



Research Article

The Association Between Maternal Chronic Energy Deficiency During Pregnancy and Low Birth Weight Deliveries at Sabatai Community Health Center

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Abstract. Chronic Energy Deficiency (KEK) in pregnant women is still a significant nutritional problem and is related to the incidence of Low Birth Weight Infants (BBLR). Inadequate intake of energy and nutrients during pregnancy can inhibit fetal growth and increase the risk of adverse pregnancy outcomes. This study aims to determine the relationship between KEK in pregnant women and the incidence of BBLR at the Sabatai Health Center. The study used an observational analytical design with a cross-sectional approach. A total of 60 respondents were included through the total sampling technique. Secondary data were obtained from maternal medical records, antenatal care registers, and childbirth records. SEZs were identified based on Upper Arm Circumference (LILA) < 23.5 cm, while BBLR was set in infants with a birth weight of < 2,500 grams. Data analysis was carried out using descriptive statistics and the Chi-Square test with a significance level of 0.05. The results showed that 22 respondents (36.7%) experienced KEK and 18 babies (30.0%) were born with BBLR. Of the mothers with KEK, 63.6% gave birth to BBLR babies, while only 10.5% of mothers without KEK gave birth to BBLR babies. Statistical analysis showed a significant relationship between pregnant women's KEK and the incidence of BBLR ($p = 0.000$). These findings confirm the importance of early nutrition screening, nutrition education, nutritional status monitoring, and optimization of antenatal services to reduce the incidence of BBLR.

Keywords: Chronic Energy Deficiency; Low Birth Weight; Maternal Nutrition; Pregnancy; Pregnant Women.

1. Background

Pregnancy is a critical period that substantially influences both maternal and neonatal health outcomes. Maternal nutritional status during pregnancy plays a fundamental role in supporting optimal fetal growth and development. One of the major nutritional problems affecting pregnant women in developing countries, including Indonesia, is Chronic Energy Deficiency (CED). CED refers to a prolonged inadequacy of dietary energy and protein intake, resulting in insufficient maternal energy reserves to meet the increased metabolic demands of pregnancy. This condition is associated with numerous adverse obstetric outcomes, including maternal anemia, preterm birth, fetal growth restriction, and the delivery of low birth weight (LBW) infants. Consequently, preventing maternal CED has become an important public health strategy to improve maternal and neonatal health while contributing to the reduction of maternal and infant mortality in Indonesia (Ministry of Health of the Republic of Indonesia, 2023; World Health Organization [WHO], 2023).

Low Birth Weight (LBW), defined as a birth weight of less than 2,500 grams regardless of gestational age, remains one of the leading causes of neonatal morbidity and mortality worldwide. Infants born with LBW are at increased risk of respiratory complications, hypothermia, neonatal infections, impaired physical and cognitive development, and chronic non-communicable diseases later in life. According to the World Health Organization, approximately one in seven newborns globally has a low birth weight, with the highest burden occurring in low- and middle-income countries. These findings highlight LBW as a persistent global health challenge that requires

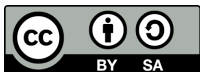
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comprehensive attention to maternal risk factors throughout pregnancy (WHO, 2023; United Nations Children's Fund [UNICEF], 2023).

In Indonesia, maternal CED continues to represent a significant nutritional concern. National health surveys indicate that a considerable proportion of pregnant women have a Mid-Upper Arm Circumference (MUAC) below 23.5 cm, the standard indicator used to identify women at risk of CED. This nutritional problem is influenced by multiple determinants, including inadequate nutrient intake, low socioeconomic status, limited educational attainment, infectious diseases, and restricted access to quality maternal healthcare services. If left untreated, maternal CED may compromise fetal growth and substantially increase the likelihood of delivering an infant with low birth weight. Therefore, early identification of CED through routine antenatal care is considered an essential strategy for preventing adverse maternal and neonatal outcomes (Ministry of Health of the Republic of Indonesia, 2023; Statistics Indonesia, 2023).

From a biological perspective, the relationship between maternal CED and LBW can be explained by impaired maternal-fetal nutrient transfer. Women experiencing chronic energy deficiency possess limited energy and protein reserves, reducing the availability of essential nutrients delivered through the placenta. This nutritional insufficiency disrupts normal intrauterine growth and may lead to Intrauterine Growth Restriction (IUGR), ultimately resulting in the birth of a low birth weight infant. Furthermore, CED is frequently accompanied by maternal anemia, which decreases oxygen transport to fetal tissues and further compromises fetal development. The combined effects of inadequate nutrient supply and reduced oxygenation significantly increase the risk of unfavorable birth outcomes compared with pregnancies in women with adequate nutritional status (Black et al., 2013; Christian & Stewart, 2010).

Previous studies have consistently demonstrated a significant association between maternal nutritional status during pregnancy and the occurrence of LBW. Pregnant women affected by CED have been shown to face a substantially greater risk of delivering LBW infants than women with normal nutritional status. Nevertheless, LBW is a multifactorial condition influenced by additional variables such as maternal age, parity, anemia, underlying medical conditions, birth spacing, and the quality of antenatal care. The contribution of these determinants differs across populations because of variations in socioeconomic conditions, cultural practices, dietary patterns, and healthcare accessibility. Consequently, locally based studies remain essential for identifying context-specific determinants that can guide effective public health interventions (Rahman et al., 2019; Ramakrishnan et al., 2012).

Sabatai Community Health Center serves as a primary healthcare facility responsible for providing comprehensive maternal and child health services. Preliminary observations indicate that pregnant women diagnosed with CED continue to require intensive nutritional monitoring during antenatal care. At the same time, cases of low birth weight remain evident within the service area, posing an ongoing threat to neonatal health and survival. These conditions suggest that maternal nutritional status remains an important public health issue requiring further scientific investigation. However, evidence regarding the relationship between maternal CED and LBW within the Sabatai Community Health Center catchment area remains limited, emphasizing the need for local epidemiological data to support evidence-based maternal nutrition interventions (Ministry of Health of the Republic of Indonesia, 2023).

A review of previous literature indicates that most studies investigating the relationship between maternal CED and LBW have been conducted in hospitals or urban settings using relatively large study populations. These investigations generally describe the association between the two variables without considering the unique characteristics of primary healthcare facilities located in island or geographically remote regions. Moreover, few studies have utilized antenatal care records from Sabatai Community Health Center as an epidemiological data source for identifying determinants of LBW. This limitation represents an important research gap, namely the scarcity of locally generated scientific evidence needed to support targeted CED prevention programs and LBW reduction strategies that are appropriate for the specific characteristics of the Sabatai service area (Lassi et al., 2020; WHO, 2023).

The novelty of the present study lies in its examination of the association between maternal CED and LBW using routinely collected data from the Sabatai Community Health Center. By focusing on a local population, this study is expected to generate empirical evidence regarding the magnitude of this association within the community. The findings are anticipated to support the development of targeted interventions, including early identification of high-risk pregnancies,

strengthening maternal nutrition education, and optimizing maternal health programs at the primary healthcare level. In addition to contributing to the scientific literature in midwifery and public health, the study is expected to provide practical evidence for policymakers seeking to improve the quality of antenatal care services in comparable settings (Victora et al., 2021; Ministry of Health of the Republic of Indonesia, 2023).

The importance of this study is further reinforced by the fact that LBW remains one of the key indicators used to evaluate maternal and child health performance. Effective prevention of LBW requires early identification of modifiable risk factors, among which maternal nutritional status is particularly important. Demonstrating the relationship between maternal CED and LBW among pregnant women attending Sabatai Community Health Center would provide valuable scientific evidence for strengthening preventive and promotive health policies. Such evidence could support nutritional supplementation programs, routine maternal nutritional assessments, individualized nutrition counseling, and comprehensive improvements in antenatal care services. Ultimately, these interventions may contribute to reducing the incidence of LBW both locally and nationally (WHO, 2023; UNICEF, 2023).

Based on the foregoing discussion, maternal Chronic Energy Deficiency can be recognized as an important modifiable risk factor for Low Birth Weight through multiple biological and socioeconomic pathways. Although previous investigations have explored this relationship, evidence specific to the Sabatai Community Health Center remains scarce. Therefore, this study aims to analyze the association between Chronic Energy Deficiency among pregnant women and the incidence of Low Birth Weight at Sabatai Community Health Center. The findings are expected to provide scientific evidence for developing effective CED prevention strategies, improving the quality of antenatal care, and reducing the burden of Low Birth Weight in Sabatai and other regions with similar demographic and geographical characteristics (Black et al., 2013; Ministry of Health of the Republic of Indonesia, 2023).

2. Literature Review

Chronic Energy Deficiency (CED) is a nutritional condition characterized by prolonged inadequate intake of dietary energy and essential nutrients, resulting in insufficient maternal energy reserves to meet the increased metabolic demands of pregnancy. In Indonesia, pregnant women at risk of CED are commonly identified through the measurement of Mid-Upper Arm Circumference (MUAC), with a circumference of less than 23.5 cm serving as the standard screening criterion. The development of CED is influenced by multiple factors, including inadequate dietary intake, low socioeconomic status, infectious diseases, maternal age, short birth intervals, and limited knowledge of maternal nutrition during pregnancy. Women affected by CED are more susceptible to adverse pregnancy outcomes, such as maternal anemia, preterm delivery, impaired fetal growth, and the birth of infants with low birth weight. Consequently, early detection and appropriate nutritional interventions are essential components of antenatal care to improve maternal and neonatal health outcomes (Ministry of Health of the Republic of Indonesia, 2023; World Health Organization [WHO], 2023).

Low Birth Weight (LBW) is defined as a birth weight of less than 2,500 grams, regardless of gestational age at delivery. It is recognized as a key indicator of maternal health and nutritional status during pregnancy and remains one of the leading contributors to neonatal morbidity and mortality worldwide. Newborns with LBW are at a significantly increased risk of respiratory complications, hypothermia, neonatal infections, impaired physical and cognitive development, and a greater likelihood of developing non-communicable diseases later in life. Consequently, reducing the incidence of LBW has become a major priority in maternal and child healthcare. Achieving this goal requires continuous monitoring of maternal nutritional status throughout pregnancy, together with comprehensive antenatal care and appropriate nutritional interventions to promote optimal fetal growth and improve neonatal health outcomes (World Health Organization [WHO], 2023; United Nations Children's Fund [UNICEF], 2023).

The Relationship Between Chronic Energy Deficiency and Low Birth Weight

From a theoretical perspective, maternal nutritional status is considered a fundamental determinant of fetal growth and development. Maternal Nutrition Theory proposes that an adequate intake of energy, protein, vitamins, and minerals throughout pregnancy is essential for maintaining optimal placental function and ensuring efficient nutrient transfer from the mother to the fetus. In pregnant women affected by Chronic Energy Deficiency (CED), inadequate

nutritional reserves may impair placental nutrient transport, leading to restricted fetal growth, commonly referred to as Intrauterine Growth Restriction (IUGR). This condition substantially increases the likelihood of delivering a low birth weight (LBW) infant. Furthermore, CED frequently coexists with maternal anemia, which compromises oxygen delivery to fetal tissues and further contributes to impaired fetal development, thereby elevating the risk of LBW (Christian & Stewart, 2010; Black et al., 2013)..

Previous Studies

A growing body of evidence has demonstrated that Chronic Energy Deficiency (CED) is an important determinant associated with the occurrence of Low Birth Weight (LBW). Rahman et al. (2019) reported that pregnant women affected by CED were significantly more likely to deliver infants with low birth weight than those with adequate nutritional status. These findings are supported by Lassi et al. (2020), who concluded that nutritional interventions implemented during pregnancy can substantially reduce the risk of LBW and other adverse neonatal outcomes. Similarly, Victora et al. (2021) emphasized that improving maternal nutritional status throughout pregnancy is among the most effective strategies for enhancing pregnancy outcomes and promoting neonatal health. Despite these consistent findings, most previous studies have been conducted in populations with different demographic, socioeconomic, and geographical characteristics. Consequently, the available evidence may not fully represent the maternal health conditions and risk factors specific to the population served by the Sabatai Community Health Center.

Conceptual Framework and Research Hypotheses

Based on established theoretical concepts and evidence from previous empirical studies, maternal nutritional status during pregnancy plays a crucial role in determining fetal growth and birth outcomes, including infant birth weight. Pregnant women affected by Chronic Energy Deficiency (CED) are considered to have a greater likelihood of delivering Low Birth Weight (LBW) infants than women with adequate nutritional status. Accordingly, this study is founded on the premise that a significant association exists between maternal Chronic Energy Deficiency during pregnancy and the occurrence of Low Birth Weight among newborns delivered within the service area of the Sabatai Community Health Center.

3. Research Methods

This study employed a quantitative analytical observational design using a cross-sectional approach, in which both the independent and dependent variables were measured simultaneously. This design was selected to examine the association between maternal Chronic Energy Deficiency (CED) and the incidence of Low Birth Weight (LBW) among infants born within the service area of the Sabatai Community Health Center.

The study population comprised all women who delivered at the Sabatai Community Health Center and had complete antenatal care records during the study period. A total sampling technique was applied, whereby all eligible participants meeting the predefined inclusion criteria were recruited. Eligible participants were mothers with complete medical records documenting maternal CED status during pregnancy and neonatal birth weight. Records with incomplete or missing information relevant to the study variables were excluded from the analysis.

Secondary data were collected from maternal medical records, delivery registers, and maternal cohort records maintained at the Sabatai Community Health Center. The independent variable was maternal Chronic Energy Deficiency (CED), assessed using Mid-Upper Arm Circumference (MUAC) measurements. Pregnant women with an MUAC of less than 23.5 cm were classified as being at risk of CED, whereas those with an MUAC of 23.5 cm or greater were categorized as not at risk. The dependent variable was Low Birth Weight (LBW), defined according to the World Health Organization criteria as a birth weight of less than 2,500 grams, regardless of gestational age.

The research instrument consisted of a structured data extraction form developed according to the study variables to systematically collect information from routine healthcare records. Content validity was established through expert review, confirming that all instrument components adequately represented the study objectives. Reliability testing further demonstrated satisfactory consistency, indicating that the instrument was appropriate for use in data collection.

Data analysis was performed in two sequential stages, including univariate and bivariate analyses. Univariate analysis was conducted to summarize participants' characteristics and describe

the distribution of each study variable using frequencies, percentages, means, and standard deviations, as appropriate for the type of data. Subsequently, bivariate analysis was performed to evaluate the association between maternal CED and LBW using the Chi-square (χ^2) test with a 95% confidence level. Statistical significance was determined at a p-value of less than 0.05. When the assumptions of the Chi-square test were not satisfied because of small expected cell frequencies, Fisher's Exact Test was employed as an alternative statistical procedure in accordance with established methodological recommendations (Dahlan, 2020).

The conceptual model of this study identified maternal Chronic Energy Deficiency (X) as the independent variable and Low Birth Weight (Y) as the dependent variable. The relationship between these variables was examined to determine whether a statistically significant association existed within the study population. All data management, processing, and statistical analyses were performed using standard statistical software commonly applied in quantitative health research.

Data collection commenced after obtaining official research approval from the Sabatai Community Health Center. The study utilized secondary data extracted from maternal medical records, antenatal cohort registers, and delivery registration records. Eligible participants were identified through predefined inclusion and exclusion criteria. Information on maternal Chronic Energy Deficiency (CED) was obtained from Mid-Upper Arm Circumference (MUAC) measurements, while neonatal birth weight was recorded from delivery records using a structured data extraction form developed for this study. Prior to statistical analysis, all collected data underwent verification to ensure completeness, accuracy, and internal consistency.

The study was conducted at the Sabatai Community Health Center between January and March 2026. A total of 60 eligible mothers were included in the study through a total sampling technique, whereby all participants who met the established selection criteria were recruited for analysis.

4. Results

Table 1. Characteristics of the Study Participants.

Characteristics	Frequency (n)	Percentage (%)
Maternal Age		
<20	6	10,0
20–35	43	71,7
>35	11	18,3
Paritas		
Primipara	24	40,0
Multipara	36	60,0
Maternal CED Status		
Chronic Energy Deficiency (CED)	22	36,7
Non-Chronic Energy Deficiency (Non-CED)	38	63,3
Neonatal Birth Weight Status		
Low Birth Weight (LBW)	18	30,0
Normal Birth Weight (Non-LBW)	42	70,0

Source: Research Data, 2026.

According to Table 1, the majority of participants were 20–35 years of age (71.7%) and were multiparous mothers (60.0%). Of the total respondents, 22 women (36.7%) were identified as having Chronic Energy Deficiency (CED), while Low Birth Weight (LBW) was observed in 18 newborns (30.0%).

Table 2. Association Between Maternal Chronic Energy Deficiency and Low Birth Weight

Chronic Energy	Low Birth Weight (LBW) (%)	n Non-LBW (%)	n _{Total}	p-value
Chronic Energy Deficiency (CED)	14 (63,6)	8 (36,4)	22	
Non-Chronic Energy Deficiency (Non-CED)	4 (10,5)	34 (89,5)	38	
Total	18 (30,0)	42 (70,0)	60	0,000
Uji Statistik: Chi-Square				

Source: Research Data, 2026.

According to Table 2, 63.6% of pregnant women with Chronic Energy Deficiency (CED) delivered infants with Low Birth Weight (LBW), whereas only 10.5% of mothers without CED gave birth to LBW infants. The Chi-square test demonstrated a statistically significant association between maternal CED status and the occurrence of LBW, with a p-value of 0.000 ($p < 0.05$). These findings indicate that maternal Chronic Energy Deficiency is significantly associated with the incidence of Low Birth Weight among deliveries at the Sabatai Community Health Center. Therefore, the study hypothesis proposing an association between maternal CED and LBW was supported.

Discussion

The findings of this study indicate that more than one-third of the participants experienced Chronic Energy Deficiency (CED) during pregnancy, highlighting that maternal undernutrition remains an important public health concern within the service area of the Sabatai Community Health Center. Inadequate maternal energy and protein reserves may compromise the mother's ability to meet the increased metabolic demands of pregnancy while simultaneously supporting optimal fetal development. As a consequence, fetal tissue formation and growth may be impaired, thereby increasing the likelihood of delivering a Low Birth Weight (LBW) infant.

The results further demonstrated that the prevalence of LBW was considerably higher among mothers with CED than among those with adequate nutritional status. Statistical analysis confirmed a significant association between maternal CED and the occurrence of LBW. From a physiological perspective, this relationship may be explained by impaired placental function resulting from prolonged nutritional deficiency. Reduced placental efficiency limits the transfer of oxygen and essential nutrients from the mother to the fetus, leading to suboptimal intrauterine growth and consequently increasing the risk of low birth weight at delivery.

These findings are consistent with Maternal Nutrition Theory, which emphasizes that adequate maternal intake of energy and essential nutrients throughout pregnancy is fundamental to normal fetal growth and development. Women with sufficient nutritional status are better able to provide the nutrients required for healthy fetal development than mothers affected by CED. Accordingly, maternal nutritional status represents one of the most influential determinants of neonatal birth weight.

The present findings are also in agreement with previous empirical evidence. Rahman et al. (2019) reported that pregnant women with CED were significantly more likely to deliver LBW infants than women with normal nutritional status. Likewise, Lassi et al. (2020) demonstrated that improving maternal nutrition during pregnancy substantially reduced the incidence of LBW and other adverse neonatal outcomes. Similarly, Victora et al. (2021) concluded that nutritional interventions during pregnancy are among the most effective strategies for improving pregnancy outcomes and neonatal health. The consistency of these findings across different studies strengthens the evidence supporting maternal nutritional status as a key determinant of birth weight.

Despite the significant association identified in this study, several mothers without CED also delivered infants with LBW. This observation indicates that LBW is a multifactorial condition influenced by a range of maternal, fetal, and healthcare-related factors. Maternal anemia, hypertensive disorders during pregnancy, infectious diseases, maternal age, exposure to passive smoking, the quality of antenatal care, and gestational age at delivery may all contribute to the occurrence of LBW. Conversely, some mothers with CED delivered infants with normal birth weight, possibly reflecting the beneficial effects of high-quality antenatal care, adherence to nutritional supplementation, improved maternal nutritional status during pregnancy, or other protective factors that supported fetal growth.

From a theoretical perspective, the results reinforce the concept that maternal nutritional status is a fundamental determinant of fetal growth and development. The significant association observed between maternal CED and LBW provides additional empirical support for the importance of maintaining adequate energy balance throughout pregnancy to ensure optimal intrauterine growth. Consequently, this study contributes to the growing body of scientific evidence regarding the influence of maternal Chronic Energy Deficiency on birth outcomes among pregnant women receiving primary healthcare services.

From a practical standpoint, these findings have important implications for maternal and child health programs at the Sabatai Community Health Center. Routine screening for CED through Mid-Upper Arm Circumference (MUAC) measurement should be integrated into every

antenatal care visit to facilitate early identification of women at nutritional risk. Furthermore, strengthening maternal nutrition education, providing appropriate iron and balanced energy–protein supplementation, monitoring gestational weight gain, and offering targeted support for high-risk pregnancies may help reduce the incidence of LBW. The evidence generated by this study may also serve as a valuable basis for developing more targeted health promotion and preventive strategies tailored to the demographic and health characteristics of the local community.

The findings of this study demonstrate a statistically significant association between maternal Chronic Energy Deficiency (CED) and the incidence of Low Birth Weight (LBW) among deliveries at the Sabatai Community Health Center. A substantially higher proportion of mothers with CED delivered infants weighing less than 2,500 grams compared with mothers who had adequate nutritional status. These findings indicate that maternal nutritional status during pregnancy remains an important determinant of fetal growth and birth outcomes. From a theoretical perspective, adequate maternal energy and protein intake throughout gestation is essential for supporting placental function, fetal tissue development, and overall fetal growth. Therefore, preventing maternal CED should be considered a priority within antenatal care programs because improving maternal nutritional status has the potential to significantly reduce the occurrence of LBW (World Health Organization [WHO], 2023; Ministry of Health of the Republic of Indonesia, 2023).

Physiologically, the observed relationship between CED and LBW can be explained by impaired maternal–fetal nutrient transfer. Women experiencing prolonged nutritional deficiency possess limited energy reserves, reducing the placenta's capacity to supply oxygen, glucose, amino acids, and other essential nutrients required for normal fetal development. Consequently, fetal growth may become restricted, resulting in Intrauterine Growth Restriction (IUGR) and an increased probability of delivering a low birth weight infant. This biological mechanism further supports the importance of maternal nutritional assessment as a routine component of antenatal care from the early stages of pregnancy (Black et al., 2013; Christian & Stewart, 2010).

The present findings are consistent with previous studies reporting that pregnant women with CED have a considerably greater likelihood of delivering LBW infants than women with normal nutritional status. Rahman et al. (2019) identified maternal CED as one of the major risk factors for LBW, whereas Lassi et al. (2020) demonstrated that nutritional interventions during pregnancy significantly reduced the incidence of low birth weight and other adverse neonatal outcomes. The agreement between the present findings and previous research strengthens the existing body of evidence supporting maternal nutritional improvement as an effective strategy for enhancing pregnancy outcomes and neonatal health. Furthermore, the consistency of these findings reinforces the external validity of the results obtained in the Sabatai Community Health Center population (Rahman et al., 2019; Lassi et al., 2020).

Nevertheless, this study also identified several mothers without CED who delivered LBW infants, indicating that maternal nutritional status is not the sole determinant of birth weight. Low birth weight is widely recognized as a multifactorial condition influenced by numerous maternal, fetal, environmental, and healthcare-related factors. Maternal anemia, hypertensive disorders during pregnancy, infectious diseases, maternal age, exposure to passive smoking, the quality of antenatal care, and gestational age at delivery may all contribute to the occurrence of LBW. These findings suggest that comprehensive preventive strategies addressing multiple modifiable risk factors throughout pregnancy are necessary to effectively reduce the burden of LBW (Ministry of Health of the Republic of Indonesia, 2023; WHO, 2023).

Conversely, several mothers classified as having CED successfully delivered infants with normal birth weight. This observation suggests that maternal CED alone does not inevitably determine neonatal birth weight. Improvements in dietary intake during pregnancy, adherence to iron supplementation, provision of balanced energy–protein supplementation, and effective antenatal monitoring may have supported adequate fetal growth despite the presence of maternal nutritional risk. These findings imply that timely nutritional interventions and continuous antenatal care can substantially improve pregnancy outcomes, even among women initially identified as being at risk of CED (Victora et al., 2021; WHO, 2023).

From a public health perspective, the findings emphasize the importance of early detection of maternal CED through routine Mid-Upper Arm Circumference (MUAC) assessment during every antenatal care visit. MUAC measurement is a practical, inexpensive, and reliable screening

method for identifying pregnant women at risk of undernutrition in primary healthcare settings. According to the principles of primary prevention, early identification of modifiable risk factors enables healthcare providers to implement timely interventions before pregnancy complications develop. Consequently, strengthening routine CED screening at the Sabatai Community Health Center may represent an effective strategy for reducing the incidence of LBW within the local population (Ministry of Health of the Republic of Indonesia, 2023; United Nations Children's Fund [UNICEF], 2023).

This study also contributes to the advancement of knowledge in midwifery and public health by providing empirical evidence regarding the relationship between maternal nutritional status and pregnancy outcomes within a primary healthcare setting. Unlike many previous investigations conducted in hospitals or urban populations, this study utilized local data from the Sabatai Community Health Center, thereby offering valuable insights into maternal health conditions in communities with distinct socioeconomic and geographical characteristics. The findings may therefore serve as an evidence base for designing context-specific maternal nutrition policies and interventions that better address the needs of the local population (Victora et al., 2021; Black et al., 2013).

Overall, the results reinforce the theoretical understanding that maternal nutritional status during pregnancy is closely associated with neonatal birth weight. The significant association identified between maternal CED and LBW underscores the need to strengthen antenatal care services through comprehensive nutritional education, balanced energy and protein supplementation, continuous monitoring of maternal nutritional status, and early management of women at nutritional risk. Collaborative efforts involving healthcare professionals, families, and local government authorities are essential to optimize maternal nutrition programs and achieve sustained improvements in maternal and neonatal health outcomes (WHO, 2023; Ministry of Health of the Republic of Indonesia, 2023).

5. Conclusion

The findings of this study demonstrate a statistically significant association between maternal Chronic Energy Deficiency (CED) and the occurrence of Low Birth Weight (LBW) among deliveries at the Sabatai Community Health Center. Pregnant women affected by CED were more likely to deliver infants with low birth weight than those with adequate nutritional status. These results support the study hypothesis that maternal nutritional status during pregnancy is an important factor associated with pregnancy outcomes, particularly neonatal birth weight. Nevertheless, the findings should be interpreted with caution, as the observed association reflects the characteristics of the study population within the Sabatai Community Health Center and should not be generalized to broader populations without considering differences in demographic, socioeconomic, and healthcare contexts, as well as other determinants of LBW.

Based on these findings, healthcare professionals at the Sabatai Community Health Center are encouraged to strengthen the early identification of maternal CED through routine Mid-Upper Arm Circumference (MUAC) assessment during antenatal care visits. Greater emphasis should also be placed on nutrition education promoting balanced dietary intake throughout pregnancy, enhanced antenatal counseling, and continuous monitoring of women identified as being at nutritional risk. Furthermore, targeted implementation of supplementary feeding programs and maternal nutritional supplementation should be prioritized as part of comprehensive strategies to reduce the incidence of LBW. These interventions are expected to improve maternal nutritional status and contribute to better pregnancy and neonatal outcomes.

Several limitations should be considered when interpreting the results of this study. First, the cross-sectional study design does not permit the establishment of a causal relationship between maternal CED and LBW. Second, the analysis relied exclusively on secondary data extracted from medical records, limiting the availability of information on other potentially influential factors, including dietary intake, household socioeconomic status, maternal comorbidities, adherence to nutritional supplementation, and the overall quality of maternal nutrition during pregnancy. In addition, the relatively small sample size and the inclusion of participants from only one primary healthcare facility may limit the external validity and generalizability of the findings.

Future research should consider employing prospective cohort or longitudinal study designs involving larger sample sizes and broader geographical coverage to provide stronger evidence regarding the relationship between maternal nutritional status and LBW. Incorporating

additional variables, such as maternal anemia, gestational age, pregnancy-related complications, socioeconomic conditions, dietary patterns, and the quality of antenatal care, would allow for a more comprehensive understanding of the multifactorial determinants of low birth weight. Such studies are expected to strengthen the existing scientific evidence and provide a more robust foundation for developing evidence-based maternal and child health policies and interventions aimed at reducing the burden of LBW.

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This article is based on research conducted at the Sabatai Community Health Center and has been prepared for publication in a scientific journal within the field of health sciences. The authors affirm that all stages of the research were carried out in accordance with accepted research ethics and the principles of academic integrity. Constructive comments and suggestions from readers and reviewers are sincerely welcomed to support the continuous improvement of this study and future research in this field.

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