RISK FACTORS INFLUENCING LOW BIRTH WEIGHT IN INDONESIA : A COMPREHENSIVE LITERATURE REVIEW

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ABSTRAK
Di Indonesia, angka kelahiran yang menurun dan tingginya angka bayi dengan Berat Badan Lahir Rendah (BBLR) yang terus meningkat menjadi tantangan yang signifikan bagi kesehatan masyarakat dan perencanaan pembangunan. Tinjauan literatur ini bertujuan untuk menganalisis faktor-faktor risiko yang berkontribusi terhadap BBLR di Indonesia. Studi ini mensintesis temuan dari 15 artikel jurnal yang relevan yang diterbitkan antara tahun 2021 dan 2023, dengan menggunakan pendekatan sintesis naratif untuk mengidentifikasi dan menganalisis faktor risiko secara komprehensif. Kajian ini menyoroti beberapa faktor risiko utama yang terkait dengan BBLR, termasuk usia ibu (terutama di bawah 20 atau di atas 35 tahun), jarak kehamilan yang lebih panjang (dua tahun atau lebih), anemia selama kehamilan, Kurang Energi Kronis (KEK), usia kehamilan, dan preeklampsia. Faktor-faktor ini mencerminkan interaksi yang kompleks antara pengaruh biologis, gaya hidup, dan pengaruh yang berhubungan dengan kesehatan yang berdampak pada hasil kesehatan ibu dan janin. Usia ibu muncul sebagai faktor penentu yang signifikan terhadap BBLR, dengan wanita yang lebih muda dan lebih tua menghadapi risiko yang lebih tinggi karena faktor biologis dan pengaruh gaya hidup. Jarak kehamilan yang lebih pendek (<2 tahun) dan jarak yang lebih panjang (≥2 tahun) juga berdampak pada kejadian BBLR, yang mencerminkan pemulihan kesehatan ibu dan komplikasi kehamilan berikutnya. Anemia selama kehamilan mengganggu oksigenasi janin, sementara KEK menyebabkan malnutrisi pada ibu, yang berdampak negatif pada pertumbuhan janin dan risiko BBLR. Selain itu, kelahiran prematur (sebelum 37 minggu) dan preeklampsia berkontribusi besar terhadap kejadian BBLR dengan insufisiensi plasenta dan persalinan prematur sebagai mekanisme utama.

Kata kunci : Berat Bayi Lahir Rendah (BBLR), faktor risiko, Indonesia, *literatur review*

ABSTRACT
In Indonesia, declining birth rates and persistently high levels of low birth weight (LBW) infants pose significant challenges to public health and development planning. This literature review explores the risk factors contributing to LBW and associated health outcomes in Indonesia. The study synthesizes findings from 15 relevant journal articles published between 2021 and 2023, employing a narrative synthesis approach to identify and analyze risk factors comprehensively. The review highlights several key risk factors associated with LBW, including maternal age (particularly under 20 or over 35 years), longer interpregnancy intervals (two years or more), anemia during pregnancy, chronic energy deficiency (CED), gestational age, and preeclampsia. These factors reflect a complex interplay of biological, lifestyle, and health-related influences impacting maternal and fetal health outcomes. Maternal age emerges as a significant determinant of LBW, with younger and older women facing heightened risks due to biological factors and lifestyle influences. Shorter interpregnancy intervals (<2 years) and longer intervals (≥2 years) also impact LBW occurrence, reflecting maternal health recovery and subsequent pregnancy complications. Anemia during pregnancy compromises fetal oxygenation, while CED leads to maternal malnutrition, both negatively affecting fetal growth and LBW risk. Additionally, preterm birth (before 37 weeks) and preeclampsia contribute substantially to LBW incidence, underscoring placental insufficiency and premature delivery as key mechanisms.

Keywords *: Low Birth Weight (LBW), risk factors, Indonesia, literature review*

INTRODUCTION
According to the projections of the Central Statistics Agency (BPS), the number of births in Indonesia in 2023 reached 4.62 million, showing a decrease of 0.6% from the previous year,

which was 4.65 million. This decline is also evident compared to a decade earlier, with a 6.6% decrease from 4.95 million births in 2013. Over the period from 2013 to 2023, there has been a declining trend in the number of births in Indonesia. BPS also estimated Indonesia's Total Fertility Rate (TFR) in 2023 to be 2.14. This means that on average, one woman in Indonesia gave birth to around two children during her reproductive years. This TFR figure is slightly lower than the previous year, which was 2.15 in 2022. With the declining trend in the number of births and a stable TFR below 2.1, this reflects demographic dynamics that need attention in future policy planning and development programs (Nur et al., 2022).

Based on data from the Maternal Perinatal Death Notification (MPDN), there was an increase in the number of maternal deaths from 4,005 in 2022 to 4,129 in 2023. Similarly, the number of infant deaths surged from 20,882 in 2022 to 29,945 in 2023. According to the United Nations International Children's Emergency Fund (UNICEF), premature birth is a leading cause of death in children under five, with an estimated 15 million premature births occurring worldwide each year (Kassabian et al., 2020). Premature babies, especially those with a birth weight of less than 2,500 grams (Low Birth Weight Babies), are vulnerable to various diseases and have a higher risk of death (Davoudi-Kiakalayeh et al., 2017).

Low Birth Weight (LBW) is a condition where a baby is born weighing less than 2500 grams, which can have serious impacts on their growth and development (Devaguru et al., 2023). LBW is a leading cause of neonatal mortality, contributing to 60%-80% of cases (Woelile et al., 2021). Babies born with LBW have a higher risk of cognitive developmental disorders, respiratory complications like asphyxia (especially if due to premature birth), and weakened immune systems making them more susceptible to infections that can lead to illness or even death (Majeed et al., 2007).

Based on data from the Indonesian Nutrition Status Survey (SSGI) in 2022, the prevalence of Low Birth Weight (LBW) in Indonesia reached 6.0%. This indicates that out of every 100 births in Indonesia, 6 babies are categorized as LBW. This demonstrates that LBW remains a significant public health issue that requires serious attention in Indonesia. LBW can serve as an important indicator for maternal and infant health, as babies born with low birth weight have a higher health risk, such as infectious diseases, developmental disorders, and neonatal mortality (Jana et al., 2023).

Low Birth Weight (LBW) is one of the leading causes of neonatal mortality worldwide because babies born with low birth weight have a higher risk of death due to vulnerability to serious medical complications. Underdeveloped organ systems make it difficult for babies to adapt outside the womb, increasing the risk of problems such as nutritional deficiencies, infection risks, and respiratory issues (Marshall et al., 2021). This condition can lead to unintended neonatal deaths. Therefore, addressing LBW is crucial in reducing neonatal mortality rates and improving survival rates for low birth weight babies.

Additionally, LBW is associated with the risk of long-term growth issues, especially stunting in children. Stunting is a condition where a child's height is shorter than expected for their age due to early-life growth disruptions (Sanctis et al., 2021). Babies born with LBW have a higher risk of experiencing stunting because their growth is hindered by this condition (Wahyuningrum et al., 2023). Stunting not only affects a child's physical appearance but can also have serious impacts on cognitive development, learning abilities, and overall health (Quamme and Iversen, 2022). This issue can persist into adulthood and affect one's quality of life and future productivity.

The occurrence of LBW is a serious issue that needs to be addressed. Apart from the risks of mortality and stunting, LBW can hinder long-term growth and development in babies, making them vulnerable to adverse environmental influences in the future. Babies born with LBW will struggle to achieve normal growth if they do not receive adequate nutrition, have poor health services, and frequently experience infections during their growth period (Namiiro

et al., 2023). The inability to achieve normal growth in LBW babies can lead to stunting, which has an increased risk of up to 7.33 times in children born with this condition (Judiono et al., 2023).

The analysis of Low Birth Weight (LBW) risk factors is the focus of this study due to the importance of understanding the variables or factors that cause or increase the risk of LBW in newborns. By identifying these risk factors, more effective prevention and intervention strategies can be developed to reduce the incidence of LBW in Indonesia. This study aims to comprehensively explore and analyze these factors. By gaining a deeper understanding of the factors influencing LBW, appropriate and effective intervention measures can be taken to protect the health and future of the nation's future generations.

METHOD

This study used the literature review design. In this study, the data sources used are drawn from various outlets including national and international journals. Published articles sourced from Google Scholar were employed using relevant keywords such as "Low Birth Weight Risk Factors," "Determinants of Low Birth Weight," "Perinatal Factors and BBLR," "Maternal Risk Factors for Low Birth Weight," and "Socioeconomic Factors and BBLR." This literature review focuses on articles published within the timeframe of 2021-2023 and accessible in full text. Journals selected for inclusion in the analysis adhere to several inclusion criteria, including publication within the relevant timeframe, research conducted in Indonesia, and complete texts comprising titles, author names, publishers, abstracts, and comprehensive article content. Exclusion criteria encompass literature review articles and those offering solely opinion pieces or inaccessible full texts. Through this approach, the literature review aims to present a comprehensive analysis of Low Birth Weight Risk Factors (BBLR) by leveraging relevant scientific literature contextualized within the research setting of Indonesia.

RESULTS

Based on the literature search, a total of 15 relevant journal articles have been identified for this research focus. These articles have been summarized and presented in a table format to facilitate the data synthesis process. The presentation of data in this table aims to provide a clear and systematic overview of the literature used in the analysis of Low Birth Weight Risk factors, supporting the overall research with comprehensive and structured information.

Table 1. Research Related to Risk Factors Influencing Low Birth Weight in Indonesia

No.	Author(s)	Year	Location	Method	Findings
1	Arsesiana	2021	Panembahan Senopati Hospital, Bantul	Observational analytic study with a case-control design	Pregnant women under the age of 20 or over 35 years old have twice the risk of giving birth to low birth weight (LBW) babies compared to women in the 20-35 age range. Additionally, pregnant women with an interpregnancy interval of two years or more have twice the risk of delivering LBW babies compared to women with an interpregnancy interval of less than 2 years.

2	Jannah, Santi, Astika, & Damayanti	2021	Ratu Zalecha Martapura Hospital	Analytical observational design with a case-control approach	There is a significant association between anemia status in pregnant women and the occurrence of Low Birth Weight (LBW) at RSUD Ratu Zalecha Martapura. Pregnant women with a history of anemia have an 8 times higher risk of giving birth to babies with LBW compared to pregnant women without a history of anemia.
3	Helena, Sarinengsih, & Suhartini	2021	Soreang District Hospital, Bandung	Cross-sectional study	There is a significant relationship between maternal age, education level, occupation, income, gestational age, parity, number of children, and comorbidities with the occurrence of Low Birth Weight (BBLR).
4	Mapandin, Yetti, & Handayani	2021	Lakipadada District Hospital, Tana Toraja	Case-control study design	Pregnant women with anemia have a 1.294 times increased risk of giving birth to Low Birth Weight (LBW) babies. Pregnant women exposed to cigarette smoke are 1.471 times more likely to give birth to LBW babies compared to those not exposed to cigarette smoke. Pregnancy stress poses a 1.262 times increased risk as a contributing factor for LBW occurrences.
5	Nur, Sari, & Morika	2021	Bhayangkara Hospital	Analytical survey with a case-control approach	There is a significant relationship between maternal age, parity, and interpregnancy interval with the occurrence of Low Birth Weight (LBW).
6	Agustin & Afrika	2022	Muara Burnai Community Health Center	Analytical survey with a cross-sectional approach	Respondents with specific health conditions exhibit significantly higher risks of experiencing Low Birth Weight (LBW) based on this analysis. Anemic respondents face a substantial 23.1 times higher risk of LBW compared to non-anemic individuals. Similarly, hypertensive respondents have a 15.2 times higher risk of LBW compared to those without hypertension. Respondents with chronic energy deficiency (CED) are at a 3.6 times higher risk of LBW than those without CED. Additionally, respondents with gemeli (twin pregnancy) experience a

					notable 12.2 times higher risk of LBW compared to non-gemeli respondents. These findings underscore the importance of addressing these health conditions during pregnancy, as they are associated with significantly increased risks of LBW.
7	Dwihestie, Sulistyoningsih, & Nofiasari	2022	Wonosari Hospital, Gunungkidul	Descriptive study with a cross-sectional design	There is no relationship between parity and the occurrence of Low Birth Weight (LBW). However, there is an association between gestational age and the occurrence of LBW, as well as a relationship between pregnancy complications and LBW occurrence.
8	Heriani & Camelia	2022	Rahmi Fachrudi Baturaja Clinic	Analytical survey with a cross-sectional approach	There is a significant relationship between maternal age and parity with the occurrence of Low Birth Weight (BBLR).
9	Jelita, Zubaidah, & Alkai	2022	Martapura Timur Community Health Center	Correlative analysis with a cross-sectional approach	Pregnant women with anemia have a 3.7 times higher risk of maternal mortality compared to non-anemic women. If anemia is not addressed, it can lead to complications for both the mother and the fetus.
10	Kusuma, Setiawati, & Haruna	2022	Sitti Khadijah 1 Muhammadiyah Hospital	Quantitative-analytical study	There is a significant relationship between preeclampsia and the occurrence of Low Birth Weight (LBW).
11	Fatimah	2023	Bantargadung Community Health Center	Quantitative analytical study with a cross-sectional approach	Several significant relationships have been identified with the occurrence of Low Birth Weight (BBLR). These include the relationship between parity, interpregnancy interval, and hypertension with the occurrence of Low Birth Weight. Each of these factors shows a statistically significant association with the likelihood of experiencing Low Birth Weight (BBLR) during pregnancy.
12	Hasibuan, Raja, Fitria, Nasution, & Wulan	2023	Delima Hospital, Medan	Analytical quantitative survey with a case-control study	Significant factors influencing Low Birth Weight (LBW) include maternal age, gestational age, parity, interpregnancy interval, medical history, and

					pregnancy complications. Meanwhile, maternal occupation does not affect LBW occurrence. Interpregnancy interval emerges as the most dominant factor influencing LBW occurrence in RSU Delima Medan during that year.
13	Heddy, Ananda, & Marfuah	2023	Banten Hospital	Analytical survey with a cross-sectional approach	There is a significant relationship between maternal age and the occurrence of Low Birth Weight (BBLR). Conversely, parity does not show a significant association with the occurrence of Low Birth Weight (BBLR). Furthermore, there is a significant relationship between gestational age and the occurrence of Low Birth Weight (BBLR). Conversely, there is no significant association between anemia and the occurrence of Low Birth Weight (BBLR).
14	Hermiati, Esmianti, & Yusniarita	2023	Pasar Kepahiang Community Health Center	Descriptive analytical study using a cross-sectional approach	There is a significant correlation between maternal age, parity, and maternal hemoglobin (Hb) levels with the occurrence of Low Birth Weight (LBW).
15	Kurniasari, Amalia, & Handayani	2023	Ogan Ilir District Hospital	Analytical survey with a cross-sectional approach	Respondents with a considered high-risk interpregnancy interval face a 3.864 times higher likelihood of experiencing Low Birth Weight (LBW) compared to those with a low-risk interpregnancy interval. Similarly, mothers with preeclampsia have a 3.028 times higher risk of delivering a baby with LBW compared to mothers without preeclampsia.

From the 15 articles reviewed by researchers, 5 articles were published in 2021, another 5 in 2022, and 5 in 2023. This distribution indicates a relatively consistent number of research articles related to Low Birth Weight (LBW) occurrence over the three-year period. The consistent number of research articles each year may reflect a sustained interest in investigating factors contributing to LBW and the ongoing research efforts to understand this health issue from various perspectives and research locations.

The literature review conducted reveals several risk factors associated with Low Birth Weight (LBW) in Indonesia. These factors include maternal age (being under 20 or over 35 years old), longer interpregnancy intervals (two years or more), anemia during pregnancy,

chronic energy deficiency (CED), gestational age, and comorbidities such as preeclampsia. These findings underscore the complexity and diversity of factors contributing to LBW in the Indonesian context, highlighting the importance of addressing these risk factors to improve maternal and fetal health outcomes during pregnancy.

DISCUSSION

Maternal Age

Maternal age is recognized as a significant risk factor associated with Low Birth Weight (LBW) due to a range of biological and health-related factors. The risk of delivering LBW babies is notably higher among pregnant women under the age of 20 or over 35 years old, compared to women within the 20-35 age range. Several factors can explain why maternal age influences LBW, including biological changes and health issues unique to different age groups.

Young maternal age, particularly below 20 years, is associated with challenges related to reproductive maturity (Ganesa et al., 2023). Women in this age group may have limited awareness of self-care during pregnancy and childbirth. Research indicates that adolescent pregnancies (age 15-19 years) are linked with higher rates of anemia, fetal growth restriction, premature delivery, and increased infant mortality rates (Nur et al., 2021). The reproductive systems of teenage girls are often not fully developed, leading to increased risks during pregnancy and childbirth.

Conversely, advanced maternal age (>35 years) presents its own set of challenges. Women in this age group experience a decline in reproductive function compared to their younger counterparts. This decline can affect embryo development and fetal growth, potentially leading to LBW. Additionally, older women are at higher risk of developing chronic diseases such as diabetes mellitus and hypertension, which can complicate pregnancy and increase the likelihood of LBW. Conditions like hypertension and diabetes are associated with adverse pregnancy outcomes, including premature birth, stillbirth, placental abruption, and placenta previa (Heddy et al., 2023).

Lifestyle factors also contribute to the association between maternal age and LBW. Older women may be more likely to have unhealthy habits, such as sedentary lifestyles or poor dietary choices, which can negatively impact fetal health and contribute to LBW. Moreover, older women are at a higher risk of chronic health conditions that can complicate pregnancy.

These findings emphasize the critical importance of optimal prenatal care and tailored maternal health interventions for women across all age groups. Early and regular prenatal care can help identify and manage risk factors associated with maternal age, improving outcomes for both mother and baby. Healthcare providers play a crucial role in educating and supporting pregnant women, especially adolescents and older mothers, to promote healthy pregnancies and reduce the incidence of LBW.

Interpregnancy Intervals

The interpregnancy interval, defined as the duration between successive pregnancies, emerges as a notable determinant affecting the incidence of low birth weight (LBW) among pregnant women. Research findings indicate that women with interpregnancy intervals of two years or longer face twice the risk of delivering LBW infants compared to those with shorter intervals (less than 2 years) (Rahayu, 2021). This heightened risk associated with longer intervals may be attributed to diminished recovery time for women's bodies to restore and replenish essential nutrients depleted during previous pregnancies, potentially impacting fetal growth and development in subsequent gestations. Conversely, extended interpregnancy intervals could reflect underlying health conditions or lifestyle factors that adversely affect maternal health and fetal growth during subsequent pregnancies.

The interpregnancy interval significantly influences birth outcomes, particularly posing risks to pregnant women with birth intervals less than 2 years with their youngest child. This proximity in childbirth intervals can lead to postpartum hemorrhage due to the mother's continued physical weakness. A short interpregnancy interval indicates that the mother's bodily organs have not fully recovered, potentially increasing maternal stress levels as she copes with self-care, newborn care, and nursing simultaneously (Petersen et al., 2021). Pregnancy with closely spaced births results in inadequate maternal nutrition, diminishing the mother's ability to support fetal growth, thereby hindering fetal development and contributing to the occurrence of low birth weight (LBW) births.

The significance of optimal interpregnancy intervals is highlighted by their substantial impact on maternal health and birth outcomes. Sufficient spacing between pregnancies supports full maternal recovery, nutrient restoration, and reduces the risk of adverse pregnancy outcomes such as low birth weight (LBW). Healthcare providers are urged to prioritize interpregnancy intervals in prenatal care and counseling, emphasizing the crucial role of family planning and appropriate pregnancy spacing in optimizing maternal and child health outcomes. These insights underscore the importance of comprehensive preconception care and education aimed at promoting healthy timing and spacing of pregnancies, ultimately mitigating the risk of LBW and improving overall pregnancy outcomes.

Anemia

Anemia during pregnancy is a significant risk factor that can negatively impact the health of both the mother and the fetus, including the risk of low birth weight (LBW). Understanding the impact of anemia on pregnancy outcomes is crucial for implementing effective interventions to improve maternal and child health. Anemia is defined as a condition characterized by a deficiency in red blood cells or hemoglobin, resulting in reduced oxygen-carrying capacity in the blood (Chaparro and Suchdev, 2019). During pregnancy, physiological changes such as increased blood volume and iron requirements can elevate the risk of developing anemia, especially in women with pre-existing iron deficiency or inadequate iron intake.

The association between anemia and LBW has been extensively studied, with consistent findings demonstrating a higher risk of LBW among pregnant women with anemia. Literature reviews indicate that pregnant women with a history of anemia are eight times more likely to deliver babies with LBW compared to non-anemic women. This substantial increase in risk emphasizes the importance of addressing anemia as a modifiable risk factor during pregnancy.

The mechanisms through which anemia contributes to LBW are complex. One primary consequence of anemia is reduced oxygen delivery to tissues, including the developing fetus. This impaired oxygen supply can hinder fetal growth and development, leading to LBW. Additionally, anemia is associated with an increased risk of preterm birth, which is a significant risk factor for LBW. The combination of these factors underscores the intricate interplay between maternal health status and fetal outcomes during pregnancy. Furthermore, anemia can have detrimental effects on maternal health. Pregnant women with anemia are more susceptible to fatigue, weakness, and complications such as an increased risk of infections. These maternal health implications can indirectly affect fetal well-being by limiting the mother's ability to provide optimal care and support during pregnancy.

Addressing anemia during pregnancy requires a comprehensive approach that includes preventive measures and appropriate interventions. Prenatal care plays a crucial role in early detection and management of anemia through routine screening and supplementation with iron and other micronutrients. Education on iron-rich dietary practices, such as consuming leafy greens, red meat, and fortified cereals, is also essential in preventing iron deficiency anemia

Chronic Energy Deficiency (CED)

Chronic Energy Deficiency (CED) is a condition characterized by consistently consuming fewer calories than required to maintain normal bodily functions and activities over an extended period. During pregnancy, CED can have significant implications for maternal health and fetal development, including its association with Low Birth Weight (LBW). Research findings demonstrate a strong relationship between CED and the occurrence of LBW during pregnancy. According to the literature review findings, respondents with CED have a 3.6 times higher risk of delivering LBW babies compared to those without CED. This heightened risk underscores the importance of addressing maternal nutrition and energy intake during pregnancy to maximize birth outcomes.

Chronic energy deficiency can lead to maternal malnutrition, characterized by inadequate nutrient reserves and overall poor health. This compromised maternal nutritional status directly impacts fetal growth and development, potentially resulting in LBW (Wahyuni et al., 2023). Insufficient energy intake can also contribute to maternal fatigue, weakness, and susceptibility to infections, further exacerbating the risk of adverse pregnancy outcomes.

Moreover, CED may reflect broader socioeconomic and environmental factors that affect maternal nutrition. Women experiencing CED are more likely to have limited access to diverse and nutritious foods due to economic constraints or food insecurity. These challenges can perpetuate a cycle of malnutrition, impacting not only maternal health but also fetal growth and development.

Gestational Age

Gestational age, defined as the length of pregnancy from the first day of the last menstrual period, plays a critical role in determining birth outcomes, particularly influencing the risk of Low Birth Weight (LBW) and associated complications. Numerous studies consistently underscore the significant relationship between gestational age and LBW, with preterm births (occurring before 37 weeks of gestation) being a key risk factor for LBW. Preterm births pose heightened risks for LBW due to incomplete development of vital organs and limited fetal growth time (Triyanti and Oktapianti, 2023). Premature infants often encounter challenges in organ maturation, especially in the lungs, brain, and digestive system, which are crucial for sustaining life outside the womb. This developmental limitation leads to lower birth weights, increasing vulnerability to various health complications and developmental issues.

One of the primary reasons preterm infants are at risk for LBW is nutritional insufficiency. During the final weeks of pregnancy, significant fetal growth and development occur, including the accumulation of fat stores that contribute to birth weight. Preterm birth interrupts this critical period of growth, limiting the time for nutrient transfer from the mother to the fetus. Consequently, preterm infants may be born with lower fat and muscle mass, contributing to LBW.

Preeclampsia

Preeclampsia is a severe hypertensive disorder that typically arises after the 20th week of pregnancy, characterized by high blood pressure and signs of organ damage. This condition poses substantial risks to both maternal and fetal health and is associated with an increased likelihood of delivering a low birth weight (LBW) baby (Sari et al., 2023). The impact of preeclampsia on LBW can be attributed to several key factors.

One of the primary mechanisms by which preeclampsia contributes to LBW is through placental insufficiency. Preeclampsia has the potential to impair blood flow to the placenta due to narrowing of the placental blood vessels. As a result, the supply of oxygen and essential nutrients that should be delivered to the fetus becomes restricted. This compromised nutrient delivery can disrupt fetal growth, leading to LBW at birth. Additionally, preeclampsia is often

associated with premature delivery. When preeclampsia develops, healthcare providers may recommend early delivery to prevent further complications for both the mother and the baby. Premature birth interrupts the critical period of fetal development in the womb, resulting in incomplete growth and development of organs and tissues. This premature delivery can contribute significantly to the occurrence of LBW in affected babies.

The consequences of preeclampsia extend beyond LBW and can have serious implications for both the mother and the fetus. Without proper treatment and management, preeclampsia can lead to complications such as preterm delivery and maternal death. Preterm delivery, driven by the onset of preeclampsia, increases the risk of various developmental abnormalities in the fetus and poses immediate health risks to the newborn. Furthermore, the restricted blood flow and oxygen supply caused by preeclampsia can lead to intrauterine fetal demise or stillbirth. It is crucial for pregnant individuals with preeclampsia to receive timely and appropriate medical care to minimize the risks associated with this condition. Regular monitoring of blood pressure and other clinical parameters is essential for early detection and management of preeclampsia. Treatment strategies may include medications to control blood pressure, dietary modifications, rest, and in severe cases, early delivery to mitigate risks and optimize outcomes for both the mother and the baby.

CONCLUSION

Based on the results of the literature review, several risk factors contribute to the occurrence of Low Birth Weight (LBW) in Indonesia. Maternal age is a significant factor, where women under 20 years old or over 35 years old have a higher risk of delivering LBW babies due to biological factors such as declining egg quality in older women and incomplete reproductive development in younger women, along with lifestyle and health conditions associated with older age. Additionally, shorter interpregnancy intervals (less than 2 years) can lead to LBW due to inadequate recovery time for maternal nutrient replenishment, while longer intervals (two years or more) may reflect underlying health issues affecting subsequent pregnancies. Anemia during pregnancy significantly increases the risk of LBW due to reduced oxygen delivery to the fetus. Chronic Energy Deficiency (CED), characterized by low calorie intake during pregnancy, is also associated with an increased risk of LBW by negatively affecting fetal growth and development. Preterm birth (before 37 weeks of gestation) is another significant risk factor for LBW due to incomplete fetal development. Preeclampsia, a hypertensive disorder during pregnancy, is linked to LBW primarily because of inadequate placental function and potential premature delivery triggered by the severity of this condition. The complex interplay of biological, lifestyle, and health factors is the primary cause of LBW occurrence in Indonesia. Comprehensive prenatal care is essential to address this issue, including routine examinations, nutritional support, management of maternal health conditions, and appropriate interventions to optimize pregnancy outcomes and reduce LBW incidence.

To advance understanding and interventions aimed at reducing the incidence of Low Birth Weight (LBW) in Indonesia, several research suggestions can be considered. Firstly, conducting a longitudinal study focusing on maternal age and LBW risk would be valuable, tracking how biological changes and lifestyle factors across different age groups influence LBW outcomes. Secondly, implementing an intervention trial to optimize interpregnancy intervals could involve educating women on healthy birth spacing practices to enhance maternal recovery and subsequent pregnancy outcomes. Thirdly, a randomized controlled trial assessing the impact of routine anemia screening and comprehensive management during pregnancy on LBW rates would provide insights into effective strategies for addressing anemia-related risks. Additionally, a nutritional intervention trial targeting pregnant women at risk of Chronic Energy Deficiency (CED) could evaluate the impact of tailored nutritional

counseling and access to fortified foods on fetal growth and LBW prevention. Developing a predictive model based on gestational age and other risk factors could enable targeted interventions and closer monitoring for high-risk pregnancies to prevent adverse outcomes. Lastly, evaluating the effectiveness of early screening and management protocols for preeclampsia in reducing LBW incidence through standardized protocols for blood pressure monitoring and timely interventions would be crucial. These multidisciplinary research efforts, involving collaboration between obstetricians, nutritionists, epidemiologists, and public health experts, would contribute significantly to addressing LBW in Indonesia and improving maternal and child health outcomes.

ACKNOWLEDGEMENTS

Thanks are given to Dr. Shrimarti Rukmini Devy, Dra., M.Kes, as a lecturer in the Public Health Undergraduate Program, Faculty of Public Health, Universitas Airlangga who has provided guidance to the making of this article.

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