JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472
Journal of Holistic Nursing Science

**Article journey**
*Submitted*
29/6/2025
*Revised*
15/7/2025
*Accepted*
15/8/2025
*Online first*
7/10/2025

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REVIEW ARTICLE

# Impact of maternal chronic energy deficiency on newborns in developing countries: A scoping review

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https://doi.org/10.31603/jhns.v12i2.14001

**Abstract**
Chronic energy deficiency (CED) among pregnant women in developing countries is a significant global health concern with direct implications for neonatal health. Despite the abundance of literature on CED, evidence specific to developing countries remains limited. This study aims to investigate the impact of maternal CED on birth outcomes and newborn health in these countries. Using a scoping review design, this study follows the Arksey and O'Malley framework and its modified version. Data were collected from multiple scientific databases, including PubMed/MEDLINE, Scopus, Web of Science, CINAHL, Cochrane Library, WHO Global Health Library, POPLINE, and regional databases to facilitate the inclusion of developing countries. The target population was pregnant women with CED in these countries. Studies published between 2015 and 2024 that reported on the relationship between CED and neonatal outcomes were included. A narrative analysis with thematic synthesis was conducted. The prevalence of CED in pregnant women in developing countries ranged from 25% to 43.1%. CED was associated with increased risks of low birth weight (OR=3.45; 95% CI=2.16-5.27; *p*=0.001), intrauterine growth restriction (IUGR), and neonatal complications. Factors such as maternal age <20 years (OR=2.17; 95% CI=1.35-3.47; *p*=0.002) and high parity (>4) exacerbated these risks. Long-term impacts included impaired cognitive development into adulthood. Maternal CED has a profound negative impact on newborn health. The findings reinforce the need for comprehensive health policies to reduce CED prevalence and mitigate long-term effects on children. To address this, we recommend integrating nutritional interventions into maternal health services, including routine CED screening, tailored counseling, food security enhancement, and women's empowerment. Cross-sectoral policies are essential to reduce CED prevalence and protect maternal and neonatal health outcomes.

**Keywords:** Birth weight, developing countries, energy deficiency, fetal growth, pregnant women

## Introduction

Chronic energy deficiency (CED) among pregnant women in developing countries is one of the critical public health problems with a significant impact on the health and survival of newborns (Harahap et al., 2025). CED is caused by malnutrition or long-term low energy intake which is closely linked to poverty, poor food security, and gender inequality (Dagne et al., 2021). According to the World Health Organization (WHO), malnutrition encompasses a range of conditions including undernutrition, micronutrient deficiencies, and overweight as result from inadequate or excessive energy and nutrient intake (Raposo & Saraiva, 2025). Women of reproductive age often experience inadequate calorie intake due to factors such as unequal food distribution, heavy workloads, and limited access to nutrition education (Alamirew et al., 2023). The prevalence of chronic energy deficiency among Adolescent Girls and Young Mother (AGYM) was 7.2% in Malawi, 13.4% in Gabon, 14.9% in Kenya and 15.4% in Nigeria (Sawadogo et al., 2024). Another study reported alarming prevalence rates of chronic energy deficiency (CED) among pregnant women in developing countries, with over 25% of rural women in Ethiopia experiencing chronic malnutrition (Fitria et al., 2024). Unlike acute energy deficiency, CED develops gradually that often characterized by a Body Mass Index (BMI) <18.5 or a low Mid-Upper Arm Circumference (MUAC), and typically requires a sustained, long-term intervention approach (Ningrum & Cahyaningrum, 2020).

Maternal malnutrition can impair maternal health and fetal development by inducing Intrauterine Growth Restriction (IUGR) and altering transplacental nutrient transfer, thereby impacting fetal growth (Connor et al., 2020). This condition contributes to an increased risk Low Birth Weight (LBW), preterm delivery, and other neonatal complications

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

that can have long-term impacts on the child's health (Asferie et al., 2025). Mothers with poor nutritional status have a 30% higher risk of giving birth to babies with LBW compared to mothers with good nutritional status (Kheirouri & Alizadeh, 2021). Each year, over 20 million births result in babies with LBW with the majority of cases occurring in low- and middle-income countries (Bilal et al., 2022). Condition LBW increases neonatal mortality and contributes to developmental delays, cognitive impairment, and increased susceptibility to non-communicable diseases later in life (Kresnawati et al., 2025).

The pathophysiological mechanisms underlying the relationship between maternal CED and adverse birth outcomes involves a complex interaction between macronutrient and micronutrient deficiencies (Wu et al., 2021). Protein-energy malnutrition (PEM) in pregnant women has significant negative effects on the placenta, which in turn compromises fetal development (Thornburg & Valent, 2024). Deficiencies in micronutrients such as folic acid, iron, and zinc exacerbate this condition by disrupting cellular metabolism, DNA synthesis, and maternal immune function (Kumari et al., 2022). Recent studies indicate that the global burden of maternal disorders attributable to malnutrition increased from 1990 to 2019, with predictions suggesting the trend will persist until 2035 without effective interventions (Xu et al., 2024; Liu et al., 2025). The socioeconomic context in developing countries exacerbates the problem of maternal CED through various mutually interacting determinants (Dagher & Linares, 2022; Simoncic et al., 2022). Food insecurity, poverty, limited education, restricted access to healthcare services, and detrimental cultural practices all contribute to the high prevalence of malnutrition among women of reproductive age (Fledderjohann et al., 2023; Waghmare et al., 2022). For example, studies in Bangladesh reveal that the double burden of malnutrition – the coexistence of undernutrition and overnutrition – creates additional complexity in addressing maternal nutrition issues (Khan et al., 2017; Hasan et al., 2017; Khan & Gulshan, 2021). Appropriate nutritional interventions during pregnancy have been shown to be effective in reducing the risk of adverse birth outcomes and increasing the baby's birth weight (Lassi et al., 2021).

With the background in place, it can be identified that chronic energy deficiency in pregnant women in developing countries is a complex public health problem with multidimensional impacts on neonatal outcomes. The high prevalence of CED among mothers emphasizes the need for a comprehensive understanding of its impact on fetal growth and newborn health. Therefore, the fundamental research question for this review is: "How does chronic energy deficiency in pregnant women affect birth outcomes and the short-term health of newborns in developing countries?" This study is important given the limited comprehensive data that analyze the causal relationship between maternal CED and the spectrum of adverse neonatal outcomes in the context of developing countries. Another consideration why it should be in developing countries is women in these settings often have a high workload, insufficient rest, and a greater risk of infections, which further exacerbate their nutritional status. This study aims to analyze the impact of chronic energy deficiency in pregnant women on birth outcomes and health status of newborns in developing countries. Specifically, this study will evaluate the relationship between maternal CED severity and neonatal outcomes parameters such as birth weight, gestational age, APGAR score, and early neonatal complications. In addition, this study will also identify the determinant factors that moderate the relationship between maternal CED and adverse birth outcomes. The findings of this study are expected to contribute to the development of maternal and neonatal health policies in developing countries. These include antenatal care protocols, programs to prevent adverse birth outcomes, and nutrition approaches during the periconceptional and gestational periods. From a theoretical aspect, this study will enrich understanding of the mechanism of maternal-fetal nutrition interaction and its impact on fetal developmental programming. The benefits to the community are the availability of evidence-based recommendations to improve the nutritional status of pregnant women and reduce neonatal mortality and morbidity in developing countries. Studying this issue in these specific contexts is important for understanding the challenges, identifying the most effective interventions, and breaking the intergenerational cycle of malnutrition and poor health.

**Method**

The review uses a scoping review approach to identify, map, and synthesize scientific evidence related to the impact of chronic energy deficiency in pregnant women on newborn birth outcomes in developing countries. The scoping review methodology was chosen for its ability to explore a wide range of literature, identify key concepts, and identify knowledge gaps in emerging research domains (Mak & Thomas, 2022). This approach allows researchers to understand the complexity of the relationship between maternal malnutrition and neonatal outcomes through a comprehensive synthesis of different types of studies and heterogeneous research designs. This scoping review followed a framework developed by Arksey and O'Malley, with modifications by Levac, consisting of five systematic stages: identifying research questions, identifying relevant studies, selecting studies, charting data, and preparing results and discussions (Arksey & O'Malley, 2005; Levac et al., 2010). This review adhered to the Preferred Reporting Items for Systematic Reviews and

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) to ensure methodological transparency and reproducibility (Tricco et al., 2018). The framework provides a systematic structure for exploring the complex and multidisciplinary literature related to maternal nutrition and neonatal health.

The literature search strategy involved multiple electronic databases, including PubMed/MEDLINE, Scopus, Web of Science, CINAHL, and the Cochrane Library. Additionally, specialized databases such as the WHO Global Health Library, POPLINE, and regional databases were searched to ensure inclusion of studies from developing countries. The combination of search keywords used Medical Subject Headings (MeSH) terminology and free keywords that included variations of the terms "chronic energy deficiency", "maternal malnutrition", "undernutrition", "pregnancy", "birth weight", "neonatal outcomes", and "developing countries". Boolean operators (AND, OR) are used to optimize search sensitivity and specificity to each database according to their respective indexing characteristics. Studies were included if they were published in English between 2015 and 2024, focused on pregnant women with chronic energy deficiency in developing countries, and reported on birth outcomes or neonatal health status. Eligible study designs included randomized controlled trials, review studies, cohort studies, case-control studies, cross-sectional studies, and other observational studies meeting methodological quality criteria. Studies were excluded if they were case reports, editorials, letters to editors, or focused on populations with specific comorbidities that could confound the nutritional-neonatal relationship, or if they were conducted in developed countries with significantly different socioeconomic characteristics.

For quality assessment, observational studies such as cohort and case-control designs were evaluated using the Newcastle-Ottawa Scale (NOS) which assesses three components such as selection, comparability, and outcome/exposure (Stang, 2010). Randomized controlled trials were appraised using the Cochrane Risk of Bias tool, which assesses aspects such as randomization, blinding, and completeness of outcome data (Higgins et al., 2011). Inter-rater reliability was calculated using Cohen's kappa coefficient, where values above 0.75 indicate strong agreement (McHugh, 2010). The study selection process was conducted in several stages. Title and abstract screening were performed by two trained researchers using a web-based screening tool to identify potentially relevant studies and minimize selection bias. This was followed by full-text screening to assess eligibility based on the predefined inclusion and exclusion criteria. Any disagreements between reviewers were resolved through discussion and consensus, with a third researcher acting as an arbitrator if needed. The selection process was documented using a PRISMA flow diagram to ensure transparency in methodological decision-making **(Figure 1)**.

Data extraction was performed using a standardized form that included study characteristics (year of publication, country, study design, and sample size), population characteristics (maternal age, socioeconomic status, and definition of chronic energy deficiency), measurement methodology (nutrition assessment instrument and birth outcome parameters), and key findings (effect size, confidence interval, and statistical significance). The extraction data was carried out by two independent researchers with Inter-rater reliability assessed using Cohen's kappa coefficient. The data extraction process was carried out by two reviewers, while the third researcher acted as an arbitrator in cases of disagreement to reach consensus. Inter-rater reliability was assessed using Cohen's kappa coefficient to evaluate the consistency between reviewers across three stages of study selection such as title and abstract screening, full-text eligibility assessment, and data extraction. The kappa values obtained indicated strong agreement that demonstrating the robustness of the selection and extraction process. Data analysis using the narrative synthesis with thematic categorization by type chronic energy deficiency, Birth outcomes, and the pathophysiological mechanisms reported in the literature. Descriptive statistics was used to describe the characteristics of the included study, geographical distribution, and methodological heterogeneity. The synthesis of findings is carried out through thematic analysis by identifying patterns of consistency, contradictions, and gaps in the literature. Subgroup analysis conducted based on the severity of the CED, the type Birth outcomes, and characteristics of developing countries to identify factors influencing associations. Assessment of the quality of the evidence (Strength of evidence) use Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach for scoping review.

**Results**

The scoping review commenced with a comprehensive identification and initial search stage, during which a total of 712 articles were retrieved from various databases and sources. Following this, a thorough screening process was conducted to evaluate that the articles met the predetermined eligibility criteria. As a result, 134 articles were excluded due to their publication year not meeting the specified requirements that thereby narrowing down the pool of relevant articles. After the exclusion of these articles, a total of 578 articles remained for further evaluation. The researchers then conducted an assessment such as scrutinizing their titles, abstracts, and keywords to determine their relevance to the review's topic. This process led to the exclusion of 533 articles that failed to align with the specified keywords that indicating a lack of

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

pertinence to the research question. Furthermore, an additional 45 articles were excluded after a more in-depth evaluation, as they did not fit within the scope of the review's topic. These articles may have touched on related themes, but their focus or methodology did not align with the objectives of this review. Finally, after a rigorous screening and selection process, a total of 11 articles were deemed suitable for inclusion in the final analysis and discussion of this review. These articles met the eligibility criteria, matched with the specified keywords, and fit within the scope of the review's topic **(Figure 1)**.

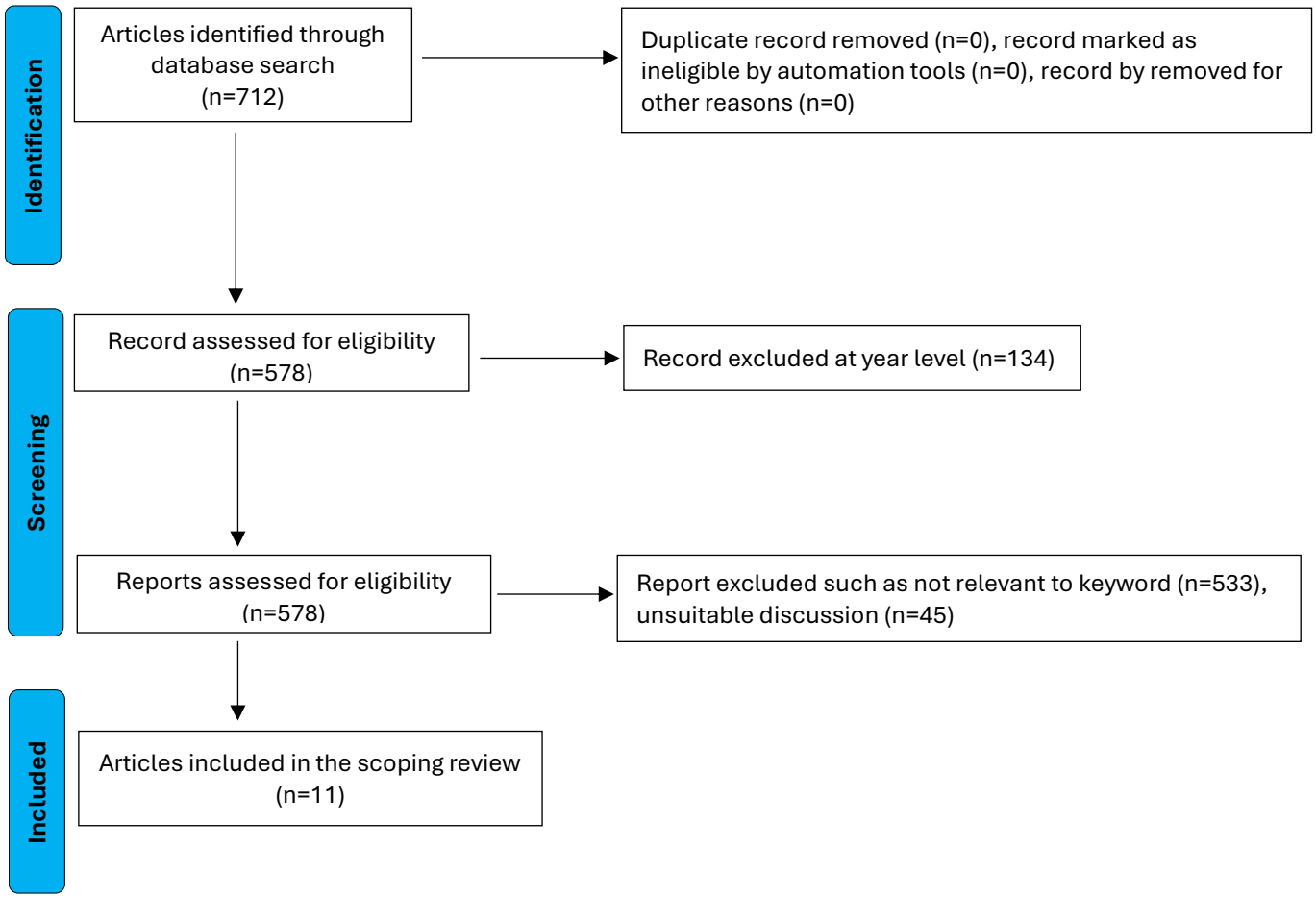


**Figure 1.** Article selection process.

The quality assessment of observational studies using the NOS shows that Gelebo et al. (2021) and Ramadhani et al. (2021) achieved high-quality ratings with total scores of 9 and 8, respectively that reflecting strong methodological rigor in terms of study selection, comparability, and outcome assessment. Meanwhile, Prisusanti et al. (2021) obtained a medium-quality rating with a total score of 6, mainly due to limited comparability and fewer outcome measures. Overall, the NOS evaluation indicates that most included studies demonstrated adequate methodological strength, particularly in the selection of participants and outcome measurement, although some studies presented weaknesses in controlling confounding factors. In addition to these three examples, other included observational studies were also assessed using the same NOS framework. The majority scored within the high-quality range (≥7), which reinforces the reliability of the evidence base. This consistency suggests that despite methodological variations, the overall quality of the observational evidence in this review provides a foundation for interpreting the relationship between maternal CED and neonatal outcomes. The inter-rater reliability obtained during the study selection and data extraction process. The kappa values were calculated based on the agreement between two independent reviewers who screened all records after initial filtering. At the title and abstract screening stage, the agreement reached $\kappa$=0.82 that reflecting strong consistency in identifying relevant studies. During the full-text eligibility review (n=45 articles assessed in detail), the agreement was $\kappa$=0.78, still within the strong range, showing that reviewers applied the inclusion and exclusion criteria. Finally, at the

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

data extraction stage for the 11 studies included in the review, κ=0.85 was obtained that indicating excellent reliability in recording study characteristics and outcomes. Any disagreements were resolved through discussion, and where necessary, adjudicated by the third reviewer. These results confirm that the review process was transparent and reproducible. This review only included studies from a few developing countries—specifically Indonesia, Ethiopia, Sudan, and Bangladesh—due to the limited number of available articles researching this topic in those nations. The majority of these articles indicated that CED is a major contributing factor to LBW and other infant complications. Most of the included studies utilized an observational design, with a small number employing a review design. The participants in the majority of these studies were pregnant women, with some studies incorporating mother-baby pairs. A subset of the article particularly those from Indonesia utilized secondary data such as existing health records.

According to the analysis of descriptive findings from this scoping review, three themes were generated as follows negative outcomes of newborns, pregnant women with CED, and environmental factors lead to negative outcomes. One of the issues found in this review is low birth weight which can affect their growth and development. This condition can also lead to weakened immunity that making babies more susceptible to infections and other clinical diseases. Research included in this review highlights that maternal energy or chronic nutritional deficiencies during pregnancy are linked to low birth weight in newborns. This issue is prevalent in developing countries with differing prevalence rates but consistent clinical findings. External factors beyond maternal health can also play a role in newborn health issues. These factors include socioeconomic status, birth spacing, household income, access to nutritional supplements, and poverty.

**Discussion**

This scoping review highlights the significant impact of CED in pregnant women on birth outcomes in developing countries. The synthesis of included studies demonstrates that maternal CED is a strong predictor of adverse neonatal outcomes, particularly LBW, intrauterine growth restriction (IUGR), and neonatal mortality (Berhe et al., 2021). These findings are consistent with a substantial body of research showing that inadequate maternal nutrition during pregnancy negatively impacts fetal and neonatal health (Kale & Fonseca, 2023; Jeena et al., 2020; Buciu et al., 2025). Healthcare professionals are at the forefront of identifying and managing risk factors associated with LBW and IUGR. During prenatal care, they monitor fetal growth through regular ultrasounds and assess maternal health to detect any signs of complications (Olagunju et al., 2025). In addition, they provide essential guidance on nutrition, lifestyle modifications, and health practices that support optimal fetal development (Marshall et al., 2022). For instance, providing adequate maternal nutrition, managing chronic conditions like diabetes or hypertension, and promoting smoking cessation are critical interventions. In cases where IUGR is detected, healthcare providers may recommend increased fetal monitoring, bed rest, or early delivery if the risks to the fetus are deemed significant (Nüsken et al., 2024). In addition to prenatal care, healthcare professionals are important in the immediate postnatal period for babies born with LBW or IUGR. For families, understanding how to care for a newborn can reduce anxiety and other problems at home.

The high prevalence of maternal CED, reaching over 40% in several regions (e.g. Kongo district in Ethiopia) reflects the severity of undernutrition among pregnant women in low-resource settings (Gelebo et al., 2021; Berhe et al., 2021; Asferie et al., 2025). Those previous studies study found the factors leading CED are household food security, dietary diversity, latrine availability, family resource decision making, food restrictions, weak maternal nutrition education, and malnutrition screening program, the practice of depending on a local alcoholic drink called "Cheka", drought, traditional way of farming and low socio-economic status. Therefore, interventions targeting the factors should be implemented to improve the nutritional status of pregnant women. Other study emphasizes the importance of increasing nutritional intake, frequency of ANC, and pregnancy interval among pregnant women to reduce the risk of CED and its adverse health outcomes (Wati et al., 2024). The impact of maternal CED on fetal development is underpinned by a complex interplay of macronutrient and micronutrient deficiencies. These deficiencies disrupt placental development and function, reducing nutrient transfer and compromising fetal growth (Gerovasili et al., 2025; Gernand et al., 2016; Jansson & Powell, 2013). The involvement of molecular pathways, such as the mTOR signaling pathway, in cases of IUGR further explains how maternal nutrition influences cellular growth mechanisms critical for fetal development (Dong et al., 2024). Maternal age and parity were identified as key moderating factors of CED. Adolescents and women with high parity are at elevated risk of delivering LBW infants (Akbarini & Siswina, 2022). These findings corroborate existing literature showing that young and multiparous mothers are particularly vulnerable to nutritional deficits during pregnancy, which is exacerbated by physiological immaturity or cumulative reproductive stress (Apostolopoulou et al., 2024; Khaskheli et al., 2016). Therefore, health professionals including midwives and community nurses are at the forefront of preventing and managing CED among pregnant women. Interventions must also address food access and include family education on balanced diets.

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

**Table 1.** Study findings.

| Author | Aims | Method, sample size, participants | Country | Findings | Topic relevancy |
|---|---|---|---|---|---|
| Gelebo et al., 2021 | Malnutrition assessment | Community-based study, 501 pregnant women | Ethiopia | 43.1% pregnant women was in malnutrition | Highly Relevant |
| Prisusanti et al., 2021 | LBW risk factor assessment | Observational design, 34 babies with LBW | Indonesia | Nutritional status, parity >4x, age | Highly Relevant |
| Ramadhani et al., 2021 | Assess the relationship between socioeconomic status, nutritional status of pregnant women | Observational study, 85 pregnant women in temporary shelters | Indonesia | Significant relationship among variables | Highly Relevant |
| Berhe et al., 2021 | Examine the effect of SEZ on birth outcomes | Prospective cohort, 540 pregnant women | Ethiopia | Pregnant women with MUAC < 23 cm led to LBW | Highly relevant |
| Asferie et al., 2025 | Assess maternal malnutrition and the risk of LBW | Systematic review & meta-analysis, 15 articles included | Ethiopia | Maternal CED led LBW | Highly relevant |
| Rahman et al., 2020 | Assess maternal CED, LBW and prematurity | Cohort study, 1,250 pregnant women | Bangladesh | Maternal CED led LBW and premature birth | Highly relevant |
| Akbarini & Siswina, 2022 | Identify factors influencing the incidence of CED. | Cross-sectional study at a community health center, 40 pregnant women | Indonesia | The distance between pregnancy and income shows a relationship with CED. | Highly relevant |
| Has et al., 2025 | Identify predictors of survival in under-five children with LBW. | Population-based study, 625 participants | Indonesia | Maternal and household factors predicted survival in LBW | Relevant |
| Bilal et al., 2022 | Examine the relationship between maternal malnutrition and neonatal outcomes. | Observational study, 1505 pairs of pregnant women and their newborns | Sudan | Women with undernutrition were at a higher risk of delivering LBW infants | Highly relevant |
| Indarti et al., 2023 | Examine the association between CED and LBW | Observational study, 81 pregnant women | Indonesia | CED was associated with increased LBW and maternal anemia. | Highly relevant |
| Selamet et al., 2024 | To describe factors influencing CED | Ecological analysis study, secondary data from Basic Research in Health (RISKESDAS) 2014-2018 | Indonesia | Blood supplement administration and poverty influence the CED prevalence. | Highly relevant |

JHNS
Journal of Holistic Nursing Science
E-ISSN: 2579-7751 P-ISSN: 2579-8472

A number of studies conducted in Bangladesh and Sudan similarly suggest that undernutrition can lead to LBW (Rahman et al., 2020; Bilal et al., 2022). Specifically, research in these regions often links maternal nutritional status to adverse fetal outcomes. These findings emphasize that when pregnant women lack adequate caloric intake and essential vitamins and minerals, the fetus's growth and development are directly compromised resulting in lower birth weights. Consequently, the data from Bangladesh and Sudan reinforces the global understanding that improving maternal nutrition is a crucial, high-impact intervention necessary to mitigate the pervasive public health challenge of LBW and reduce associated infant morbidity and mortality. Similarly, in Indonesia, study have also reported that maternal nutrition has a significant impact on fetal development (Ramadhani et al., 2021). The study found that maternal nutritional factors contributed to 58.8% of LBW cases in referral hospitals that highlighting the dominant role of maternal malnutrition as a primary etiology (Prisusanti et al., 2021). Furthermore, limited economic conditions can trigger the onset of Chronic Energy Deficiency (CED), as pregnant women or their families may be unable to afford nutritious food to support the fetus (Has et al., 2025). The lack of proper nutritional supplements and poverty are also documented risk factors for CED (Indarti et al., 2023; Selamet et al., 2024).

The scoping review suggests several strategic recommendations. First, implement preconception nutrition programs targeting adolescent girls. Second, improve the quality of antenatal care by incorporating routine nutritional screening and individualized counseling. Third, encourage multisectoral policies linking health with agriculture, education, and social services for food insecurity and poverty. From a policy perspective, this review indicates that tackling maternal CED requires integrative approaches including community education, economic empowerment, food security interventions, and improved maternal healthcare access. Moreover, global factors such as conflict and climate change, which disrupt food systems, must be considered when designing sustainable nutrition programs. This review also has a limitation in that a number of other developing countries are not represented in the analyzed literature, a constraint imposed by the paucity of available data and research from those regions.

## Conclusion

This scoping review reinforces that CED in pregnant women remains a major public health concern in developing countries, with profound implications for neonatal survival, growth, and long-term development. The findings highlight the urgent need for interventions particularly in high-risk populations. Addressing this issue requires collaborative action across sectors that grounded in evidence-based strategies to improve maternal nutrition and break the cycle of intergenerational malnutrition. To effectively mitigate the impact of maternal CED on newborns, policymakers and healthcare providers should prioritize the following strategies such as strengthening routine CED screening and monitoring during antenatal care visits, providing nutritional counseling and support to pregnant women and enhancing food security along with access to nutrient-rich foods for pregnant women and their families. Furthermore, future research should focus on identifying context-specific solutions and evaluating the effectiveness of interventions aimed at reducing CED prevalence and improving maternal and neonatal health outcomes.

## Acknowledgments

The author wishes to express sincere appreciation to the Faculty of Public Health, Universitas Diponegoro, particularly to my supervisors for their guidance and support in preparing the manuscript.

## AI statements

The authors declare that no artificial intelligence was used in the writing of the manuscript. All ideas and concepts presented are original from the authors' own work.

## Author's declaration

The lead author served as the primary researcher, overseeing study design, data analysis, and preparation of the discussion for this review. The other two authors contributed by providing suggestions on data sourcing, article selection, and data processing.

## Availability of data and materials

All data are available from the authors upon request for research purposes.

## Competing interests

The author declares that there is no conflict of interest regarding the publication of this article.

**Ethical clearance**

As this review did not involve human subjects, it was exempt from ethical clearance requirements.

**Funding**

The preparation of this scoping review did not receive any financial support from institutions or other parties.

**Publishers and journal's note**

This scoping review is important for improving the literacy of healthcare professionals who focus on managing maternal chronic energy deficiency. The findings of this review can serve as support for government programs for optimizing nutrition for mothers. The Editor would like to commend the authors for their work in generating this excellent research.

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**Authors' insight**

**Key points**

- Maternal CED is a significant public health concern in developing countries that affecting both mothers and newborns.
- CED can lead to adverse birth outcomes including low birth weight, intrauterine growth restriction, and increased risk of neonatal complications.
- Addressing maternal CED requires comprehensive approaches such as nutrition education, food security, healthcare access and multidisciplinary team.

**Emerging nursing avenues**

- What are the most effective and comprehensive interventions to prevent and manage maternal CED in developing countries?
- How does maternal CED impact the long-term health and development of newborns beyond the neonatal period of time?
- What are the key barriers and facilitators to implementing effective maternal nutrition programs in developing countries?

**How to cite this article (APA style)**
Al Maeka, S. M., Kartasurya, M. I., & Pradigdo, S. F. (2025). Impact of maternal chronic energy deficiency on newborns in developing countries: A scoping review. *Journal of Holistic Nursing Science, 12*(2), 315–325. https://doi.org/10.31603/jhns.v12i2.14001