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FACTORS ASSOCIATED WITH THE OCCURRENCE OF LOW BIRTH WEIGHT INFANTS IN THE ADMINISTRATIVE REGENCY OF THE THOUSAND ISLANDS

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ABSTRACT
Low Birth Weight (LBW) is a neonatal health issue that contributes to high rates of infant morbidity and mortality. A mother's condition during pregnancy plays a crucial role in the occurrence of LBW. The Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) possesses unique geographical characteristics that can affect access to and the quality of maternal and infant healthcare services, leading to a higher incidence of LBW compared to other administrative regions. To identify factors associated with the occurrence of Low Birth Weight in the Thousand Islands Administrative Regency from 2023 to 2025. This study employs a quantitative analytical approach with a case-control design. The sample consists of 192 respondents—96 infants with LBW (case group) and 96 infants without LBW (control group)—selected using proportional stratified random sampling. The variables examined include maternal age, maternal nutritional status, anemia during pregnancy, gestational age, and the occurrence of premature rupture of membranes (PROM). Data were collected using a checklist, and bivariate analysis was performed using the Chi-Square test. There is a significant association between the occurrence of LBW and maternal age (p=0.000; OR=11.294), maternal nutritional status (p=0.001; OR=3.909), anemia during pregnancy (p=0.000; OR=7.236), gestational age (p=0.000; OR=13.387), and the occurrence of PROM (p=0.000; OR=9.747). A gestational age of <37 weeks is the most dominant factor associated with the occurrence of LBW. Maternal age, maternal nutritional status, anemia during pregnancy, gestational age, and the occurrence of PROM are significantly associated with the incidence of LBW in the Thousand Islands Administrative Regency.

Keywords: anemia in pregnancy; gestational age; low birth weight (LBW); maternal age; nutritional status

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INTRODUCTION

Low birth weight (LBW) refers to a newborn weighing less than 2,500 grams at birth, regardless of gestational age (Syafrudin & Hamidah, 2022). LBW infants require immediate, intensive care and monitoring; their physical condition is extremely fragile, and their respiratory systems are not yet fully functional, making them highly susceptible to infections and diseases (Manuaba, 2022). The World Health Organization (WHO, 2025) reports that, globally, an estimated 15–20% of all live births are LBW, meaning more than 20 million infants are born with a low birth weight worldwide each year. LBW infants account for 60 to 80% of all neonatal deaths and face a risk of mortality 20 times higher than that of infants with a normal birth weight. The prevalence of LBW in developing countries is 16.5%—more than double the rate in developed countries (7%). According to the 2023 Indonesian Demographic and Health Survey, the infant mortality rate in Indonesia in 2023 was 17.0 deaths per 1,000 live births. The prevalence of low birth weight (LBW) reached 7.2% (Indonesian Ministry of Health, 2023). The 2024 Statistical Profile of DKI Jakarta indicates that, in 2023, the region recorded the lowest infant mortality rate in Indonesia—10.38 deaths per 1,000 live births.

Out of a total of 203,709 infants born in DKI Jakarta, 1,365 (0.67%) were classified as having a low birth weight (< 2,500 grams). This demonstrates that the prevalence of low birth weight in DKI Jakarta in 2023 was significantly lower than the national average (Department of Communication, Informatics, and Statistics of DKI Jakarta Province, 2024).

In the Thousand Islands (Kepulauan Seribu) region, there were 5 neonatal deaths (aged 0–28 days) in 2023, 6 in 2024, and 7 in 2025. In 2023, out of 478 live births, 54 infants were born with low birth weight (LBW)—an incidence rate of 11.29%. In 2024, out of 413 live births, 35 infants (8.47%) had LBW, while in 2025, out of 385 live births, 34 infants (8.83%) had LBW. Based on this data, the Thousand Islands region faces a more serious LBW issue compared to the DKI Jakarta province as a whole (Thousand Islands Health Office, 2025). Dwienda (2023) explains that infants weighing less than 2,500 grams face a 20-fold higher risk of death compared to infants with a normal birth weight. LBW can lead to various health complications, such as asphyxia, respiratory distress, hypothermia, breastfeeding difficulties, infections, jaundice, and bleeding disorders. Furthermore, infants with LBW are at a higher risk of experiencing developmental delays during early growth, being more susceptible to infectious diseases, and facing mortality during infancy and childhood. According to the Indonesian Ministry of Health (2023), the government has taken steps to break the cycle of LBW-related issues, including the implementation of the "1,000 First Days of Life" (1000 HPK) policy, which spans from pregnancy through the first two years of a child's life. Pantiwati (2021) suggests that the incidence of LBW can be prevented by increasing the frequency of antenatal check-ups—ensuring at least four visits throughout the pregnancy—starting from the early stages of gestation. Subakti and Anggarani (2022) state that factors contributing to low birth weight (LBW) can be categorized into maternal, pregnancy-related, and fetal factors. Maternal factors associated with LBW include age, nutritional status, and anemia during pregnancy, while pregnancy-related factors include gestational age and the premature rupture of membranes (PROM).

LBW can be linked to maternal age—specifically, being under 20 or over 35 years old. A maternal age of under 20 is considered a risk factor because the female reproductive system is not yet fully developed, both anatomically and physiologically, which increases the likelihood of complications during pregnancy and childbirth. Conversely, an age of over 35 is also considered a risk factor, as pregnant women in this age group are more physiologically susceptible to chronic conditions such as hypertension, diabetes mellitus, and a higher probability of anemia (Muu et al., 2021). Nutritional status is also linked to the incidence of low birth weight (LBW). This is because if a mother’s nutritional status is not well monitored during pregnancy, her risk of experiencing complications increases. Inadequate nutrient intake during pregnancy can lead to various adverse outcomes, including the birth of an infant with a low birth weight, preterm birth, or even intrauterine fetal death (IUFD) (Puspitaningrum, 2020). Research by Hidayat et al. (2023) confirms that a mother’s nutritional status is associated with the incidence of LBW.

Pregnant women with anemia may cause their fetuses to experience a deficiency in nutrients and oxygen, which hinders fetal growth and can result in the infant having a low birth weight (Saifuddin, 2022). Research by Santoso et al. (2023) indicates that anemia is associated with the incidence of low birth weight (LBW). Subekti (2022) explains that a pregnancy lasting less than 37 weeks of gestation is classified as preterm (not yet full-term). Pregnancies of this duration are more prone to complications; for instance, infants may be born with a birth weight of less than 2,500 grams and are more likely to experience health issues. Research by Sari et al. (2023) found a significant association between gestational age and the incidence of low birth weight (LBW). Similarly, a study by Apriani et al. (2020) demonstrated a significant relationship between gestational age and the occurrence of LBW. Specifically, a preterm pregnancy carries a 20.213 times higher likelihood of resulting in a low birth weight infant.

The Thousand Islands (Kepulauan Seribu) region faces a more serious issue regarding low birth weight (LBW) compared to the province of DKI Jakarta as a whole, as evidenced by an 8.47% prevalence of LBW in the area. Its unique geographical characteristics—an archipelago—result in limited access to transportation and specialized or tertiary healthcare services, particularly for the management of high-risk cases. These limitations potentially contribute to a higher risk of LBW compared to other urban areas. However, there is a significant lack of specific research and local data concerning the relationship between maternal health during pregnancy, delivery complications, and the incidence of LBW in the Thousand Islands. Maternal factors associated with LBW include age, nutritional status, and anemia during pregnancy, while pregnancy-related factors include gestational age and the occurrence of premature rupture of membranes (PROM). To identify factors associated with the occurrence of Low Birth Weight in the Thousand Islands Administrative Regency from 2023 to 2025.

METHOD

This study employs a quantitative analytical design, specifically a case-control study. The research will be conducted from October 2025 to January 2026. The study population consists of all infants born in the Thousand Islands (Kepulauan Seribu) region and recorded by the Thousand Islands District Health Office between 2023 and 2025—a total of 1,276 infants, 109 of whom were born with low birth weight (LBW). A sample of 96 subjects will be selected using a proportional stratified random sampling technique. The independent variables in this study include maternal age, nutritional status, anemia during pregnancy, gestational age, and premature rupture of membranes (PROM). The dependent variable is the occurrence of low birth weight. Data collection will be carried out using a checklist. The data will then be processed through the following stages: editing, coding, data entry, tabulating, and cleaning. Data analysis will involve univariate analysis (frequency distribution) and bivariate analysis (Chi-square test).

RESULT

Table 1.
Frequency Distribution of Low Birth Weight, Maternal Age, Nutritional Status, Anemia During Pregnancy, Gestational Age, and Premature Rupture of Membranes (PROM)

Incidence of Low Birth Weight Babies	f	%
Low Birth Weight Babies		
Low Birth Weight Babies	96	50,0
Not Low Birth Weight Babies	96	50,0
Age		
At Risk	68	35,4
Not At Risk	124	64,6
Maternal Nutritional Status		
KEK	40	20,8
Not KEK	152	79,2
Anemia in Pregnancy		
Anemia	64	33,3
Not Anemia	128	66,7
Maternal Gestational Age		
< 37 Minggu	78	40,6
≥ 37 Minggu	114	59,4
Insident KPD		
KPD	61	31,8
Not KPD	131	68,2

Based on table 1, among the 192 infants, 96 (50.0%) were not born with low birth weight (LBW), while 96 (50.0%) were born with LBW. The majority of mothers were in a non-risk age group (n=124; 64.6%), did not suffer from chronic energy deficiency (CED) (n=152; 79.2%), were not anemic during pregnancy (n=128; 66.7%), had a gestational age of ≥ 37 weeks (n=114; 59.4%), and did not experience premature rupture of membranes (PROM) (n=131; 68.2%). Table 2, The chi-square test results yielded a p-value of 0.000 (< 0.05), indicating a significant association between

maternal age and the occurrence of low birth weight in the Thousand Islands Administrative Regency during the 2023–2025 period.

Table 2
The Relationship Between Maternal Age and the Occurrence of Low Birth Weight Infants

Maternal Age	Incidence of BBLR				Amount		*P value*	OR CI 95%
	BBLR		Not BBLR					
	f	%	f	%	f	%		
At Risk	57	59,4	11	11,5	68	35,4	0,000	11,294 (5,343-23,874)
Not At Risk	39	40,6	85	88,5	124	64,6		

Table 3
The Relationship Between Maternal Nutritional Status and the Occurrence of Low Birth Weight Infants

Maternal Nutritional Status	Incidence of BBLR				\ Amount		*P value*	OR CI 95%
	BBLR		Not BBLR					
	f	%	F	%	f	%		
KEK	30	31,3	10	10,4	40	20,8	0,001	3,909 (1,784-9,564)
Not KEK	66	68,8	86	89,6	152	79,2		

The chi-square test yielded a p-value of 0.001 (< 0.05), indicating a significant association between maternal nutritional status and the occurrence of low birth weight infants in the Thousand Islands region during the 2023–2025 period.

Table 4.
The Relationship Between Anemia During Pregnancy and the Occurrence of Low Birth Weight Infants

Anemia in Pregnancy	Incidence of BBLR				Amount		*P value*	OR CI 95%
	BBLR		Not BBLR					
	f	%	f	%	f	%		
Anemia	51	53,1	13	13,5	64	33,3	0,000	7,236 (3,562-14,701)
Not Anemia	45	46,9	83	86,5	128			

The chi-square test results yielded a p-value of 0.000 (< 0.05), indicating a significant association between anemia during pregnancy and the occurrence of low birth weight in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) from 2023 to 2025.

Table 5.
The Relationship Between Maternal Gestational Age and the Occurrence of Low Birth Weight Infants

Maternal Gestational Age	Incidence of BBLR				Amount		*P value*	OR CI 95%
	BBLR		Not BBLR					
	f	%	f	%	f	%		
< 37 Minggu	65	67,7	13	13,5	79	40,6	0,000	13,387 (6,487-27,625)
≥ 37 Minggu	31	32,3	83	86,5	114	59,4		

The chi-square test yielded a p-value of 0.000 (< 0.05), indicating a significant association between maternal gestational age and the occurrence of low birth weight infants in the Thousand Islands Administrative Regency from 2023 to 2025.

Table 6.
The Relationship Between Premature Rupture of Membranes (PROM) and the Occurrence of Low Birth Weight Infants

Insident KPD	Incidence of BBLR				Amount		*P value*	OR CI 95%
	BBLR		Not BBLR					
	f	%	f	%	f	%		
KPD	51	53,1	10	10,4	61	31,8	0,000	9,747 (4,523-21,004)
Not KPD	45	46,9	86	89,5	131	68,2		

The chi-square test results yielded a p-value of 0.000 (< 0.05), indicating a significant association between the occurrence of premature rupture of membranes (PROM) and the birth of low-birth-weight infants in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) during the 2023–2025 period.

DISCUSSION

The Relationship Between Maternal Age and the Occurrence of Low Birth Weight Infants

The bivariate analysis indicates that among 96 infants with low birth weight (LBW), 57 (59.4%) were born to mothers in a high-risk age group, whereas among 96 infants without LBW, 85 (88.5%) were born to mothers in a non-risk age group. The chi-square test yielded a p-value of 0.000 (< 0.05), signifying a significant association between maternal age and the occurrence of low birth weight in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) during the 2023–2025 period. An odds ratio (OR) of 11.294 suggests that infants born to mothers in a high-risk age group are 11.294 times more likely to have a low birth weight compared to those born to mothers in a non-risk age group.

LBW can be attributed to maternal age (specifically, < 20 years and > 35 years). Maternal age under 20 is considered high-risk because the female reproductive system is not yet fully developed—anatomically or physiologically—which increases the likelihood of complications during pregnancy and childbirth. Conversely, maternal age over 35 is considered high-risk because such individuals are more physiologically susceptible to chronic conditions, including hypertension, diabetes mellitus, and anemia (Muu et al., 2021). These high-risk age ranges are particularly prone to resulting in low birth weight; for mothers under 20, the body still requires significant nutrients for its own continued growth, leading to competition for nutrients between the mother and the fetus. In mothers over 35, endometrial function has often declined, which impairs the efficient distribution of nutrients between the mother and the fetus (Manuaba, 2022). In line with the findings of Martinus et al. (2023), statistical analysis yielded a p-value of 0.000 for the relationship between maternal age and low birth weight (LBW), indicating a significant association. Similarly, research by Hazimah (2024) demonstrates that maternal age at the time of delivery is a factor influencing the occurrence of LBW (p=0.026, OR= 3.077).

The Relationship Between Maternal Nutritional Status and the Occurrence of Low Birth Weight Infants

Bivariate analysis indicates that among 96 infants with low birth weight (LBW), 66 (68.8%) were born to mothers who did not suffer from chronic energy deficiency (CED), while among 96 infants without LBW, 86 (89.6%) were born to mothers who did not have CED. The chi-square test yielded a p-value of 0.001 (< 0.05), signifying a significant association between maternal nutritional status and the occurrence of low birth weight in the Thousand Islands (Kepulauan Seribu) region during the 2023–2025 period. An odds ratio (OR) of 3.909 suggests that infants born to mothers with CED are 3.909 times more likely to have a low birth weight compared to those born to mothers without CED.

Maternal nutritional status is linked to the incidence of LBW; if a mother's nutritional status is not well-monitored during pregnancy, the likelihood of experiencing complications increases. Inadequate maternal nutrition during pregnancy can lead to various adverse outcomes, including low birth weight, preterm birth, and even intrauterine fetal death (IUFD) (Puspitaningrum, 2020). The Indonesian Ministry of Health (2023) explains that poor nutritional status and chronic energy deficiency (CED) in pregnant women can stem from underlying nutritional issues. Sulistyoningsih (2022) notes that chronic energy deficiency is a common nutritional problem among pregnant women, which can hinder fetal growth and increase the risk of LBW. Pregnant women with CED often experience an insufficient intake of energy and protein; therefore, providing supplementary food—rich in both macro- and micronutrients—is essential for preventing low birth weight. Consistent with the findings of Santoso et al. (2023), maternal nutritional status—specifically in the context of CED—is associated with the occurrence of LBW, with a p-value of 0.031. Similarly, the study by Hazimah et al. (2024) indicates that a factor influencing the occurrence of low birth weight (LBW) is the mother's nutritional status, with a p-value of 0.024.

The Relationship Between Anemia During Pregnancy and the Occurrence of Low Birth Weight

The results of the bivariate analysis indicate that among 96 infants with low birth weight (LBW), 51 (53.1%) were born to mothers who experienced anemia during pregnancy; conversely, among 96 infants without LBW, 85 (86.5%) were born to mothers who did not experience anemia during pregnancy. The chi-square test yielded a p-value of 0.000 (< 0.05), signifying a significant association between anemia during pregnancy and the occurrence of low birth weight in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) between 2023 and 2025. An odds ratio (OR) of 7.236 suggests that infants born to mothers with anemia during pregnancy are 7.236 times more likely to have a low birth weight compared to those born to mothers without anemia. Anemia is a contributing factor to low birth weight (LBW). It occurs more frequently during pregnancy due to an increased demand for nutrients—particularly iron—to support fetal growth and the physiological changes taking place in the mother's body. During pregnancy, blood plasma volume increases more significantly than the red blood cell count, leading to hemodilution (blood dilution), which can lower hemoglobin levels and result in anemia (Mochtar, 2021). Pregnant women with anemia are at risk of delivering an infant with a low birth weight. Severe anemia can increase the risk of hemorrhage—both before and during labor—and elevate the likelihood of maternal and fetal mortality. For pregnant women, a hemoglobin (Hb) level of < 11 g/dL is considered a risk factor, while a level of ≥ 11 g/dL is considered non-risky (Manuaba, 2022).

Consistent with these findings, a study by Mazhar and Satriyandari (2024) reported a p-value of 0.001, confirming an association between maternal anemia during pregnancy and the occurrence of LBW; mothers who experienced anemia were 7.347 times more likely to give birth to an infant with a low birth weight compared to those who did not have anemia. A similar study was conducted by Santoso et al. (2023) found a relationship between anemia in pregnant women and the incidence of low birth weight (LBW), with a p-value of 0.015. Similar results were reported by Hidayat et al. (2023), who found that anemia during pregnancy is significantly associated with the incidence of LBW, with a p-value of 0.019. Anemia during pregnancy disrupts the delivery of oxygen and nutrients from the mother to the fetus. Consequently, the fetus experiences impaired weight gain, resulting in low birth weight (LBW).

The Relationship Between Maternal Gestational Age and the Occurrence of Low Birth Weight Infants

Bivariate analysis results indicate that among 96 infants with low birth weight (LBW), 65 (67.7%) were born to mothers with a gestational age of < 37 weeks, whereas among 96 infants without LBW, 83 (86.5%) were born to mothers with a gestational age of ≥ 37 weeks. The chi-square test yielded a p-value of 0.000 (< 0.05), signifying a significant association between maternal gestational age and the occurrence of low birth weight in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) during the 2023–2025 period. An odds ratio (OR) of 13.387 indicates that infants born to mothers with a gestational age of < 37 weeks are 13.387 times more likely to have a low birth weight compared to those born to mothers with a gestational age of ≥ 37 weeks.

A gestational age of less than 37 weeks is referred to as "preterm" (not yet full-term). Pregnancies of this duration are more prone to complications than full-term pregnancies; infants may be born weighing less than 2,500 grams and are more susceptible to health complications (Subekti, 2022). Gestational age influences the incidence of LBW because a shorter gestation period results in less complete development of bodily organs, which in turn affects the infant's birth weight (Manuaba, 2022). In preterm pregnancies (28–36 weeks), incomplete organ maturation and less effective delivery of nutrients and oxygen hinder optimal fetal growth, leading to premature birth and low birth weight. Consequently, gestational age at the time of delivery is the most significant

determinant of a newborn's birth weight (Cooper, 2021). Consistent with the research findings of Sari et al. (2023) found a significant association between gestational age (p-value 0.000; OR 1.077) and the incidence of low birth weight (LBW). Similarly, the study by Apriani et al. (2020) identified a significant association between gestational age and the incidence of LBW, with a p-value of 0.000.

The Relationship Between Premature Rupture of Membranes (PROM) and the Occurrence of Low Birth Weight Infants

Based on the bivariate analysis, among 96 infants with low birth weight (LBW), 51 (53.1%) were associated with premature rupture of membranes (PROM), while among 96 infants without LBW, 86 (89.5%) did not experience PROM. The chi-square test yielded a p-value of 0.000 (< 0.05), indicating a significant association between PROM and the occurrence of low birth weight in the Thousand Islands Administrative Regency (Kabupaten Administrasi Kepulauan Seribu) during the 2023–2025 period. An odds ratio (OR) of 9.747 suggests that infants associated with PROM are 9.747 times more likely to have a low birth weight compared to those without PROM.

Wiknjosastro (2021) posits that PROM poses a risk for LBW because infections originating in the vagina or cervix trigger biomechanical processes in the fetal membranes—specifically, the proteolytic breakdown of cells—which facilitates membrane rupture. Saifuddin (2022) notes that the rupture of fetal membranes creates a direct connection between the external environment and the fetus. Furthermore, the rupture of membranes can stimulate contractions, potentially leading to preterm birth. Manuaba (2022) adds that PROM can result in oligohydramnios, which may compress the umbilical cord, leading to fetal asphyxia and hypoxia, as well as reduced nutrient delivery to the fetus and impaired fetal growth. Consistent with these findings, research by Mahardika (2020) indicates that PROM influences the occurrence of low birth weight (p = 0.031).

CONCLUSION

There is a significant association between maternal age (p-value 0.000), maternal nutritional status (p-value 0.001), anemia during pregnancy (p-value 0.000), gestational age (p-value 0.000), and the occurrence of premature rupture of membranes (p-value 0.000) with the incidence of low birth weight infants in the Thousand Islands (Kepulauan Seribu) region from 2023–2025.

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