



Relationship Between Chronic Energy Deficiency Status and Maternal Age with Low Birth Weight Incidence in The Working Area

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ABSTRACT

Low Birth Weight (LBW) remains a major public health problem associated with increased neonatal morbidity and mortality. Maternal nutritional status and maternal age are important factors associated with LBW incidence. This study aimed to determine the relationship between Chronic Energy Deficiency (CED) status and maternal age with LBW incidence in the working area of Bira Public Health Center, Makassar. This study used an analytic observational design with a retrospective approach. The study was conducted in the working area of Bira Public Health Center with a total sample of 135 respondents selected using cluster random sampling. Primary data were collected through interviews using questionnaires, while secondary data were obtained from Maternal and Child Health (MCH) books. Data were analyzed using Chi-Square and multiple logistic regression tests. The results showed that the incidence of LBW was 29.6%. Mothers with CED had a 6.21 times greater risk of delivering LBW infants compared to mothers without CED (OR=6.21; p=0.000). Maternal age at risk (<20 years and >35 years) was also significantly associated with LBW incidence (p<0.05). In conclusion, CED status and maternal age are associated with LBW incidence. Strengthening nutritional interventions and reproductive health education for women of reproductive age is needed to reduce LBW incidence.

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AUTHORS' CONTRIBUTION

A. Conception and design of the study;
B. Acquisition of data;
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INTRODUCTION

Low Birth Weight (LBW) remains one of the major public health problems contributing to neonatal mortality and long-term morbidity worldwide. The World Health Organization (WHO) defines LBW as a birth weight of less than 2,500 grams regardless of gestational age. Infants born with LBW have a higher risk of infection, developmental disorders, stunting, and chronic diseases later in life (WHO, 2025). In addition, LBW is closely associated with poor growth and cognitive development among children, making it an important indicator of maternal and child health status. In developing countries, including Indonesia, LBW continues to be a significant challenge due to the high prevalence and its long-term health consequences.



Globally, UNICEF and WHO reported that approximately 14.7% of live births in 2020 were classified as LBW, with the majority occurring in low- and middle-income countries (UNICEF & WHO, 2023). In Indonesia, the prevalence of LBW based on the 2024 Indonesian Nutritional Status Survey (SSGI) was 6.5%, while South Sulawesi Province recorded a higher prevalence of 8.1% (Kementerian Kesehatan RI, 2025). These data indicate that LBW remains an unresolved health issue that requires serious attention, particularly in areas with high maternal nutritional problems and limited health resources.

Several maternal factors have been reported to influence LBW incidence, particularly maternal nutritional status during pregnancy. One of the most common nutritional problems among pregnant women is Chronic Energy Deficiency (CED). CED reflects long-term inadequate intake of energy and nutrients, resulting in insufficient maternal nutritional reserves to support fetal growth and development. This condition may impair placental function and reduce nutrient and oxygen supply to the fetus, leading to intrauterine growth restriction and increased risk of LBW (Batmomolin et al., 2023; Istiani et al., 2025). Previous studies conducted by Pertiwi et al. (2025) and Apriani et al. (2021) reported that pregnant women with CED were more likely to deliver LBW infants compared to mothers with normal nutritional status. Similar findings were also reported by Maifita & Armalini (2022) and Nada & Daryanti (2023), who found a significant association between maternal CED and LBW incidence.

Maternal age is another important factor frequently associated with LBW. Pregnancy occurring at an age younger than 20 years or older than 35 years is considered high risk because of biological and reproductive factors that may affect pregnancy outcomes. Mothers younger than 20 years often experience incomplete reproductive organ maturation and inadequate nutritional readiness, while mothers older than 35 years are more likely to experience pregnancy complications such as hypertension and diabetes (Artini et al., 2023; Heriani & Camelia, 2022). These conditions may interfere with placental circulation and fetal development, thereby increasing the likelihood of LBW. Fitriyah et al. (2021) found that mothers in high-risk age groups had a significantly greater probability of delivering LBW infants compared to mothers aged 20–35 years.

Although many studies have investigated the relationship between maternal age and LBW, inconsistent findings have been reported. Studies conducted by Fitriyah et al. (2021), Martinus et al. (2023), Putri & Herdiman (2023), and Tarigan et al. (2022) demonstrated a significant association between maternal age and LBW incidence. In contrast, Limbong (2022) and Subagja et al. (2024) found no significant relationship between maternal age and LBW. These inconsistent findings suggest that maternal age may interact with other maternal factors, such as nutritional status, antenatal care, and socioeconomic conditions, which require further investigation. Local data regarding maternal CED and LBW incidence in this area remain limited despite the relatively high prevalence of both conditions. Based on data from Bira Public Health Center in 2024, there were 68 LBW cases out of 474 live births (14.35%), while 49 out of 441 pregnant women experienced CED. These conditions indicate the need for further investigation

regarding maternal factors associated with LBW in this region. Therefore, this study aimed to determine the relationship between Chronic Energy Deficiency status and maternal age with the incidence of Low Birth Weight in the working area of Bira Public Health Center with relatively high LBW prevalence.

METHODS

This study used a quantitative analytic observational design with a retrospective approach to determine the relationship between Chronic Energy Deficiency (CED) status and maternal age with the incidence of Low Birth Weight (LBW). The study was conducted in the working area of Bira Public Health Center, South Sulawesi, Indonesia, from December 8 to December 15, 2025. The population of this study consisted of mothers with children aged 0–59 months who had Maternal and Child Health (MCH) books registered at Bira Public Health Center. The sample was selected using a cluster random sampling technique, resulting in 135 respondents who met the inclusion criteria. The inclusion criteria included mothers who possessed complete MCH records and were willing to participate in the study. Respondents with incomplete data were excluded from the analysis. Data collection was carried out using interviews and documentation studies. Primary data were obtained through direct interviews using structured questionnaires to collect information regarding maternal age, educational level, and family income. Secondary data were collected from Maternal and Child Health (MCH) books, including birth weight and maternal CED status based on Mid-Upper Arm Circumference (MUAC/LiLA) measurements. The dependent variable in this study was Low Birth Weight, defined as birth weight less than 2,500 grams. The independent variables were maternal Chronic Energy Deficiency status and maternal age during pregnancy. Maternal age was categorized into high-risk age (<20 years and >35 years) and non-risk age (20–35 years). Maternal CED status was determined based on MUAC measurements, where MUAC <23.5 cm was categorized as CED. Data analysis was performed using SPSS software. Univariate analysis was conducted to describe the characteristics of respondents and study variables. Bivariate analysis using the Chi-Square test was applied to determine the relationship between independent variables and LBW incidence. Statistical significance was determined at a p-value of <0.05 with a 95% confidence interval.

RESULTS AND DISCUSSION

Result

Table 1.
Respondent Characteristics

Characteristics	n	%
Age		
<20 years	7	5,2
20–35 years	102	75,5
>35 years	26	19,3
Occupation		
Housewife	105	77,8
Laborer	13	9,6

Characteristics	n	%
Entrepreneur	5	3,7
Private employee	11	8,2
Civil servant	1	0,7
Educational Level		
No schooling/elementary incomplete	1	0,7
Elementary-Junior High School	34	25,2
Senior High School/Vocational School	94	69,7
Diploma/Bachelor/Postgraduate	6	4,4
Family Income		
Low (< IDR 3,880,136)	104	77,0
High (≥ IDR 3,880,136)	31	23,0

Table 1 shows that most respondents were aged 20–35 years (75.5%), while respondents aged <20 years accounted for 5.2% and those aged >35 years accounted for 19.3%. Based on occupation, the majority of respondents were housewives (77.8%), while civil servants represented the smallest proportion (.7%). Most respondents had completed senior high school or vocational school education (69.7%). In terms of family income, most respondents belonged to the low-income category (77.0%).

Table 2.

Distribution of LBW Incidence

Category	n	%
Normal Birth Weight (≥2,500 grams)	95	70,4
Low Birth Weight (<2,500 grams)	40	29,6
Total	135	100

Table 2 indicates that most infants were born with normal birth weight (70.4%), while 29.6% were born with Low Birth Weight (LBW). Although most infants had normal birth weight, the prevalence of LBW in the study area remained relatively high.

Table 3.

Distribution of CED Status and Maternal Age

Category	n	%
CED Status		
Non-CED (MUAC ≥23.5 cm)	95	70,4
CED (MUAC <23.5 cm)	40	29,6
Maternal Age		
Non-risk (20–35 years)	103	76,3
Risk (<20 years and >35 years)	32	23,7

Table 3 shows that most mothers did not experience Chronic Energy Deficiency (70.4%), while 29.6% were categorized as having CED. In addition, the majority of mothers were within the non-risk reproductive age group of 20–35 years (76.3%).

Relationship Between CED Status and LBW Incidence

Table 4.

Relationship Between CED Status and LBW Incidence

CED Status	LBW Incidence				OR (95% CI)	p-value
	LBW		Non-LBW			
	n	%	n	%		
CED	23	57,5	17	17,9	6,21 (2,74–14,06)	0,000
Non-CED	17	42,5	78	82,1		
Total	40	100	95	100		

Table 4 shows that among mothers who delivered LBW infants, most had CED status (57.5%). Meanwhile, among mothers who delivered infants with normal birth weight, most did not experience CED (82.1%). The Chi-Square test demonstrated a significant relationship between maternal CED status and LBW incidence ($p < .001$). Mothers with CED had a 6.21 times greater risk of delivering LBW infants compared with mothers without CED.

Relationship Between Maternal Age and LBW Incidence

Table 5.
 Relationship Between Maternal Age and LBW Incidence

Maternal Age	Kejadian BBLR				OR (95% CI)	p-value
	BBLR		Tidak BBLR			
	n	%	n	%		
Risk age	16	40	16	16,8	0,304 (0,132-0,697)	0,004
Non-risk age	24	60	79	83,2		
Total	40	100	95	100		

Table 5 indicates that mothers in the high-risk age category (<20 years and >35 years) were more likely to deliver LBW infants compared with mothers aged 20–35 years. Statistical analysis showed a significant relationship between maternal age and LBW incidence ($p = .004$).

Discussion

The findings of this study indicate that most respondents were within the reproductive age range of 20–35 years, which is considered the safest age for pregnancy because reproductive organs generally function optimally and the risk of pregnancy complications is lower. However, there were still mothers categorized as high-risk age groups, namely those aged below 20 years and above 35 years. Most respondents were housewives with low family income, indicating limited socioeconomic conditions that may affect access to adequate nutrition, healthcare services, and maternal health information during pregnancy. In addition, the majority of respondents had completed senior high school education, which may influence maternal knowledge and awareness regarding pregnancy care and nutritional fulfillment.

The prevalence of Low Birth Weight (LBW) in this study remained relatively high, indicating that LBW is still an important maternal and child health problem in the working area of Bira Public Health Center. LBW is known to contribute significantly to neonatal morbidity and mortality because infants born with low birth weight are more susceptible to infections, respiratory disorders, impaired growth and development, and stunting. Furthermore, LBW may increase the risk of chronic diseases such as hypertension, diabetes mellitus, and cardiovascular disorders later in life. Therefore, identifying factors associated with LBW is important to improve maternal and child health outcomes.

This study found that maternal Chronic Energy Deficiency (CED) was significantly associated with LBW incidence. Mothers with CED had a higher likelihood of delivering LBW infants compared with mothers who did not experience CED. This finding suggests

that maternal nutritional status during pregnancy plays a major role in fetal growth and development. Long-term inadequate intake of energy and nutrients may impair placental function and reduce the transfer of oxygen and nutrients to the fetus, resulting in intrauterine growth restriction and low birth weight. In addition, mothers with poor nutritional status are more vulnerable to pregnancy complications that may further affect fetal development. These findings are consistent with previous studies conducted by Pertiwi et al. (2025), Apriani et al. (2021), and Maifita & Armalini (2022), which reported that maternal CED significantly increases the risk of LBW.

Maternal age was also found to have a significant relationship with LBW incidence. Mothers aged below 20 years and above 35 years were more likely to deliver LBW infants compared with mothers aged 20–35 years. Pregnancy at a young age is often associated with incomplete reproductive organ maturity and inadequate nutritional readiness, while pregnancy at older age is associated with declining reproductive function and increased risk of complications such as hypertension and diabetes mellitus. These conditions may interfere with placental blood circulation and reduce nutrient supply to the fetus, thereby increasing the risk of LBW. The findings of this study support previous studies conducted by Fitriyah et al. (2021), Martinus et al. (2023), and Putri & Herdiman (2023), which also found a significant association between maternal age and LBW incidence.

Overall, the findings of this study emphasize that maternal nutritional status and maternal age are important determinants of birth weight outcomes. Improving maternal nutrition through early detection of CED, nutritional counseling, and supplementation programs during pregnancy is essential to reduce the incidence of LBW. In addition, reproductive health education regarding safe pregnancy age and routine antenatal care should be strengthened to improve maternal and infant health outcomes.

CONCLUSION

This study concluded that maternal Chronic Energy Deficiency (CED) status and maternal age were significantly associated with the incidence of Low Birth Weight (LBW) in the working area of Bira Public Health Center. Mothers with CED had a greater risk of delivering LBW infants compared with mothers without CED, while mothers aged below 20 years and above 35 years were also more likely to experience LBW outcomes. These findings emphasize the importance of improving maternal nutritional status and promoting safe reproductive age as part of maternal and child health interventions to reduce LBW incidence.

This study contributes to the existing scientific evidence regarding maternal factors associated with LBW, particularly in community health center settings with relatively high LBW prevalence. However, this study had several limitations, including the use of a retrospective design and reliance on secondary data from Maternal and Child Health (MCH) books, which may contain incomplete information. In addition, several potential factors such as maternal dietary patterns, smoking exposure, and psychosocial conditions were not analyzed in this study.

Based on these findings, it is recommended that healthcare providers strengthen early nutritional screening, nutritional counseling, and maternal health education during pregnancy, especially for mothers with CED and high-risk reproductive age. Future studies are recommended to use prospective cohort or case-control designs with broader variables to provide more comprehensive evidence regarding factors associated with LBW incidence.

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