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A family empowerment-based health promotion model for preventing chronic energy deficiency in pregnant women: A systematic literature review

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Keywords:
CED; pregnant women; health promotion; family empowerment; systematic literature review.

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ABSTRACT

This study aimed to examine family empowerment-based health promotion models for preventing chronic energy deficiency (CED) among pregnant women through a systematic literature review. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, with relevant articles identified through searches of Google Scholar, PubMed, and ScienceDirect. The inclusion criteria comprised articles published between 2016 and 2026 in Indonesian or English that addressed health promotion interventions, family empowerment, and maternal nutritional status. Eligible articles were systematically reviewed to identify intervention strategies, forms of family involvement, and their reported contributions to CED prevention. The findings indicated that family empowerment-based health promotion approaches commonly integrated nutrition education, nutritional counseling, antenatal classes, and community-based interventions. Family involvement, particularly spousal support, financial assistance, shared decision-making, and accompaniment during antenatal care visits, was associated with improved maternal nutritional knowledge, healthier dietary behaviors, and better nutritional outcomes. Interventions incorporating sustained family and social support also demonstrated potential benefits in reducing the risk of CED during pregnancy. Overall, the findings suggested that family empowerment-based health promotion represents a promising approach to preventing CED among pregnant women. Integrating nutrition education, counseling, and family participation into maternal health services may facilitate sustained behavioral improvements and strengthen maternal nutritional well-being. Therefore, maternal health programs should prioritize meaningful family engagement, particularly the involvement of husbands and other household members, as an integral component of comprehensive CED prevention strategies.

INTRODUCTION

Maternal nutritional health plays a crucial role in ensuring favorable pregnancy outcomes, supporting optimal fetal growth and development, and promoting the health of future generations. Inadequate nutritional intake during pregnancy increases the risk of maternal complications and adverse birth outcomes, potentially contributing to maternal morbidity and mortality. Chronic energy deficiency (CED), characterized by prolonged insufficient energy intake relative to physiological requirements, remains a significant maternal health concern, particularly in resource-limited settings. Maternal undernutrition may impair

fetal development and increase susceptibility to pregnancy-related complications, emphasizing the importance of adequate nutritional support throughout pregnancy (WHO, 2024; Rahman et al., 2025).

Adequate maternal nutrition is particularly important during the first 1,000 days of life, encompassing the period from conception through a child's second birthday. Nutritional deficiencies during pregnancy may compromise fetal growth and contribute to adverse maternal and neonatal outcomes, including preterm birth, low birth weight (LBW), and an increased risk of childhood stunting (Kemenkes RI, 2023; Harna et al., 2024). These potential consequences underscore the importance of early nutritional screening, appropriate dietary interventions, and continuous maternal healthcare support to prevent nutritional deficiencies and improve pregnancy outcomes.

Maternal undernutrition remains a major global public health challenge, particularly in low- and middle-income countries. Inadequate nutritional intake during pregnancy can adversely affect maternal health and fetal development, with potential consequences extending into infancy and childhood. Limited maternal knowledge of balanced nutrition, insufficient dietary intake, household food insecurity, and restricted access to nutritious foods may contribute to the persistence of CED. In Indonesia, maternal CED continues to warrant public health attention because of its potential implications for maternal well-being, pregnancy outcomes, and child growth and development (Mariya Ulfah, 2024).

Evidence from Indonesia indicates that maternal CED is associated with multiple socioeconomic, nutritional, and behavioral determinants. Low household income, inadequate dietary intake, food insecurity, and limited nutritional knowledge may increase pregnant women's vulnerability to prolonged energy deficiency. These challenges may be compounded by unequal access to maternal healthcare services, limited household resources, and insufficient family support. Consequently, preventing CED requires comprehensive interventions that address not only individual nutritional knowledge and dietary practices but also the broader socioeconomic and family environments influencing maternal nutritional health (Rahman et al., 2025).

According to the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia, SKI), the prevalence of CED among pregnant women in Indonesia was 16.9%, compared with 17.3% reported in the 2018 Basic Health Research (Riset Kesehatan Dasar, Riskesdas). Although these figures suggested a modest decline, the prevalence remained above the national target of 10% established for 2024 under the Ministry of Health's strategic planning framework. This discrepancy highlighted the continued need for comprehensive, accessible, and sustainable maternal nutrition interventions, particularly among socioeconomically disadvantaged populations and communities with limited access to healthcare services (Kemenkes RI, 2023).

Health-related behaviors are shaped by interactions among individual knowledge, attitudes, family relationships, social support, and environmental conditions. Therefore, maternal nutrition interventions should address not only individual dietary practices but also the household and community contexts in which nutritional decisions are made. Family- and community-based empowerment approaches may improve nutritional awareness, encourage healthier dietary behaviors, strengthen household support, and facilitate access to antenatal care and nutritional services (Harna et al., 2024). Previous research has also identified associations among maternal nutritional knowledge, dietary patterns, attitudes, family support, and the

occurrence of CED during pregnancy (Mariya Ulfah, 2024). These findings suggest that meaningful family participation, particularly through emotional, informational, and practical support, may contribute to improved maternal nutritional practices and more effective CED prevention.

The urgency of this systematic literature review stemmed from the persistent prevalence of maternal CED in Indonesia, which remained above the national reduction target, and the recognized importance of family support in shaping maternal nutritional behaviors (Kemenkes RI, 2023). Although previous studies had examined nutritional education, maternal dietary practices, and family support, evidence regarding their integration into a comprehensive family empowerment-based health promotion model remained fragmented. Accordingly, this review aimed to synthesize existing evidence on family empowerment-based health promotion approaches for preventing CED among pregnant women, with particular emphasis on identifying effective intervention strategies, forms of family participation, and reported maternal nutritional outcomes. The review sought to contribute theoretically by integrating evidence related to social support and socioecological approaches to maternal health behavior, while offering practical insights for developing culturally appropriate, family-centered maternal nutrition interventions. The findings were expected to inform healthcare professionals, maternal health program managers, and policymakers in strengthening family engagement, improving nutritional support, and developing more comprehensive and sustainable CED prevention strategies.

METHOD

A systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure a transparent and structured study selection process (Page et al., 2021) [L9.1]. Relevant articles were identified through searches of Google Scholar, PubMed, and ScienceDirect using keywords related to health promotion models, family empowerment, chronic energy deficiency (CED), and pregnant women. The inclusion criteria comprised national and international publications published between 2016 and 2026, with accessible full texts. No restrictions were imposed on study design.

The initial database searches identified 1,943 records. Following title and abstract screening, relevance assessment, and duplicate removal, 20 articles remained for further evaluation. Of these, nine articles were selected for full-text analysis and included in the final synthesis. The study selection process was presented in the PRISMA flow diagram (Figure 1).

RESULTS AND DISCUSSION

Nine articles analyzed use a table matrix (Table 1) to identify each variable studied related to the Community-Based Health Promotion Model, the Empowerment Family in Prevention of Energy Deficiency Chronicle on pregnant mothers. Four of the nine articles use a cross-sectional design, one of the nine articles uses a review of the literature design, and the other uses a quasi-experimental design. One of nine articles uses a qualitative method

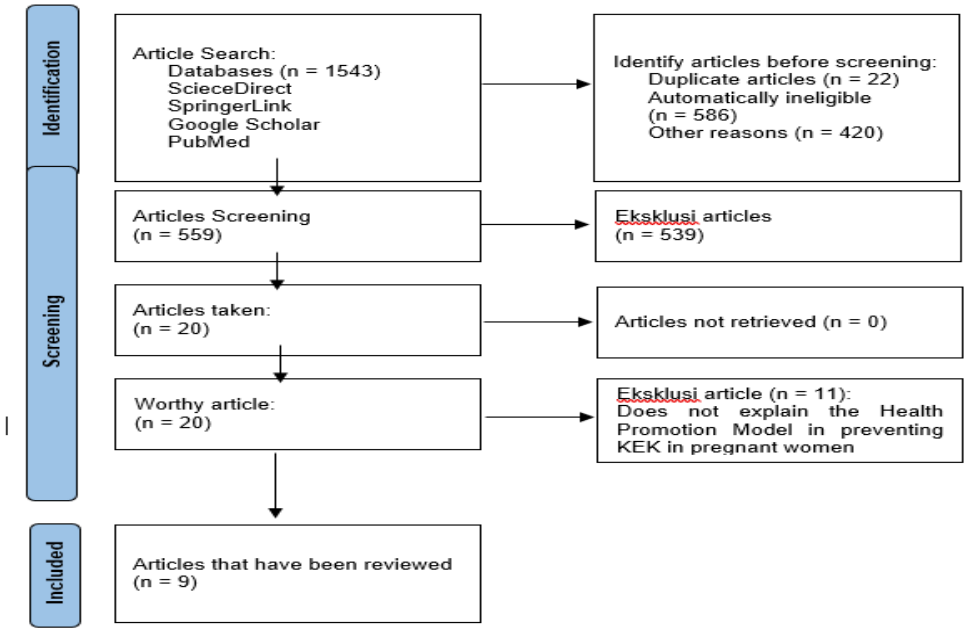


Figure 1. Selection scheme article using Prisma Flo

The variables that are the focus of the literature review are CED for pregnant women, promotion modes based on family empowerment. The results of the article analysis are grouped into two categories related to (1) health promotion models, (2) family-based empowerment models, namely.

Table 1. Analysis of Synthesis Results

No	Writer	Title Study	Method, Sample Place	Results
1	*Situmorang et all, 2024*	Cadre's Assistance of the Integrated Health Service Post (Posyandu) Effectively Improves Adherence of Pregnant Women Taking Iron Supplements in West Sorong Health Center	quasi- experimenta , 34 samples, Sorong -Papua	Help intervention Integrated Health Post Integrated Health Services In a way Effective Increase Compliance of Pregnant Women in Consuming Supplement Substance nutrition
2	*Syafitri et,all , 2023*	Role of Midwives, Role of Cadres, Support Family , Mother's Motivation and The relationship with Behavior of Pregnant Women in Prevention Lack Energy Chronicle	*Cross Sectional Study, 84, Southeast Sulawesi*	The roles of cadres and midwives are related with Mother's behavior in CED Prevention
3	*Silvia et,all ,2020*	Connection Husband's Support With Behavior Consumption Patterns Nutrition for Pregnant Women	*Cross Sectional Study, 83 samples , Jember East Java*	Husband's support is very influence on behavior consumption nutrition Mother pregnant

No	Writer	Title Study	Method, Sample Place	Results
4	*Halisah , et .,all ,2022*	*The Effect of Family Approach Model Education and Zinc Supplementation on Pregnant Women with Chronic Energy Lack from Poor Families*	*Quasi-experiment with a pre-post-test control design, 61 samples , Mamuju ,West Sulawesi*	supplementation zinc will more Good If accompanied by with giving education based approach family , as form system support public for mother , because pattern Eat family own strong influence to pattern Eat Mother
5	*Satriani., 2025*	*Transformation of Cultural Values and Practices Consumption Food in CED Prevention on Pregnant Women in Coastal Communities Selayar, South Sulawesi*	*qualitative with method case study , 10 samples, South Sulawesi*	Family , especially husband and in-laws , playing role important in taking decision consumption food , approach intervention health - based culture local , improvement amount officer nutrition , as well as use Language area in counseling For increase effectiveness of the CED prevention program
6	*Jusni ., et all ,2025*	Homecare Services For Increase Knowledge of Pregnant Women in Overcoming Lack Energy Chronicle	*Quasi-Experimental, 12 samples ,Tanah Toa,Bulukumba South Sulawesi*	improvement knowledge Mother pregnant about CED in general significant after accept homecare services
7	*Ulfah et all, 2024*	Connection Knowledge , Husband's Support and the Role of Health Workers with Behavior Prevention Lack Energy Chronic (CED) in Pregnant Women	*Crosssectional , 67 samples ,Bojonegoro ,East Java*	There is a relationship knowledge , support husband and role power health with behavior prevention Lack Energy Chronicle
8	*Simanjutak, 2024*	The Determinant Factor Energy Chronic (CED) in Pregnant Women	*Cross-sectional, 100 samples,Palembang South Sumatera*	Based on socio-demographic characteristics, it was found that the highest number of pregnant women risk of CED, low parity, high education, good knowledge, adequate nutritional intake, and supportive husbands. .
9	*Indriyani ., et all 2014*	Empowering Pregnant Women with Health Promotion Strategies to Prevent Chronic Energy Deficiency (CED): Systematic	*Systemic review*	Change behavior through empowerment Mother pregnant using promotional strategies health in prevention CED has proven very effective . However in its implementation become complex things Because diversity culture in Indonesia.

Nutrition counseling/education supports pregnant women with certain nutritional disorders to improve their nutritional status. This approach emphasizes providing a balanced and optimal diet. The ultimate goal is to support pregnant women in achieving a standard weight .(Sartika et al., 2025) [L10.1]Family empowerment through health promotion plays a crucial role in managing anemia CED among pregnant women. This approach focuses not only on medical interventions but also emphasizes community involvement and health education as a sustainable, long-term strategy[L11.1]. (Ningsih et al., 2025) A program providing iron to pregnant women would be better served if accompanied by family-based education, as a form

of community support system for mothers, as family eating patterns have a strong influence on pregnant women's eating patterns. (Halisah et al., 2022)[L12.1]

Knowledge of pregnant women increases after receiving counseling and educational media about CED and its prevention. Nutrition education is a multidimensional process that not only focuses on increasing knowledge, but also on changing behavior through social support, family, and a conducive environment. (Rahman et al., 2025)[L13.1] Health counseling is a communication interaction between a health professional and a client, aimed at helping individuals recognize their health conditions, improve their decision-making skills, and encourage behavioral changes toward a healthier lifestyle. In maternal health, counseling serves not only as an information tool but also as an empowerment method that focuses on sustainable behavioral change[L14.1] (Zainal, 2018)

Pregnant women's class activities aim to increase knowledge, change mothers' attitudes and behavior so that they understand about pregnancy checks, childbirth, postpartum and newborn care for optimal growth and development. (Hayati et al., 2024)[L15.1] Implementation of learning in the pregnant women's class will improve the knowledge of pregnant women regarding the prevention of anemia and CED to be better. During the pregnant women's class, pregnant women will get information, interact with each other with various experiences between pregnant women participants regarding their pregnancy. (Ningsih et al., 2025)[L16.1] Participation family in class For Mother pregnant play a role important in success CED prevention . Research show that support family , especially from husband , related close with condition nutrition Mother pregnant . Participation husband in class Mother pregnant can strengthen understanding about importance nutrition during pregnancy as well as push support in the form of provision food nutritious and intake decision about health. (Kusumastuti, 2024)[L17.1]

In a way theoretical , effectiveness class for Mother pregnant in prevent CED can explained through Support Theory Social , which emphasizes role support social in influence behavior health . In addition , the approach this is also in line with the Ecological Model of Health Behavior, which states that behavior health influenced by interactions between individual , family , and social context. (Eduhealth et al., 2025)[L18.1] Mother's class pregnant is comprehensive intervention Because combine education nutrition , counseling health , and strengthening family in one program. Education nutrition, counseling nutrition, class Mother pregnant proven succeed in repair behavior nutrition Mother pregnant and helping in prevent CED. Thus , strengthening and optimizing implementation class for Mother pregnant become a crucial strategy in business lower prevalence of CED in mothers pregnant (Muh et al., 2024)[L19.1]

Intervention based community is one of the important strategies in promotion health that aims improve health status public through involvement active individual , family , and environment social . In the context of prevention CED in mothers pregnant , approach community assessed more effective compared to individual intervention because capable reach various determinant social factors that influence nutritional status.(Harna et al., 2024) [L20.1]

Various study show that intervention community , such as educational programs nutrition based community , mentoring by cadres health , as well as group Mother pregnant , have impact significant to improving nutritional status Mother pregnant. (Kusumastuti, 2024) Intervention community very impactin create supportive environment change behavior .

Through activity group like class Mother pregnant and integrated health post , mother pregnant No only get information , but also support social from fellow participants and cadres health. (Halisah et al., 2022) Support This proven increase compliance to pattern Eat healthy and consumption supplements , which are factor important in prevention. (Situmorang et al., 2025)[L21.1]

Support family is attitudes , actions , and acceptance given family to its members . The most important indicator from role family is help financial For behavior Mother pregnant in effort prevention of CED .(Simanjuntak et al., 2024)[L22.1] The most significant support from family is support from couples . Pregnant women who experience CED risks and not get support from husband more tall For No utilise service nutrition compared to with Mother pregnant women who get support from husband[L23.1]. (Multazam & Amelia, 2022)

Head Family that is husband and in-laws , have role crucial in determine decision consumption food , how to intervention health rooted in culture local , improvement amount power nutrition , as well as utilization Language local in counseling For increase effectiveness of the CED prevention program[L24.1]. (Fikayanti et al., 2024) A strong relationship between husband's support and nutritional consumption behavior in preventing CED in pregnant women. Husbands can increase information support, attention and involvement in fulfilling nutritional needs during pregnancy by providing information obtained from social media, magazines, books and pamphlets[L25.1].(Putri Ragil et al., 2016)

With Thus , involvement husband own significant influence in prevention of CED in mothers pregnant through improvement support social , taking more decisions good , and strengthening behavior health . Therefore that , intervention promotion health should No only focus on mother pregnant , but also involving husband as part from empowerment strategy family[L26.1]. (Multazam & Amelia, 2022) Families, especially husbands and in-laws, play an important role in food consumption decision-making, local culture-based health intervention approaches, increasing the number of nutrition officers, and using regional languages in outreach to increase the effectiveness of the CED prevention program.(Satriani, Arlin Adam, 2025)[L27.1]

Condition economy family impact directly on the ability fulfil need nutritious food , access to service health , as well as sustainability maintenance during pregnancy . Therefore , the factors finance No Can inseparable from business improvement condition nutrition Mother pregnant . Family income level has a significant relationship between pregnant women with CED and those without CED. (Muh et al., 2024)[L28.1] Socioeconomic status refers to the position or standing of an individual in society, socioeconomic status is a representation of the condition of the individual or group of people being analyzed. From a socioeconomic perspective, the illustration includes education level, income, and others. Economic conditions are very likely to be a determining factor in a family's lifestyle. Economic conditions are the position of an individual or family in a community that is determined by monthly income. Economic conditions can be seen from income that has been adjusted to the price of basic needs[L29.1]. (Musaddik1, Linda Ayu Rizka Putri2, 2022)

Intervention health can be realized in the form of help finances can also strengthened through a program based on community , such as help food , subsidies nutrition and empowerment programs economy House stairs.(Satriani, Arlin Adam, 2025) Community

programs that include support source power , including factor economy , can in a way significant improve nutritional status Mother pregnant. (Girard & Olude, 2012) [L30.1]Health mentoring is a crucial strategy for improving the quality of health interventions, particularly for vulnerable groups such as pregnant women. Mentoring is defined as the process of providing continuous support by health workers, cadres, or family members to help individuals access health services, understand medical information, and adopt healthy behaviors. In efforts to prevent CED, mentoring serves to ensure that pregnant women not only receive information but are also able to implement recommended nutritional practices[L31.1]. (Putri et al., 2025)

Pregnant women's knowledge regarding CED significantly increased after receiving home care services. Home care services bring pregnant women closer to them in accompanying their pregnancies, increasing their knowledge regarding CED and being able to apply it to change their attitudes in preventing CED. (Satriani, Arlin Adam, 2025) Mentoring in service health play a role important in prevent CED in mothers pregnant , because can increase compliance , strengthening support social , and guarantee sustainability intervention . As as a result , integration mentoring in health programs mother , okay through power medical , cadres , and family , must become focus main in business improve nutritional status for Mother pregnant . (Jusni , Sri Ningsih , Haerani, Nurul Hidayah Bohari, 2025)[L32.1]

Pregnant women who participated in taking decision together husband own condition more nutrition Good compared to those who don't . This is caused by existence agreement in family about importance adequacy nutrition during pregnancy , so allocation source power and attention to health Mother become more efficient. (Kung et al., 2018)[L33.1] Pregnant women with higher levels of knowledge are better able to access, comprehend, and utilize health information during pregnancy, which facilitates appropriate decision-making related to the consumption of nutritious foods and the maintenance of adequate nutritional intake throughout the gestational period (Elia & Ayungo, 2023).

CONCLUSION

Family-centered health promotion models have demonstrated an important role in preventing chronic energy deficiency (CED) among pregnant women. Family involvement, particularly spousal support, through emotional encouragement, nutritional information, and practical assistance, has been associated with improved maternal nutritional knowledge, healthier dietary behaviors, greater adherence to antenatal care recommendations, and improved access to adequate nutrition throughout pregnancy. Furthermore, family empowerment approaches encourage shared household decision-making, facilitating more effective allocation of financial and nutritional resources to meet maternal dietary needs. These findings highlight the potential of integrating family participation into maternal health promotion programs to strengthen nutritional support and reduce the risk of CED during pregnancy.

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CONFLICT OF INTEREST

The authors declare that there are no financial, personal, or institutional conflicts of interest that could have influenced the research process, interpretation of findings, or publication of this article.

AUTHOR CONTRIBUTIONS

Ika Suhartati, Dwi Sarwani Sri Rejeki, and Elviera Gamelia contributed to the conceptualization of the study, development of the systematic literature review methodology, identification and selection of relevant articles, analysis and synthesis of research findings, and preparation of the manuscript. All authors participated in reviewing and revising the manuscript and approved the final version for publication.

GENERATIVE ARTIFICIAL INTELLIGENCE USAGE STATEMENT

The authors declare that no generative artificial intelligence (AI) tools were used in the conceptualization, literature selection, data analysis, interpretation of findings, or preparation of this manuscript. All research activities and scientific content were independently developed and verified by the authors.

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