53673. <u>https://doi.org/10.7759/cureus.53673</u>

2. Bryce, E., Gurung, S., Tong, H., Katz, J., Lee, A. C. C., Black, R. E., & Walker, N. (2022). Population attributable fractions for risk factors for spontaneous preterm births in 81 low- and middle-income countries: A systematic analysis. *Journal of Global Health*, *12*, 04013. https://doi.org/10.7189/jogh.12.04013

3. Cobo, T., Kacerovsky, M., & Jacobsson, B. (2020). Risk factors for spontaneous preterm delivery. *International Journal of Gynecology & Obstetrics*, *150*(1), 17–23. https://doi.org/10.1002/ijgo.13184

4. Couceiro, J., Matos, I., Mendes, J. J., Baptista, P. V., Fernandes, A. R., & Quintas, A. (2021). Inflammatory factors, genetic variants, and predisposition for preterm birth. *Clinical Genetics*, *100*(4), 357–367. <u>https://doi.org/10.1111/cge.14001</u>

5. Díaz-Rodríguez, A., Feliz-Matos, L., & Ruiz Matuk, C. B. (2021). Risk factors associated with preterm birth in the Dominican Republic: A case-control study. *BMJ Open*, 11(12), e045399. <u>https://doi.org/10.1136/bmjopen-2020-045399</u>

6. Etil, T., Opio, B., Odur, B., Lwanga, C., & Atuhaire, L. (2023). Risk factors associated with preterm birth among mothers delivered at Lira Regional Referral Hospital. *BMC Pregnancy and Childbirth, 23*, Article 814. <u>https://doi.org/10.1186/s12884-023-06120-4</u>

7. Gervoise-Boyer, M.-J., Fauque, P., De Mouzon, J., Devaux, A., Epelboin, S., Levy, R., Valentin, M., Viot, G., Bonomini, J., Bergère, M., Jonveaux, P., & Pessione, F. (2023). Risk factors associated with preterm birth in singletons born after IVF: A national cohort study. *Reproductive BioMedicine Online*, *46*(4), 750–759. <u>https://doi.org/10.1016/j.rbmo.2023.01.011</u>

8. Gyamtsho, S., Tenzin, K., & Choeda, T. (2023). Maternal risk factors associated with preterm birth: A case control study. *Journal of Nepal Health Research Council*, *21*(3), 505–513. <u>https://doi.org/10.33314/jnhrc.v21i3.4933</u>

9. Ji, X., Wu, C., Chen, M., Wu, L., Li, T., Miao, Z., Lv, Y., & Ding, H. (2022). Analysis of risk factors related to extremely and very preterm birth: A retrospective study. *BMC Pregnancy and Childbirth*, 22(1), 818. <u>https://doi.org/10.1186/s12884-022-05119-7</u>

10. Khandre, V., Potdar, J., & Keerti, A. (2022). *Preterm birth: An overview*. Cureus, 14(12), e33006. <u>https://doi.org/10.7759/cureus.33006</u>

11. Kinjyo, Y., Kinjo, T., Mekaru, K., Nagai, Y., Moromizato, T., Ohata, T., Iseki, C., Iseki, K., & Aoki, Y. (2023). Risk Factors of Preterm Birth in Okinawa Prefecture, the Southernmost Island Prefecture of Japan. *Maternal and Child Health Journal*, *27*(1), 92–100. https://doi.org/10.1007/s10995-022-03530-2

12. Landman, A. J. E. M. C., Don, E. E., Vissers, G., Ket, H. C. J., Oudijk, M. A., de Groot, C. J. M., Huirne, J. A. F., & de Boer, M. A. (2022). The risk of preterm birth in women with uterine fibroids: A systematic review and meta-analysis. *PLOS ONE*, *17*(6), e0269478. https://doi.org/10.1371/journal.pone.0269478

13. Li, J., Shen, J., Zhang, X., Peng, Y., Zhang, Q., Hu, L., Reichetzeder, C., Zeng, S., Li, J., Tian, M., Gong, F., Lin, G., & Hocher, B. (2022). Risk factors associated with preterm birth after IVF/ICSI. *Scientific Reports, 12*, Article 7944. <u>https://doi.org/10.1038/s41598-022-12149-w</u>

14. Mitrogiannis, I., Evangelou, E., Efthymiou, A., Kanavos, T., Birbas, E., Makrydimas, G., & Papatheodorou, S. (2023). Risk factors for preterm birth: An umbrella review of metaanalyses of observational studies. *BMC Medicine*, *21*, 456. <u>https://doi.org/10.1186/s12916-023-03171-4</u>

15. Seetho, S., Kongwattanakul, K., Saksiriwuttho, P., & Thepsuthammarat, K. (2023). Epidemiology and factors associated with preterm births in multiple pregnancy: A retrospective cohort study. *BMC Pregnancy and Childbirth*, 23(1), 872. <u>https://doi.org/10.1186/s12884-023-06186-0</u>

16. Sendeku, F. W., Beyene, F. Y., Tesfu, A. A., Bante, S. A., & Azeze, G. G. (2021). Preterm birth and its associated factors in Ethiopia: A systematic review and meta-analysis. *African Health Sciences*, *21*(3), 1321–1333. <u>https://doi.org/10.4314/ahs.v21i3.43</u>

Tang, I. D., Mallia, D., Yan, Q., Pe'er, I., Raja, A., Salleb-Aouissi, A., & Wapner, R. (2024). A scoping review of preterm birth risk factors. *American Journal of Perinatology*, 41(S 01), e2804–e2817. <u>https://doi.org/10.1055/s-0043-1775564</u>

18. Torremante, P., Berge, N. K., & Weiss, C. (2023). Reducing the rate of premature births through early diagnosis and pregnancy-adapted treatment of hypothyroidism. *Geburtshilfe und Frauenheilkunde*, *83*(11), 1361–1370. <u>https://doi.org/10.1055/a-2103-8143</u>

19. Wu, S.-T., Lin, C.-H., Lin, Y.-H., Hsu, Y.-C., Hsu, C.-T., & Lin, M.-C. (2023). Maternal risk factors for preterm birth in Taiwan: A nationwide population-based cohort study. *Pediatrics and Neonatology*, *64*(5), 588–595. <u>https://doi.org/10.1016/j.pedneo.2023.03.014</u>

20. Ye, C.-X., Chen, S.-B., Wang, T.-T., Zhang, S.-M., Qin, J.-B., & Chen, L.-Z. (2021). Risk factors for preterm birth: A prospective cohort study. *Chinese Journal of Contemporary Pediatrics*, 23(12), 1242–1249. <u>https://doi.org/10.7499/j.issn.1008-8830.2108015</u>

21. Younes, S., Samara, M., Al-Jurf, R., Nasrallah, G., Al-Obaidly, S., Salama, H., Olukade, T., Hammuda, S., Ismail, M. A., Abdoh, G., Abdulrouf, P. V., Farrell, T., AlQubaisi, M., Al Rifai, H., & Al-Dewik, N. (2021). Incidence, risk factors, and outcomes of preterm and early term births: A population-based register study. *International Journal of Environmental Research and Public Health*, *18*(11), 5865. <u>https://doi.org/10.3390/ijerph18115865</u>

22. Zhang, Y.-J., Shen, J., Lin, S. B., Lu, C., Jiang, H., Sun, Y., Cheng, X., Wang, H., Cui, S., Liu, X., Huang, L., Lin, X., Zhao, G., Yang, L., & Chen, C. (2022). The risk factors of preterm birth: A multicentre case-control survey in China in 2018. *Journal of Paediatrics and Child Health*, *58*(8), 1396–1406. <u>https://doi.org/10.1111/jpc.16002</u>