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Health belief model in pregnant women in the free nutritional meal program: a review

Health belief model pada ibu hamil dalam program makan bergizi gratis: review

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ABSTRACT

***Background**: Stunting is still a serious problem in Indonesia, one of which is caused by malnutrition since pregnancy.*
***Objective**: To systematically identify and map the use of HBM in understanding pregnant women's compliance with nutritional intervention programs, especially free nutritious meals.*
***Methods:** This scoping review was conducted based on the Arksey and O'Malley framework and followed the PRISMA-ScR guidelines. The literature was searched through the PubMed, ScienceDirect, and Google Scholar databases in 2018–2025. The studies reviewed were original studies with a quantitative, qualitative, or mixed methods approach that used HBM in pregnant women.*
***Results**: From 12 selected studies, it was found that HBM components such as perceived benefits, barriers, and cues to action had a significant effect on the nutritional behavior of pregnant women. Driving factors include culture-based education, family support, and the use of educational media. Meanwhile, the main barriers include economic constraints, food access, and cultural norms.*
***Conclusion**: HBM effectively understands pregnant women's behavior in the free nutritious meal program. HBM-based educational interventions integrated with community approaches and digital technology are recommended to improve the program's effectiveness.*

***Keywords**: Health Belief Model, Pregnant Women, Nutrition Intervention, Free Nutritious Meal, Compliance*

ABSTRAK

Latar Belakang: Stunting masih menjadi masalah serius di Indonesia, salah satunya disebabkan oleh kekurangan gizi sejak masa kehamilan.
Tujuan: Mengidentifikasi dan memetakan secara sistematis penggunaan HBM dalam memahami kepatuhan ibu hamil terhadap program intervensi gizi, khususnya makan bergizi gratis.
Metode: Scoping review ini dilakukan berdasarkan kerangka kerja Arksey dan O'Malley dan mengikuti panduan PRISMA-ScR. Literatur dicari melalui database PubMed, ScienceDirect, dan Google Scholar tahun 2018–2025. Studi yang dikaji adalah penelitian asli dengan pendekatan kuantitatif, kualitatif, atau mixed methods yang menggunakan HBM pada ibu hamil.
Hasil: Dari 12 studi terpilih, ditemukan bahwa komponen HBM seperti *perceived benefits, barriers,* dan *cues to action* berpengaruh signifikan terhadap perilaku gizi ibu hamil. Faktor pendorong meliputi edukasi berbasis budaya, dukungan keluarga, dan penggunaan media edukatif. Hambatan utama mencakup kendala ekonomi, akses pangan, dan norma budaya.
Kesimpulan: HBM efektif untuk memahami perilaku ibu hamil dalam program makan bergizi gratis. Intervensi edukasi berbasis HBM yang terintegrasi dengan pendekatan komunitas dan teknologi digital direkomendasikan untuk meningkatkan efektivitas program.

Kata kunci: *Health Belief Model*, ibu hamil, intervensi gizi, makan bergizi gratis, kepatuhan

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INTRODUCTION

Stunting is one of the most serious public health problems in Indonesia[1]. Basic Health Research (Riskesdas) data shows that the prevalence of stunting in children under five years is still around 24.4%, which is included in the high category according to WHO standards[2]. Stunting impacts physical growth and affects cognitive development and future productivity, thus threatening the development of human resources (HR) in Indonesia[3,4].

One of the leading causes of stunting is poor nutrition experienced during pregnancy, especially in pregnant women who experience Chronic Energy Deficiency (CED) and anemia[5,6]. Inadequate nutrition during pregnancy causes the fetus to experience intrauterine growth retardation (IUGR), which contributes to low birth weight and the risk of stunting later in life[7,8]. Therefore, fulfilling the nutrition of pregnant women is a key factor in preventing stunting and improving the quality of future generations[9,10].

To address this problem, the Indonesian government has launched various nutritional intervention programs, including a free nutritious meal program for pregnant women to increase nutritional intake during pregnancy[11,12]. This program is an essential strategy for preventing stunting by improving the quality of nutritional intake, especially energy, protein, and micronutrients[13,14].

Although the free nutritious meal program has great potential to improve the nutritional status of pregnant women, significant challenges remain in its implementation. One of the main problems is the low level of participation and compliance of pregnant women in following the program[15,16]. Various studies report that in addition to economic factors and access to health services, psychological and social factors also influence the success of this program[17,18].

Pregnant women's perceptions of the benefits of a nutritious eating program, the health risks of not consuming healthy food, perceived barriers, and social and environmental support are essential factors in determining their behavior[16,19]. However, until now, little research has systematically examined these psychosocial factors using a strong and structured behavioral theory approach.

The Health Belief Model (HBM) is one of the most widely used health behavior theories to explain and predict why individuals do or do not take certain health actions[20,21]. This model consists of several main components, namely: perceived susceptibility (perception of vulnerability to health problems), perceived severity (perception of the severity of health problems), perceived benefits (perception of the benefits of preventive measures), perceived barriers (obstacles felt in carrying out actions), cues to action (triggers or reminders to act), and self-efficacy (confidence in the ability to carry out actions)[20,22].

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In the context of the free nutritious meal program, HBM can be used to understand how pregnant women's perceptions of the risk of malnutrition, the benefits of consuming healthy food, the barriers they face, and the triggering factors and self-efficacy influence their decisions to participate in and comply with the program [20]. Applying HBM allows for the development of more targeted and effective interventions by tailoring messages and approaches based on the perceptions and needs of the target audience [23].

Despite the growing interest in maternal nutrition, there is still limited understanding of how psychosocial factors, particularly through theoretical frameworks such as the Health Belief Model (HBM), influence pregnant women's participation in free nutritious meal programs. Therefore, this review aims to systematically explore the application of HBM in this specific context to provide a clear scientific foundation for designing more effective and contextually relevant interventions.

The lack of in-depth studies on pregnant women's perceptions of nutritious meal programs and how psychosocial factors influence compliance are obstacles to designing effective and sustainable intervention strategies. Therefore, a systematic literature review on implementing HBM in pregnant women in free nutritious meal programs is needed to provide a scientific basis for developing contextual and evidence-based intervention models.

RESEARCH MATERIALS AND METHODS

This study used a scoping review design to systematically map the literature related to applying the Health Belief Model (HBM) to pregnant women in the context of nutritional intervention programs, especially free nutritious meal programs. This approach is used to identify key concepts, research findings, and relevant knowledge gaps. This methodology refers to the framework of Arksey and O'Malley and follows the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines. The research questions are formulated using the PCC (Population, Concept, Context) approach, where the population reviewed is pregnant women, especially in areas at risk of stunting or low nutritional status. The concept studied is the application of HBM to predict behavior or compliance in nutritious meal programs, with the context of free nutritious meal programs, nutritional interventions for pregnant women, and community-based health promotion.

The inclusion criteria include studies conducted on pregnant women, using or discussing HBM, discussing nutritional interventions such as nutritious eating programs and PMT for pregnant women, and are original research articles, either quantitative, qualitative, or mixed methods, written in Indonesian or English and published between 2018 and 2025. Meanwhile, studies on populations other than pregnant women,

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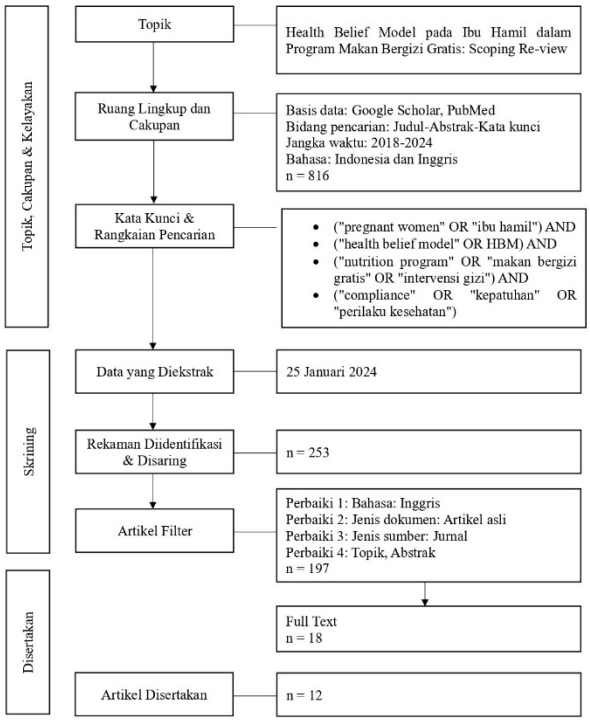
articles without a behavioral theory approach, non-nutritional interventions, and articles in the form of opinions, editorials, or conference abstracts were not included in this review.

Literature searches were conducted through PubMed, ScienceDirect, and Google Scholar databases using keywords and Boolean combinations such as: (“pregnant women” OR “pregnant mothers”) AND (“health belief model” OR HBM) AND (“nutrition program” OR “free nutritious meals” OR “nutrition intervention”) AND (“compliance” OR “compliance” OR “health behavior”). The study selection process was conducted in three stages: screening titles and abstracts to assess initial relevance, full-text review to ensure eligibility based on inclusion criteria, and documentation of the selection process using a PRISMA flow diagram.



Based on the PRISMA chart presented, the literature search and selection process in this scoping review was carried out systematically and in stages. Of the 816 articles identified through the Google Scholar and PubMed databases, 253 were screened based on initial relevance to the title, abstract, and keywords. After further filtering with language criteria (Indonesian and English), document type (original article), and source (scientific journal), the number of articles that passed this stage decreased to 197. From the results of the full-text review of 18 articles, 12 articles met all inclusion criteria and were included in the final analysis.

All collected data were analyzed descriptively and thematically, with findings grouped based on the main components of the HBM, such as perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy. The analysis also included cross-study comparisons to identify similarities, differences, and research gaps.

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RESULTS AND DISCUSSION

Table 1.

No	Author and Year	Research Design	Main findings	Barriers and driving factors	Program recommendations
1	Neha R. Jhaveri, Natalia E. Poveda, Shivani Kachwaha, Dawn L. Comeau, Phuong H. Nguyen, dan Melissa F. Young (2023)	This qualitative study was conducted in Uttar Pradesh, India, to evaluate the impact of Alive & Thrive's maternal nutrition intervention. In-depth interviews were conducted with 24 pregnant women, 13 husbands, and 15 mothers-in-law, with thematic analysis based on the COM-B (Capability, Opportunity, Motivation, Behavior) model. The objective was to understand maternal nutritional behavior and the family's influence on adopting such behavior.	Adoption of nutritional behavior is influenced by a fundamental understanding of mothers (capability), limited access to food and supplements (opportunity), and low motivation due to misconceptions and lack of ANC encouragement. Field health workers (FLW) support has been shown to help implement nutritional behavior.	The main obstacles include maternal workload, limited access to food and supplements, minimal family support, and incorrect cultural norms. Meanwhile, the supporting factors are responsive FLW education, involvement of husbands and mothers-in-law, and internal motivation of mothers.	Program recommendations include improving prenatal nutrition education, supplement distribution, and a family-centric approach. Strengthening FLW capacity and implementing the COM-B model in interventions for maternal nutrition behavior is also recommended.
2	Juhrotun Nisa, Nora Rahmanindar (2023)	This study used a quantitative approach with a cross-sectional design. The population was all pregnant women who attended the pregnancy class at the Dukuhwaru Health Center, totaling 208 people, and a sample of 53 people was taken using the accidental three-sampling technique. Data were collected through an online questionnaire that measured six components of the Health Belief Model (HBM) and analyzed using the Fisher's Exact test to see the relationship with the regularity of antenatal check-ups.	The results showed that only three of the six HBM components had a significant relationship with the regularity of antenatal check-ups: perception of seriousness, threat, and obstacles. Meanwhile, perception of vulnerability, perception of benefits, and cues to action did not show a significant relationship. This means that mothers who feel that their pregnancy is serious feel threatened and do not think of many obstacles tend to have more routine antenatal check-ups.	The main obstacles faced by pregnant women in antenatal check-ups during the pandemic are fear of contracting COVID-19, limited transportation, and prohibitions from family. However, many mothers still check their pregnancies because they feel the need to know the condition of their fetus and themselves. The main supporting factors are good access to information and personal experience or support from health workers, which encourage them to continue to	There is a need for stronger education about the seriousness and threat of pregnancy complications, as well as reducing barriers to access through safe and comfortable ANC services. Programs also need to expand the provision of information through digital media and pregnant women's groups to raise awareness and encourage regular visits even during the pandemic.

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				have routine check-ups.	
4	Ririn Widyastuti1, Ferry W.F Waangsir, Yuliana Dafroyati, Astin Nur Hanifah, Bertolomeus E Rimba, Grasiana Florida Boa, Tirza V.I Tabelak (2023)	This descriptive correlational study was conducted in 5 Community Health Centers in Ende City (January–December 2022) with 221 pregnant women as samples (quota and purposive sampling). Data were collected through a valid and reliable 40-item questionnaire. The analysis used Pearson correlation and linear regression to test the relationship between the Health Belief Model (HBM) and the preventive behavior of pregnant women during the COVID-19 pandemic.	There is a significant positive relationship between HBM and preventive behavior (r=0.295; p=0.000). HBM components (perceived susceptibility, severity, benefit, and barrier) together influence behavior. Perceived susceptibility is highest (4.23), and perceived barriers are lowest (3.16).	Main barriers: most mothers are housewives (70.1%) with limited decision-making. Supporting factors include a high perception of risks and benefits, especially in mothers aged 20–35 years with higher education.	HBM-based educational interventions are recommended to increase perceptions of vulnerabilities and benefits and reduce barriers, supported by education, family support, and maternal-friendly health services. Online media and home visits are recommended for effectiveness during social restrictions.
5	Ratna Diana Fransiska, Dian Kusumaningtyas, Kentri Anggarina Gumanti (2022)	This study is a correlational analytical study with a cross-sectional approach involving 120 pregnant women in Malang City. Data were collected using the Health Belief Model (HBM) questionnaire and COVID-19 prevention behavior, then analyzed using multiple linear regression.	Of the six HBM components, only perceived barriers and self-efficacy significantly affect COVID-19 prevention behavior. Other components, such as perceived vulnerability, seriousness, benefits, and cues to action, do not have a significant effect even though their values are pretty high.	The main barrier is high perceived barriers (e.g., limited access and confusing information). Strong supporting factors are the high self-efficacy level of education and family support.	Educational interventions that focus on reducing barriers and increasing self-efficacy are recommended, with easy-to-understand communication strategies that prevent excessive anxiety.
6	Getahun Ersino Lombamo, Carol J. Henry, dan Gordon A. Zello (2024)	This was a quasi-experimental study with intervention and control groups involving approximately 200 mothers and children under five years of age in two legume-producing communities in Halaba, Ethiopia. The intervention group received six months of Health Belief Model-based nutrition	The results showed significant improvements in knowledge, attitudes, and practices of pulse consumption in the intervention group. Dietary diversity and consumption of nutritious foods increased, and the prevalence of wasting in children decreased. However, long-term	The main barriers were the short duration of the intervention and socioeconomic factors such as low maternal access to food and resources. Supporting factors for success were the educational approach based on HBM theory, the active involvement of local cadres,	It is recommended that nutrition education programs be implemented in the longer term, accompanied by support for agriculture and the household economy. Programs also need to involve families and communities widely and focus on increasing food diversity and empowering

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		education through monthly community meetings and home visits, while the control group received no intervention.	nutritional status, such as stunting, did not improve significantly.	and the use of positive and culturally relevant messages.	mothers in managing family nutrition.
7	Adane Tesfaye , Kefyalew Taye Belete, Dessalegn Ta miru, dan Tefera Belache w (2025)	This study was a two-arm parallel cluster-based randomized controlled trial conducted over one year in West Arsi, Ethiopia. A total of 28 clusters (kebeles) were randomly divided into intervention and control groups. The intervention group received four sessions of Health Belief Model (HBM)-based nutrition behavior change communication (NBCC) by community cadres (AFDs), including cooking demonstrations and trimester-based counseling.	NBCC significantly improved nutritional knowledge and healthy eating practices in pregnant adolescents. The proportion of appropriate eating practices increased by 20.3% in the intervention group while decreasing by 5.6% in the control group. Dietary diversity scores (MDD-W) and daily meal frequency also significantly improved. The odds of pregnant adolescents in the intervention group having good eating practices were 4.2 times higher, and sound nutritional knowledge was 5.5 times higher than those in the control group.	Key barriers include limited food resources, reliance on seasonal consumption, and minimal nutrition education sessions during routine ANC visits. Supporting factors for success were the use of HBM, home-based and visual education, personal counseling approaches (GALIDRAA), and the involvement of husbands and local cadres (AFDs) that strengthened the acceptance of the intervention.	It is recommended that NBCC be implemented sustainably by communities (such as AFDs) and combined with nutrition-sensitive interventions such as food safety training, cooking demonstrations, and education on local food use. NBCC is more effective when linked to strengthening the health service system, culture-based approaches, and strategies to prevent teenage pregnancy.
8	Aria Aulia Nastiti, Mira Triharini, Nofinda Widya Sari, Ni Ketut Alit Armini, Nursalam Nursalam, Sandeep Poddar (2024)	This study used a descriptive-analytical design with a cross-sectional approach. The sample consisted of 164 pregnant women in the Megaluh Health Center working area, Jombang Regency, who were selected through simple random sampling. The study analyzed the relationship between the components of the Health Belief Model (HBM) and the nutritional fulfillment behavior of pregnant	Three factors from the HBM model significantly related to nutritional fulfillment behavior are perceived benefits, perceived barriers, and cues to action. Meanwhile, perceived susceptibility, severity, and self-efficacy did not show a significant relationship. Pregnant women tend to fulfill their nutritional needs if they see the benefits, receive external	The main obstacles pregnant women face in meeting their nutritional needs include economic constraints, limited access to nutritious food, and lack of social support. In contrast, strong supporting factors are family support, health workers' role, and pregnancy classes that respondents routinely attend. Education from health workers and the involvement of	Educational interventions based on the Health Belief Model that emphasize increasing perceptions of benefits, reducing barriers, and strengthening cues to action are needed. Programs can include expanding the role of nutrition workers in ANC, providing family training to support pregnant women, and running public awareness campaigns on the

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		women using a structured questionnaire and Spearman's rho statistical test.	encouragement, and not feel burdened by major obstacles.	husbands or families greatly influence behavioral changes.	importance of nutrition during pregnancy. The government is also advised to improve access to nutritious food for low-income families to support maternal and infant health.
9	Abedi Aminloui E, Amin-Shokravai F, dan Zarei F (2019)	This study used a quasi-experimental design with a pretest-posttest approach and a control group. The subjects were 86 primigravida pregnant women (first pregnancy) in eight Khorram Darreh, Iran health centers. They were randomly divided into intervention (43 people) and control (43 people). The intervention was conducted through nutrition education by a nutritionist in three sessions during the first to third trimester. The primary measurement instrument was the NUTRIKAP questionnaire, which assessed maternal knowledge, attitudes, and practices related to pregnancy nutrition.	After the intervention, there was a significant increase in knowledge scores (p=0.019) and nutritional practices (p<0.001) in the intervention group compared to the control group. However, there was no significant change in attitudes (p=0.311). In addition, the intervention group showed a higher proportion of appropriate weight gain during pregnancy (62.8% vs 32.6%). This suggests that the educational intervention had a positive effect on maternal nutritional knowledge and behavior as well as on the outcome of healthy weight gain during pregnancy.	Significant barriers included time constraints in completing the questionnaire, which could affect the accuracy of responses, differences in education levels across health centers, and difficulty scheduling training sessions due to differences in gestational age. In addition, attitude scores did not change much due to local cultural influences (e.g., high-fat dairy consumption habits among local ethnic Turks). Supporting factors included the direct involvement of nutritionists in education, the use of needs-based training modules, and monitoring during pregnancy.	Educational interventions based on the Health Belief Model that emphasize increasing perceptions of benefits, reducing barriers, and strengthening cues to action are needed. Programs can include expanding the role of nutrition workers in ANC, providing family training to support pregnant women, and running public awareness campaigns on the importance of nutrition during pregnancy. The government is also advised to improve access to nutritious food for low-income families to support maternal and infant health.
10	Girma Beressa 1, Susan J. Whiting dan Tefera Belache w (2025)	This study used a cluster randomized controlled trial (RCT) design with two parallel groups (intervention and control) conducted in the urban area of Bale Zone, Ethiopia. Four hundred forty-seven pregnant women in their first and early second trimesters were randomly	The main results showed that the nutrition education intervention significantly increased hemoglobin (Hgb) levels by 0.36 g/dL (β = 0.36, 95% CI: 0.30–0.43; p < 0.001). In addition, daily tea or coffee consumption decreased Hgb	Significant barriers to implementation include potential recall bias, social bias due to self-completion of the questionnaire, and limited generalizability of results because the cluster approach can lead to behavioral homogeneity	Nutrition education interventions based on HBM and TPB theories are integrated into maternal and child health service programs, especially during routine antenatal visits. Education must emphasize the importance of consuming iron-rich

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		assigned to two cities: Robe (intervention) and Goba (control). The intervention group received six nutrition education sessions based on the Health Belief Model (HBM) and Theory of Planned Behavior (TPB) theories delivered by trained nurses over six months, while the control group received only routine antenatal care services.	levels by 0.14 g/dL (β = -0.14, 95% CI: -0.23 to -0.06). The scores of HBM and TPB components, such as perceived susceptibility, benefits, barriers, and self-efficacy, also increased significantly in the intervention group. This proves the effectiveness of the theory-based educational approach in improving nutritional behavior and status during pregnancy.	within a region. In addition, biological and cultural factors such as food savings, economic constraints, and low access to iron-rich foods are also obstacles. On the other hand, supporting factors for the success of the intervention are direct delivery of education at home, use of local languages, and support from trained health professionals who regularly conduct home visits.	foods, limiting tea/coffee consumption during pregnancy, and understanding local cultures influencing pregnant women's diets. The government and related institutions are also advised to strengthen national nutrition policies, expand access to nutritious food, and improve the quality of counseling through behavioral-based health worker training.
11	AdaneTesfay, Dessalegn Tamiru Tefera Belachew (2024)	This study was a cluster-controlled trial (RCT) involving 426 pregnant adolescents (<16 weeks of gestation) in Ethiopia. The intervention group received Health Belief Model (HBM)-based nutrition counseling through Alliance for Development (AFD) cadres, while the control group received routine education. Counseling was conducted at home, involving husbands, and lasted four sessions.	NBCC intervention significantly improved nutritional status (MUAC +1.89 cm) and gestational weight gain (GWG +4.23 kg) compared to the control group ($p < 0.001$). This improvement was driven by changes in perception and understanding of nutrition through the HBM-based approach.	The main barriers were negative perceptions about food and cultural barriers. Supporting factors included husband involvement, the GALIDRAA method, intensive cadres training, and visual aids and cooking demonstrations.	HBM-based NBCC is recommended as a national approach for nutritional counseling for pregnant adolescents because it is practical, inexpensive, and easily integrated into the health system through community cadres such as AFD.
12	Robab Sharifat, Fatemeh Borazjani, MarziehAraban , Amir H. Pakpour, Kambiz AhmadiAngali, dan Saleh Aiiashi (2024)	This study used an open randomized controlled trial (RCT) with a parallel design involving 90 pregnant women at high risk of gestational diabetes. Participants were randomly divided into two groups: the intervention group received nutrition education based on the Health Belief Model (HBM) for 12	After 12 weeks of intervention, there was a significant increase in perceived susceptibility and cue-to-action scores in the intervention group. Biochemically, there was a significant decrease in triglyceride and hs-CRP levels and a lower increase in	The main barriers identified included limited time to prepare healthy meals, lack of nutrition information during pregnancy, and limited access to nutritious foods such as vegetables and whole grains. In contrast, factors supporting the program's success	It is recommended that behavioral model-based nutrition education, such as HBM, be integrated into maternal health service programs. Interventions should be initiated in the first trimester and continued consistently until the end of pregnancy to increase

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	weeks, while the control group only received routine health services. Assessments were carried out before and after the intervention, including the HBM questionnaire, quality of life (SF-12), physical activity, 3-day food records, and blood biomarkers (FBS, insulin, hs-CRP, lipids).	total cholesterol compared to the control group. Regarding quality of life, the general health subscale increased significantly in the intervention group. However, no significant changes were found in fasting blood glucose levels or other glycemic indicators.	included the HBM theory-based approach that increased motivation, active participant engagement in discussions, educational media such as booklets and WhatsApp, and support from health workers and families.	effectiveness. Further studies with longer duration, larger sample sizes, and including pregnancy outcomes as indicators are needed to strengthen these findings and expand the generalizability of the results to a broader population, including rural areas.

Source: (24–33)

The Health Belief Model (HBM) is a robust theoretical framework for understanding and predicting health behaviors, including maternal adherence to a nutritious eating program. The model allows for identifying psychosocial factors that influence behavior, which is essential for improving the effectiveness of nutritional interventions.

The Influence of the Health Belief Model on Pregnant Women's Participation in Nutrition Intervention Programs

The application of the Health Belief Model (HBM) has been proven to contribute positively to improving the nutritional consumption behavior of pregnant women. HBM explains that perceptions of vulnerability, seriousness, benefits, barriers, cues to action, and self-efficacy influence health decision-making. Several studies have shown that perceptions of benefits and barriers play a significant role in shaping the nutritional behavior of pregnant women. For example, pregnant women who know the benefits of fulfilling nutrition and have access to information and family support are more likely to follow nutritional interventions [24].

In Ethiopia, a six-month HBM-based educational intervention significantly improved pregnant women's nutritious food consumption practices and dietary diversity, indicating that enhanced understanding through theory-based education promotes the adoption of healthy eating behaviors25. Another study showed that pregnant women who felt their pregnancy was at risk (perceived susceptibility) and felt they received a strong cue to act (cue to action) tended to show better changes in eating behavior after receiving an HBM-based intervention[26].

Self-efficacy was also a key component in overcoming barriers to participation. For example, mothers with high self-efficacy in managing their nutritional needs remained consistent in participating in the program despite limited access or low social support [27]. Thus, HBM is a practical framework for designing and implementing nutritional intervention programs for pregnant women, especially when combined with

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community-based approaches and personal support from health workers.

HBM components such as perceived susceptibility and perceived severity were found to significantly influence pregnant women's involvement in nutrition programs [28,29]. Pregnant women who are aware of the risks of complications due to malnutrition tend to be more compliant with the program.

The components of perceived benefits and barriers are critical in determining the success of the intervention. Studies show that pregnant women who understand the benefits of nutritional intake are more likely to change their behavior[24]. However, economic barriers, limited access to food, and cultural norms are significant challenges [30,31].

Barriers and Drivers of Pregnant Women's Participation in Nutrition Intervention Programs

Several barriers have been identified to pregnant women's participation in nutrition intervention programs, including economic constraints, limited access to nutritious food, and the influence of cultural and family norms. For example, in a study in India, restricted access to food and low motivation due to misconceptions and domestic workload were significant barriers. However, support from field health workers and families could facilitate behavior change[31]. Similarly, in the context of the COVID-19 pandemic, fear of infection and family restrictions are significant barriers, although some mothers remain motivated due to the need for fetal monitoring[28].

Key motivating factors for participation include family support, the role of health workers, and the presence of relevant and easily accessible education. A study by Tesfaye et al. (2025) emphasizes the importance of culture-based personal counseling and household education through local cadres in increasing program acceptance. The use of educational media, such as WhatsApp and booklets, as well as cooking demonstrations and regional languages , also increases the involvement of pregnant women [26,30].

In general, interventions that involve families, use visual and participatory approaches, and consider local cultural and logistical factors have shown higher success rates. Therefore, the success of the free nutritious meal program for pregnant women is greatly influenced by its ability to reduce structural and psychological barriers and maximize educational and social motivators.

Self-efficacy or self-confidence of mothers in managing nutritional intake was found to be a strong predictor of behavioral change27. Programs that integrate training, home visits, and community empowerment have significantly increased self-efficacy [25,33]. Meanwhile, cues to action such as education from health workers and involvement of husband/family strengthen the intention to act[24,31].

Many studies underline the importance of understanding local socio-cultural factors,

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including the influence of husbands, in-laws, and community leaders in supporting or inhibiting changes in pregnant women's behavior[26,31]. Interventions that do not take cultural norms into account tend to be less effective, as seen in studies in Iran and Ethiopia[34].

Several knowledge gaps identified in this review indicate that studies adopting the Health Belief Model (HBM) approach in a participatory manner with local communities in Indonesia are still minimal. Community involvement in the design and implementation of nutrition programs is significant in ensuring the relevance of the socio-cultural context and increasing the acceptability of interventions. In addition, there is a lack of an integrative approach that combines the HBM with other behavioral theories, such as the Theory of Planned Behavior (TPB), which can complement the understanding of behavioral intention and control in health-related decision making, as shown by[34]. On the other hand, the use of digital technology and online communication media in delivering theory-based nutrition education messages has not been maximized optimally. However, this approach has proven effective in expanding the reach and efficiency of interventions. Therefore, efforts are needed to design nutrition interventions based on the results of maternal perception assessments using instruments that refer to the entire HBM. The educational approach must also involve community cadres, family members, and the use of local and digital media to overcome structural and cultural barriers that hinder behavior change. The government and policymakers are advised to strengthen support for the free nutritious meal program by integrating evidence-based health promotion strategies and paying attention to behavioral dimensions as a whole.

The findings of this review can guide policymakers, health care providers, and program administrators in designing more targeted, culturally appropriate, and theory-based interventions to improve pregnant women's compliance with free nutritious meal programs. By identifying key psychosocial drivers, especially perceived benefits, barriers, and cues to action, this review highlights which behavioral components should be prioritized in messaging and program design. Additionally, this review contributes to the understanding of the Health Belief Model by showing that certain components, such as perceived benefits and self-efficacy, are more prominent and consistently associated with behavioral change in this context, indicating their central role in promoting nutritional compliance during pregnancy.

Economic constraints and limited food access are categorized under perceived barriers, as they directly hinder the ability of pregnant women to act despite awareness of the program's benefits. On the other hand, family support and health worker involvement function as cues to action, providing external motivation and reinforcement for compliance. Meanwhile, cultural education and media-

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based messages strengthen perceived benefits by enhancing understanding of the program's advantages and outcomes. Self-confidence in managing food intake, which falls under self-efficacy, has also been identified as a strong predictor of adherence, especially when supported through training and personal counseling.

CONCLUSION

The conclusion of this literature study shows that the Health Belief Model (HBM) approach effectively influences pregnant women's behavior to participate in the free nutritious meal program, mainly through increasing perceptions of benefits, risk awareness, and relevant cues to action. However, the program's success is greatly influenced by barriers such as limited access to food, cultural norms, minimal family support, and low maternal self-efficacy. In contrast, motivating factors such as culturally tailored education, support from health workers and families, and the use of educational media have been shown to increase participation. Therefore, it is recommended that the free nutritious meal program for pregnant women sustainably integrate HBM-based education, actively involve families and communities, expand access to healthy food through multi-sector policies, and use interactive and easily accessible communication media to strengthen the motivation and involvement of pregnant women in maintaining their nutritional status during pregnancy.

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