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Review Article

A Literature Review of Factors Affecting Low Birth Weight Babies (LBW)

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Abstract: Low Birth Weight (LBW) remains a critical global health issue that significantly contributes to neonatal morbidity and mortality, particularly in developing countries such as Indonesia. The main challenge in addressing LBW lies in its complex and multifactorial risk profile, which involves biological, social, environmental, and healthcare-related determinants. This study aims to analyze and synthesize the risk factors associated with LBW based on recent scientific literature. A literature review method was applied by searching articles from Portal Garuda, DOAJ, PubMed, and Google Scholar published between 2020 and 2025 using relevant keywords. The findings indicate that maternal age, interpregnancy interval, nutritional status, anemia, preeclampsia, infections, socioeconomic conditions, environmental exposure, and the quality of antenatal care are significant determinants of LBW. The synthesis of evidence confirms that LBW is influenced by the interaction of multiple individual and healthcare system factors rather than a single cause. In conclusion, this study highlights the urgent need to strengthen antenatal care services, improve maternal nutritional status, control maternal diseases during pregnancy, and implement community-based promotive and preventive strategies as key efforts to reduce the incidence of LBW.

Keywords: Antenatal Care; Low Birth Weight; Maternal Nutrition; Pregnancy; Risk Factors.

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1. Introduction

According to the World Health Organization (WHO), a newborn is classified as having Low Birth Weight (LBW) if its birth weight is less than 2,500 grams (WHO, 2025). Infants born with LBW in addition to being at higher risk for neonatal mortality also face increased likelihood of impaired cognitive development and long-term health and developmental complications (Arabzadeh et al. 2024). Thus, LBW is more than just a matter of birthweight: it serves as a critical marker of maternal health during pregnancy and the quality of newborn care.

The World Health Organization reports that low-birth-weight newborns are approximately 20 times more likely to die during the neonatal period compared with heavier infants, and low birth weight accounts for a large share of global neonatal deaths. An increasing incidence of low birth weight in a country is frequently accompanied by a rise in infant mortality because LBW is associated with conditions such as prematurity, respiratory difficulties, and infection that markedly raise early-life vulnerability. Therefore, interventions aimed at addressing the root determinants of LBW improved maternal nutrition, comprehensive antenatal care, and timely management of pregnancy complications are essential to reduce infant deaths (WHO, 2021).

Global estimates indicate that the prevalence of low birth weight (LBW) ranges between 15% and 20% of all births corresponding to more than 20 million newborns each year

worldwide. Most of these LBW births occur in low- and middle-income countries, including Indonesia (Mare et al. 2025).

When analyzed by region, the highest incidence of LBW is observed in Central and South Asia, while European countries generally report the lowest prevalence Verina and Kartini, (2025), regional differences highlight the influence of socioeconomic conditions, maternal nutrition and health, and access to maternal-newborn healthcare on the risk of LBW. Therefore, reducing global LBW prevalence requires integrated policies addressing the social, economic, and health determinants underlying this phenomenon.

Indonesia continues to face substantial challenges in reducing maternal mortality (MMR) and infant mortality (IMR), despite notable improvements over the past decades. Data from the national population census indicate that the national infant mortality rate declined to 16.85 deaths per 1,000 live births in 2020, reflecting significant progress compared to earlier periods (Kemenkes, 2023). Nevertheless, infant mortality remains a critical public health concern. According to the Indonesian Ministry of Health, a total of 29,945 infant deaths were recorded nationwide in 2023, demonstrating that mortality among infants is still a serious issue requiring sustained intervention.

One of the major contributors to infant mortality in Indonesia is low birth weight (LBW). National vital statistics reports show that the proportion of LBW infants slightly decreased from 4.26% in 2019 to 4.16% in 2023; however, this condition continues to pose a high risk for neonatal morbidity and mortality (Ilmiani and Iqbal 2024). Infants born with low birth weight are significantly more vulnerable to respiratory disorders, infections, thermoregulation problems, and long-term growth impairments, which substantially increase their risk of early death (Marlina and Idealistiana 2024).

Thus, although the national infant mortality rate has shown a declining trend, low birth weight remains a critical determinant of neonatal survival. Strengthening antenatal care services, improving maternal nutrition, ensuring skilled birth attendance, and implementing early risk detection during pregnancy are essential strategies to achieve further reductions in infant mortality in Indonesia.

Low Birth Weight (LBW) in newborns is commonly caused by two main pathways: premature delivery (gestational age less than 37 weeks) and/or Intrauterine Growth Restriction (IUGR) also known as restricted fetal growth (PJT) (Tatiana et al. 2020).

These pathways prematurity or IUGR are often triggered by a combination of risk factors related to the mother, the placenta, the fetus, and the surrounding environment (Pancawardani, Amelia, and Wahyuni 2020). Maternal risks such as poor nutrition, anemia, hypertension or chronic maternal disease, inadequate nutrient intake, as well as lifestyle factors like maternal smoking or exposure to secondhand smoke, can impair uteroplacental blood flow and reduce the supply of oxygen and nutrients to the fetus (Odongkara et al. 2024).

In addition, suboptimal placental conditions such as placental insufficiency, impaired perfusion, or structural abnormalities and fetal factors (e.g., multiple pregnancy, congenital anomalies, intrauterine infection) also contribute to impaired fetal growth (Low et al. 1985). Socioeconomic and environmental factors such as limited access to antenatal care, poverty, and exposure to environmental pollutants further increase the risk of LBW.

Therefore, LBW should not be viewed merely as a consequence of early birth alone; rather, it reflects a complex interplay of maternal health, placental function, fetal conditions, and external environment. Preventing LBW effectively requires ensuring maternal nutrition and health during pregnancy, providing quality antenatal care, as well as close monitoring of placental and fetal well-being.

The occurrence of Low Birth Weight (LBW) is determined by an interrelated set of factors. Maternal sociodemographic characteristics including maternal age, education level, socioeconomic status, and urban-rural residence are strongly associated with LBW risk because they shape access to nutritious food and health services (Laksono et al. 2023). Maternal medical risks before and during pregnancy (such as anemia, hypertensive disorders, diabetes, and other chronic illnesses) further increase the likelihood that the fetus will receive insufficient nutrients and oxygen, resulting in reduced birth weight (Belete, Belete, and Assefa 2025).

Reproductive health indicators for example, short interpregnancy intervals, high parity, and prior obstetric complications affect a mother's physiological capacity to support fetal growth (Qur et al. 2025).Equally important is antenatal care: both the quantity (number of ANC visits) and the quality (screening, nutritional counselling, detection and management of

complications) of antenatal services are critical; inadequate or poor-quality ANC is repeatedly linked to higher LBW incidence (Sari et al. 2024).

Mechanistically, these factors compromise placental function or maternal nutritional reserves, reducing transfer of oxygen and nutrients to the fetus and thereby impairing intrauterine growth. For this reason, LBW prevention requires integrated approaches that combine social and economic support for women, preconception and antenatal medical care, and improved access to high-quality maternal health services (Nurwati et al. 2023b).

Maternal sociodemographic characteristics are strongly associated with the occurrence of Low Birth Weight (LBW). Extremely young maternal age (below 20 years) and advanced maternal age (above 34 years) are linked to increased LBW risk due to biological immaturity and a higher susceptibility to pregnancy complications. Racial and ethnic disparities have also been documented, with certain population groups experiencing higher LBW prevalence. In addition, low socioeconomic status, limited maternal education, and unstable marital conditions restrict access to adequate nutrition and maternal healthcare services, thereby elevating the risk of LBW (Blencowe et al. 2025).

Pre-pregnancy medical risk factors further contribute to LBW. Inappropriate parity, non-optimal maternal body weight and height, a previous history of LBW delivery, and short interpregnancy intervals are closely associated with impaired maternal physiological adaptation and depleted nutritional reserves. These conditions reduce nutrient transfer to the fetus and subsequently hinder optimal fetal growth.

Reproductive health status during pregnancy also plays a critical role. Poor maternal nutritional status, anemia, pregnancy-related infections, and underlying conditions such as hypertension and gestational diabetes substantially increase the risk of LBW. Furthermore, pregnancy complications including preeclampsia and placental dysfunction significantly elevate the likelihood of intrauterine growth restriction and low birth weight at delivery (Krasevec et al. 2023).

Antenatal care services constitute another decisive determinant. Inadequate frequency and quality of antenatal visits, limited availability of skilled healthcare providers, difficult access to healthcare facilities, and delayed initiation of antenatal care are consistently associated with higher LBW incidence. High-quality antenatal services enable early detection of nutritional deficiencies and pregnancy complications, thereby substantially reducing the risk of LBW (Preventable 2025).

Infants born with low birth weight (LBW) not only face elevated mortality risk in the neonatal period but among survivors, they remain more susceptible to long-term adverse health and developmental outcomes. A growing body of research indicates that individuals with a history of LBW have a heightened likelihood of developing non-communicable diseases such as hypertension, cardiovascular disease (CVD), and type 2 diabetes in adulthood or mid-life (Negrato and Gomes 2013).

LBW is often viewed through the lens of "developmental programming," whereby suboptimal fetal environment such as inadequate nutrient or oxygen supply during gestation leads to lasting alterations in metabolic and vascular physiology (Abitbol, C. L., & Rodriguez 2012). Consequently, the long-term health consequences associated with LBW may include increased risks of atherosclerosis, coronary heart disease, stroke, insulin resistance, metabolic syndrome, and other chronic conditions compared with those born at a normal birth weight (Huang et al. 2022)

Therefore, LBW should not be regarded merely as a perinatal concern it represents a critical early-life determinant of health across the life span. Early detection, nutritional and medical intervention, together with lifelong health monitoring, are essential to mitigate the long-term burden associated with LBW.

Low Birth Weight (LBW) results from a complex interplay of risk factors spanning maternal demographics, anthropometry and medical/behavioural risks, paternal contributions, fetal conditions, environmental and nutritional exposures, and the adequacy of prenatal care. Maternal sociodemographic characteristics such as maternal age, education and household socioeconomic status shape access to nutritious diets and health services and thereby influence birth weight outcomes (Oktriyanto et al. 2022).

Maternal measurements and medical/behavioural risk factors (e.g., pre-pregnancy BMI, maternal height and weight, anemia, hypertensive disorders, chronic diseases, tobacco use) directly affect the intrauterine environment and the mother's capacity to sustain fetal growth (Kumar et al. 2022; Herwanto, Hudiyanto, and Muhammad 2024).

Paternal factors including age, occupation, education and paternal health history also make a measurable contribution to birthweight through genetic inheritance and household socioeconomic pathways (Fan et al. 2015; Libretti et al. 2024).

Fetal-level determinants (for example multiple pregnancy or congenital anomalies), together with environmental and nutritional determinants such as household food security, sanitation, and exposure to air pollution, further elevate LBW risk; several large analyses have linked particulate air pollution to both prematurity and low birth weight (Ghosh et al. 2021; Alfira, Baliwati, and Riyadi 2025).

Finally, inadequate prenatal care characterized by insufficient visit frequency, late initiation of antenatal care, or poor service quality impedes early detection and management of risk factors, increasing the likelihood of LBW (Kurniasari et al. 2024; Irawati et al. 2024)

Therefore, effective LBW prevention requires coordinated multisectoral strategies: improving maternal nutrition and management of chronic conditions, reducing harmful environmental exposures, engaging fathers and families, and strengthening access to high-quality antenatal services.

Family socioeconomic conditions play a crucial role in the occurrence of Low Birth Weight (LBW). Factors such as household income, parental education, housing quality, and residential environment whether urban or rural are closely linked to maternal nutritional status, sanitation, and access to adequate antenatal healthcare (Kurniasari et al. 2024; Laksono et al. 2023). Families with lower socioeconomic status tend to experience greater barriers in obtaining nutritious food and regular pregnancy check-ups, thereby increasing the risk of delivering infants with LBW.

In addition to socioeconomic determinants, several maternal and pregnancy-related factors are well established as contributors to LBW. Extremely young or advanced maternal age is associated with biological vulnerability and a higher likelihood of pregnancy complications. Multiple pregnancies, maternal obesity, short interpregnancy intervals, and rapid labor have also been identified as conditions that elevate the probability of LBW (Tee, Suryawan, and Suryaningsih 2023; Indah et al. 2024). Moreover, preterm birth represents one of the most prominent direct causes of LBW, as shortened gestational age substantially limits fetal weight gain (Salim, Insani, and Sihaloho 2024).

Therefore, LBW should be understood as a multifactorial condition driven by the intricate interaction of socioeconomic, biological, and obstetric factors, highlighting the necessity for comprehensive preventive strategies.

The objective of this paper is to systematically synthesize findings from existing research on risk factors associated with Low Birth Weight (LBW). Through a comprehensive literature review, this study collates empirical evidence from both Indonesian and international studies to provide an integrated overview of determinants of LBW ranging from sociodemographic and economic factors, maternal medical risk, to pregnancy conditions and environmental influences. This synthesis aims to identify which factors consistently emerge as significant contributors to LBW, thereby offering a foundation for evidence-based maternal-child health policies and interventions.

2. Method

This review was conducted using a systematic literature review approach by exploring several reputable national and international scientific databases. The literature search was carried out through Portal Garuda, the Directory of Open Access Journals (DOAJ), PubMed, and Google Scholar. The search strategy applied a combination of relevant keywords, namely *"low birth weight (LBW)"* and *"risk factors."* As a result of the screening process based on predetermined inclusion criteria, four scientific publications published between 2020 and 2025 were selected. These articles were then critically analyzed to obtain a comprehensive understanding of the various risk factors associated with the incidence of low birth weight.

3. Result

In a review of recent literature, the author identified four relevant studies addressing risk factors for Low Birth Weight (LBW). A recent study conducted at RSUD dr. La Palaloi in January 2023 found that maternal age, parity, maternal nutritional status, twin pregnancy (gemelli), as well as the frequency and quality of antenatal care (ANC) visits, were significantly associated with LBW incidence (Mirnawati, M., Hasbullah, A. A., & Hariadi 2025).

These recent findings update our understanding that LBW risk arises not from a single factor, but from a complex interplay of maternal characteristics, pregnancy conditions, and

quality of maternal health services. Therefore, synthesizing up-to-date evidence is essential as a scientific foundation before formulating maternal-child health policies and targeted interventions.

Second finding the study conducted by Andini, Nurvinanda, and Agustin, (2025), were significantly associated with the incidence of low birth weight (LBW). Mothers who became pregnant at a very young age or at an advanced maternal age were found to have a higher likelihood of delivering infants with low birth weight compared to those who conceived within the optimal reproductive age range. Furthermore, short birth intervals were identified as a meaningful risk factor, as the maternal body may not have sufficient time to recover physiologically and nutritionally from the previous pregnancy.

In contrast, the study demonstrated that maternal education level, nutritional status, and parity were not statistically associated with LBW incidence. These findings suggest that the influence of certain risk factors may differ depending on local population characteristics, environmental conditions, and accessibility of maternal health services.

Based on these results, LBW prevention strategies should prioritize the regulation of optimal maternal age at pregnancy and adequate birth spacing. Reproductive health education for adolescents and women of childbearing age is essential to reduce early and high-risk pregnancies. In addition, strengthening family planning programs plays a crucial role in helping couples manage safe pregnancy intervals. Moreover, the enhancement of antenatal care (ANC) services is fundamental for continuous monitoring of pregnancy and early identification of potential complications that may contribute to LBW, allowing timely and appropriate interventions.

The study conducted by Rizkika, Rahfiludin, and Asna, (2023), The results demonstrated that maternal age at pregnancy was significantly associated with the incidence of LBW. Mothers who became pregnant at a very young age or at an advanced maternal age had a higher risk of delivering low-birth-weight infants compared to those who conceived at the optimal reproductive age. This finding is related to the immaturity of the reproductive system in young mothers and the decline of physiological function in older mothers.

Furthermore, the study revealed that interpregnancy interval played a significant role in the occurrence of LBW. Short birth spacing increased the risk of LBW because the maternal body requires sufficient time to restore nutritional reserves, physical strength, and overall health after a previous pregnancy. Inadequate recovery time may impair fetal growth in subsequent pregnancies.

Environmental factors were also highlighted as important contributors. Exposure to pesticides during pregnancy was found to be significantly associated with an increased risk of LBW. Mothers living in agricultural areas or frequently exposed to chemical substances used in farming were more likely to deliver infants with low birth weight. Pesticide exposure is believed to disrupt hormonal balance, placental blood flow, and fetal growth processes.

Overall, the findings of this study confirm that LBW is influenced not only by maternal biological factors but also by environmental exposure and reproductive patterns, indicating that LBW prevention requires an integrated approach involving medical care, behavioral interventions, and environmental protection.

In the study conducted in Kitengie et al. (2024) it was reported that approximately 14.5% of births resulted in infants weighing less than 2,500 grams.

Multivariate analysis identified several factors significantly associated with increased risk of low birth weight (LBW). These included: unmarried maternal status (adjusted Odds Ratio, ORa ≈ 2.92), non-Luba ethnicity (ORa ≈ 1.71), maternal anemia during pregnancy (ORa ≈ 2.92), lack of antenatal care (ANC) attendance (ORa ≈ 1.92), preterm delivery (ORa ≈ 3.11), gestational diabetes (ORa ≈ 3.34), maternal malaria during pregnancy (ORa ≈ 2.00), multiparity (ORa ≈ 2.00), and history of threatened abortion (ORa ≈ 6.17).

These findings illustrate that LBW in Mbujimayi arises from a multifactorial interplay of maternal health, prenatal care, social and ethnic context, and pregnancy complications. Conditions such as anemia, infections, chronic diseases, and insufficient prenatal care highlight the critical role of maternal health services and early detection. Simultaneously, social factors like marital status and ethnicity suggest that socioeconomic and cultural contexts shape maternal and fetal outcomes.

Recent studies in sub-Saharan Africa, including DR Congo, Rwanda, and Uganda, report similar associations teenage pregnancies, inadequate prenatal visits, maternal anemia or infection, and preterm birth remain consistently linked with LBW.

4. Discussion

The reviewed literature consistently underscores that Low Birth Weight (LBW) is a multifactorial outcome not the result of a single determinant but rather the product of complex interplay among maternal biology, pregnancy characteristics, socioeconomic status, environmental exposure, and health services quality. For instance, the 2024 study at RSUD Depati Hamzah identified maternal age and inter-pregnancy interval as significant predictors of LBW, while variables such as education level, nutritional status, and parity were not significantly associated (Andini et al. 2025). Similarly, research at RSUD dr. La Palaloi (2023) added that twin pregnancy (gemelli), maternal nutritional status, and antenatal care (ANC) utilization significantly influence birth weight (Nurwati et al. 2023a)

These findings align with broader epidemiologic evidence showing that maternal nutritional indicators e.g., pre-pregnancy body mass index (BMI) or mid-upper arm circumference (MUAC) alongside pregnancy complications (anemia, hypertension, preeclampsia), and the adequacy of antenatal care are crucial determinants of LBW risk (Mirnawati, M., Hasbullah, A. A., & Hariadi 2025).

Moreover, recent meta-analytic data deepen our understanding by highlighting environmental factors notably prenatal exposure to air pollution. A 2022 systematic review found that maternal exposure to fine particulate matter during pregnancy is associated with increased risk of LBW (Kitengie et al. 2024). This expands the scope of LBW prevention beyond the traditional boundaries of medical and socio-demographic interventions to include environmental health and public policy.

Practical and policy implications from these combined findings point toward the necessity of a comprehensive, integrated maternal-child health approach. Efforts should not only ensure access to high-quality antenatal services including nutritional assessment, anemia screening, hypertension control, and reproductive health counseling but also promote optimal pregnancy planning (appropriate maternal age, safe birth spacing) and address environmental determinants (air quality, sanitation, pollution control). A multisectoral strategy involving health, environment, education, and socioeconomic sectors will likely yield more substantial reductions in LBW prevalence.

From a research perspective, the literature suggests that LBW risk factors are highly contextual varying across regions depending on local environmental, socioeconomic, and healthcare conditions. Future studies should aim to integrate diverse data streams (environmental exposures, maternal nutrition, health service access) to develop more robust, context-specific risk models for LBW.

5. Comparison

This section situates recent empirical findings within a comparative and up-to-date framework to demonstrate the state-of-the-art of low birth weight (LBW) research and to highlight the scientific contribution of the present study.

A growing body of recent evidence indicates that LBW is a multifactorial condition, shaped by a complex interaction of maternal, obstetric, service-related, and environmental determinants. A study conducted at RSUD dr. La Palaloi in 2023 revealed that maternal age, parity, maternal nutritional status, twin pregnancy, as well as the frequency and quality of antenatal care (ANC) visits were significantly associated with LBW incidence (Unibos, 2023). These findings emphasize that LBW does not arise from a single cause but rather from the combined influence of maternal biological factors and health-care service quality.

Similar results were reported by Andini, Nurvinanda, and Agustin (2024) at RSUD Depati Hamzah Pangkalpinang. Their study demonstrated that maternal age and interpregnancy interval were significantly associated with LBW. Mothers who conceived at a very young age or at advanced maternal age showed a higher probability of delivering LBW infants compared with those who conceived within the optimal reproductive age range. Short birth intervals were likewise identified as a significant risk factor due to incomplete physiological and nutritional recovery following previous pregnancies. However, unlike the La Palaloi study, maternal education level, nutritional status, and parity were not statistically associated with LBW, suggesting that the influence of specific risk factors may vary across populations and health-care settings.

Further expansion of the risk framework was provided by Rizkika, Rahfiludin, and Asna (2023) in their study at Kertek 2 Primary Health Centre, Wonosobo Regency. Consistent with prior findings, maternal age at pregnancy and short interpregnancy interval emerged as major determinants of LBW. Importantly, this study also identified environmental exposure,

particularly pesticide exposure during pregnancy, as a significant risk factor. Mothers residing in agricultural areas or frequently exposed to pesticides exhibited a higher likelihood of delivering LBW infants. Such exposure is believed to disrupt placental perfusion, hormone regulation, and fetal growth mechanisms.

Evidence from sub-Saharan Africa further reinforces the multifactorial nature of LBW. Moise et al. (2017), in a study conducted in Mbujimayi City, Democratic Republic of Congo, reported that 14.5% of births resulted in infants weighing less than 2,500 grams. Multivariate analysis identified unmarried maternal status, non-Luba ethnicity, maternal anemia, absence of ANC attendance, preterm birth, gestational diabetes, malaria during pregnancy, multiparity, and a history of threatened abortion as significant predictors of LBW. These findings illustrate how medical factors, health-care access, and socio-cultural conditions jointly shape LBW risk.

When compared across regions, these studies demonstrate convergent evidence regarding key determinants, particularly maternal age, short birth interval, inadequate ANC, maternal medical disorders, and preterm birth. At the same time, context-specific factors, such as pesticide exposure and socio-cultural characteristics, distinguish risk patterns across settings. Therefore, the current state-of-the-art of LBW research underscores that prevention strategies must be multisectoral, integrating reproductive health regulation, strengthening of family planning programs, optimization of antenatal care quality, effective control of maternal diseases, and environmental health protection.

6. Conclusions

Based on the synthesis of national and international literature discussed in this study, it can be concluded that Low Birth Weight (LBW) remains a complex and multifactorial public health issue and continues to be a major challenge in improving maternal and neonatal health outcomes. The main findings indicate that maternal age, interpregnancy interval, nutritional status, medical conditions during pregnancy such as anemia, preeclampsia, and infectious diseases, as well as the quality of antenatal care, are significantly associated with the risk of LBW. In addition, socioeconomic factors, environmental exposure, and maternal health behaviors also play important roles in increasing the incidence of LBW across different regions.

The synthesis of these findings demonstrates a strong relationship between biological, environmental, and health service factors and the primary objective of this study, which is to identify the risk factors associated with LBW. These results support the argument that LBW cannot be explained by a single determinant but rather arises from a complex interaction between individual, social, and healthcare system factors. Therefore, effective LBW prevention strategies require integrated approaches that encompass promotive, preventive, curative, and rehabilitative interventions in a continuous manner.

The implications of these findings provide meaningful contributions to both scientific knowledge and practical applications in maternal and child health. This study offers valuable evidence to support comprehensive health policy formulation, improvement of antenatal care quality, strengthening of pregnancy planning programs, and community-based interventions aimed at improving maternal nutrition and socioeconomic conditions. Moreover, this review highlights the growing importance of environmental and social determinants as essential components of sustainable LBW prevention strategies.

However, this study also has several limitations. The analysis is limited to available literature within a specific time frame, and most of the included studies employed observational designs, which restrict the ability to establish causal relationships. In addition, variations in population characteristics and research methodologies across studies limit the generalizability of the findings. Therefore, future research is recommended to employ longitudinal or cohort study designs with larger and more diverse samples, and to explore environmental and behavioral factors in greater depth. Further studies are also encouraged to develop contextual and applicable LBW risk prediction models to enhance targeted prevention efforts.

Author Contributions:

Conceptualization of the study was carried out by Elly Dwi Wahyuni and Junengsih. The methodology was designed by Elly Dwi Wahyuni. Software management was conducted by Jehanara. Data and result validation involved Elly Dwi Wahyuni, Junengsih, and Ani Kusumastuti. Formal data analysis was performed by Elly Dwi Wahyuni. Investigation activities were undertaken by Jehanara. Research resources were coordinated by Ani

Kusumastuti. Data curation and organization were handled by Jehanara. The original draft of the manuscript was prepared by Elly Dwi Wahyuni. Manuscript review and editing were performed by Junengsih. Data visualization and presentation were developed by Jehanara. Supervision of the entire research process was provided by Ani Kusumastuti. Project administration was managed by Elly Dwi Wahyuni, while funding acquisition was carried out by Junengsih. All authors have reviewed and approved the final version of the manuscript.

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Data Availability Statement:

The authors affirm their willingness to provide the research data used in this study. All datasets that support the findings of this work are available from the corresponding author upon reasonable request. Due to considerations related to participant privacy and ethical obligations, the data cannot be deposited in a public repository; however, the authors will share relevant materials with qualified researchers who meet the necessary ethical requirements.

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Conflicts of Interest:

The authors declare that they have no conflicts of interest that could influence the presentation or interpretation of the findings reported in this study. Since this work was self-funded, the funders had no involvement in the study design; in the processes of data collection, analysis, or interpretation; in the preparation of the manuscript; or in the decision to submit the results for publication.

References

Abitbol, C. L., & Rodriguez, M. M. (2012). The long-term renal and cardiovascular consequences of prematurity. *Nature Reviews Nephrology, 8*(5), 265–274. https://doi.org/10.1038/nrneph.2012.38

Alfira, J., Baliwati, Y. F., & Riyadi, H. (2025). Unveiling the risks of low birth weight prevalence: An ecological study in West Java. *AcTion: Aceh Nutrition Journal, 10*(1), 1–13. https://doi.org/10.30867/action.v10i1.2144

Andini, R. N., & Agustin. (2025). Faktor-faktor yang berhubungan dengan kejadian berat badan lahir rendah (BBLR) di RSUD Depati Hamzah Pangkalpinang tahun 2024. *Jurnal Kesehatan Tambusai, 6*(1), 1231–1243.

Arabzadeh, H., Doosti-irani, A., Kamkari, S., Farhadian, M., Elyasi, E., & Mohammadi, Y. (2024). The maternal factors associated with infant low birth weight: An umbrella review. *BMC Pregnancy and Childbirth, 24*(316), 1–11. https://doi.org/10.1186/s12884-024-06487-y

Belete, N. K., Belete, A. G., & Assefa, D. T. (2025). Effects of maternal anemia on low-birth-weight in Sub-Sahara African countries: Systematic review and meta-analysis. *PLOS One, 20*(6), 1–14. https://doi.org/10.1371/journal.pone.0325450

Blencowe, H., Krasevec, J., De Onis, M., Black, R. E., An, X., Stevens, G. A., Borghi, E., Hayashi, C., Estevez, D., Cegolon, L., Shiekh, S., Hardy, V. P., Lawn, J. E., & Cousens, S. (2025). National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: A systematic analysis. *The Lancet Global Health, 7*(7), e849–e860. https://doi.org/10.1016/S2214-109X(18)30565-5

Fan, C., Huang, T., Cui, F., Gao, M., Song, L., & Wang, S. (2015). Paternal factors to the offspring birth weight: The 829 birth cohort study. *International Journal of Clinical and Experimental Medicine, 8*(7), 11370–11378.

Ghosh, R., Causey, K., Burkart, K., Wozniak, S., Cohen, A., & Brauer, M. (2021). Ambient and household PM2.5 pollution and adverse perinatal outcomes: A meta-regression and analysis of attributable global burden for 204 countries and territories. *PLOS Medicine, 18*(9), 1–22. https://doi.org/10.1371/journal.pmed.1003718

Herwanto, E. S., Hudiyanto, P. S., & Muhammad, I. (2024). Factors of maternal influence on low birth weight. *Asian Journal of Health Research, 3*(1), 30–35. https://doi.org/10.55561/ajhr.v3i1.144

Huang, X., Liu, J., Qi, L., Adachi, J. D., Wu, J., Li, Z., Meng, Q., Li, G. Y. H., Irene, M., & Lara, B. (2022). Birth weight and the risk of

cardiovascular outcomes: A report from the large population-based UK Biobank cohort study. *Frontiers in Cardiovascular Medicine, 9*(827491), 1–9. https://doi.org/10.3389/fcvm.2022.827491

Ilmiani, T. K., & Iqbal, M. (2024). Faktor-faktor yang memengaruhi kejadian berat badan lahir rendah (BBLR) di RSIA Puri Betik Hati Bandar Lampung. *Jurnal Kesehatan Dan Teknologi Medis, 8*(10), 1–8.

Indah, N. S., Tiwery, B., S. Kep, M. Kep, & Sp Kep A. (2024). Edukasi dan upaya pencegahan stunting. In *Book Chapter Stunting*.

Irawati, D., Dewi Sartika, R. A., Utari, D. M., & Wirawan, F. (2024). Determinant factors of the incidence of low birth weight in Central Java province: Analysis of 2018 Basic Health Research data. *Indonesian Journal of Public Health Nutrition (IJPHN), 4*(2). https://doi.org/10.7454/ijphn.v4i2.8062

Kemenkes. (2023). *Laporan statistik hayati Indonesia 2019-2023*. Kementerian Kesehatan Republik Indonesia.

Kitengie, B. L., Ngiele, C. M., Salamayi, Y. S., Kitunga, C. K., Lutumba, B. B. L., Kafinga, E. L., Mawunu, M., Mudogo, V., Ngbolua, K. N., & Mukandu. (2024). Assessment of the risk factors for low birth weight at Kitenge Hospital, Mbujimayi City, Democratic Republic of the Congo: 2018-2022. *Journal of Oral & Public Health, 5*(3), 1–8. https://dx.doi.org/10.4314/orapj.v5i3.25

Krasevec, J., Blencowe, H., Coffey, C., Okwaraji, Y. B., Estevez, D., Stevens, G. A., Ohuma, E. O., Conkle, J., Gatica-Domínguez, G., Bradley, E., Muthamia, B. K., Dalmiya, N., Lawn, J. E., Borghi, E., Hayashi, C., Duncan, J. R., & Brook, C. A. (2023). Study protocol for UNICEF and WHO estimates of global, regional, and national low birthweight prevalence for 2000 to 2020. *Gates Open Research, 6*(80), 1–24.

Kumar, S., Ram, D., Baral, J. R., Raj, D., Kumar, N., & Gurung, G. (2022). Maternal hemoglobin and risk of low birth weight: A hospital-based cross-sectional study in Nepal. *Heliyon, 8*(January), e12174. https://doi.org/10.1016/j.heliyon.2022.e12174

Kurniasari, L., Kartasurya, M. I., Nugraheni, S. A., & Agushybana, F. (2024). Determinants for low birth weight in mothers giving birth during the Covid-19 pandemic. *Amerta Nutrition, 8*(1), 27–36. https://doi.org/10.20473/amnt.v8i1SP.2024.27

Laksono, A. D., Wulandari, R. D., Matahari, R., & Laksono, A. D. (2023). Socioeconomic disparities in low birth weight in Indonesia's rural areas: A population-based study. *Atlantis Press, 12*(4). https://doi.org/10.2991/978-94-6463-112-8

Libretti, A., Savasta, F., Nicosia, A., Corsini, C., De Pedrini, A., Leo, L., Simone, A., Tro, L., Dellino, M., Tinelli, R., Sorrentino, F., & Remorgida, V. (2024). Exploring the father's role in determining neonatal birth weight: A narrative review. *Medicina, 60*(1661), 1–12. https://doi.org/10.3390/medicina60101661

Low, Preventing, Birthweight Committee, Low Birthweight, Health Promotion, Disease Prevention. (1985). *Preventing low birthweight*. National Academies Press.

Mare, K. U., Gobena Andarge, G., Sabo, K. G., & Mohammed, O. A. (2025). Regional and sub-regional estimates of low birth weight and its determinants in 44 low- and middle-income countries: Evidence from demographic and health survey data. *BMC Pediatrics, 25*(342). https://doi.org/10.1186/s12887-025-05691-9

Marlina, R., & Idealistiana, L. (2024). Analisis faktor resiko terjadinya BBLR (berat badan lahir rendah) pada bayi baru lahir di RS Citra Sari Husada Karawang. *MANUJU: MALAHAYATI NURSING JOURNAL, 6*(10), 4177–4189.

Mirnawati, M., Hasbullah, A. A., & Hariadi, A. (2025). Faktor-faktor yang ada hubungan dengan ibu yang melahirkan bayi berat badan lahir rendah di RSUD Dr. La Palaloi periode Januari 2023. *Bosowa Medical Journal, 3*(1), 18–22. https://doi.org/10.56326/bmj.v3i1.2481

Negrato, C. A., & Gomes, M. B. (2013). Low birth weight: Causes and consequences. *Diabetology & Metabolic Syndrome, 5*(49), 1–8.

Nurwati, Y., Hardinsyah, H., Marliyati, S. A., & Santoso, B. I. (2023a). A review of nutritional and health risk factors for low birth weight infants in Indonesia. *Journal Gizi Pangan, 18*(28), 22–24.

Nurwati, Y., Hardinsyah, H., Marliyati, S. A., & Santoso, B. I. (2023b). Potential maternal risk factors for low birth weight in Indonesia: A systematic review. *Journal Gizi Pangan, 18*(3), 167–176. https://doi.org/10.25182/jgp.2023.18.3.167-176

Odongkara, B., Nankabirwad, V., Achora, V., Arach, A. A., Napyo, A., Musaba, M., Mukunya, D., Ndeezi, G., Tylleskär, T., & Tumwine, J. K. (2024). Low birthweight increased the risk of neonatal death twenty-folds in northern Uganda: A community-based cohort study. *MedRxiv*. https://doi.org/10.1101/2024.04.25.24306373

Oktriyanto, M. B. R., Nury FN, D., Amrullah, H., & Pujihasvuty, R. (2022). Determinants of low birth weight in Indonesia. *Jurnal Kesehatan Masyarakat, 17*(4), 583–593.

Pancawardani, R., Amelia, R., & Wahyuni, S. (2020). Usia kehamilan ibu mempengaruhi keluaran bayi berat badan lahir rendah. *Midwifery Care Journal, 3*(2). https://doi.org/10.31983/micajo.v3i2.8312

Preventable, Ending. (2025). *How we act now will determine the course*. Ending Preventable Newborn Deaths and Stillbirths by 2023.

Qur, N., Fitriani, U., Dina, P., Cindra, F., Hutton, A., & Sweet, L. (2025). Multilevel modelling of the determinants of low birth weight in frontier, outermost and underdeveloped regions: Evidence from the Indonesian National Socioeconomic Survey (2019–2021). *Midwifery, 138*, 104136. https://doi.org/10.1016/j.midw.2024.104136

Rizkika, A., Rahfiludin, M. Z., & Asna, A. F. (2023). Low birth weight related factors at Kertek 2 Public Health Centre Wonosobo Regency. *Amerta Nutrition, 7*(1), 37–44. https://doi.org/10.20473/amnt.v7i1.2023.37-44

Salim, P. R., Insani, N. D., & Sihaloho, E. D. (2024). Cost-analysis of reducing mortality rate for LBW babies at Fatmawati Hospital's NICU. *Indonesian Journal of Health Administration, 12*(1). https://doi.org/10.20473/jaki.v12i1.2024.129-138

Sari, D. P., Ekoriano, M., Pujihasvuty, R., Kistiana, S., Nasution, S. L., Ardiana, I., Purwoko, E., Devi, Y. P., & Muthmainnah, M. (2024). Antenatal care utilization on low birth weight children among women with high-risk births. *F1000Research, 12*(399), 1–20.

Tatiana, C., Garcia Barreto, F., Tavares, G. T., Theme-filha, M., Nascimento Farias, Y., Pantoja, L. D. N., & Cardoso, A. M. (2020). Low birthweight, prematurity, and intrauterine growth restriction: Results from the baseline data of the first indigenous birth cohort in Brazil (Guarani Birth Cohort). *BMC Pregnancy and Childbirth, 20*(784), 1–19. https://doi.org/10.1186/s12884-020-03396-8

Tee, J., Suryawan, I. W. B., & Suryaningsih, P. S. (2023). Risk factors influencing the incidence of low birth weight infants at Wangaya Regional General Hospital, Denpasar City, Bali. *International Journal of Research and Review, 10*(12).

Verina, Y., & Kartini, F. (2025). Methods of early detection for low birth weight (LBW) babies: A scoping review. *MEDIA PENELITIAN DAN PENGEMBANGAN KESEHATAN, 35*(1), 169–179. https://doi.org/10.34011/jmp2k.v35i1.2565

WHO. (2021). *Global nutrition targets 2025: Low birth weight policy brief*. World Health Organization.

WHO. (2025). *Low birth weight: What is this indicator?* Nutrition Landscape Information System. World Health Organization.