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LITERATURE REVIEW
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Perspectives of Pregnant Women and Antenatal Service Providers Regarding Gestational Weight Gain and Nutritional Needs: Systematic Review

Perspektif Ibu hamil dan Penyedia Layanan Antenatal terkait Peningkatan Berat Badan Ibu dan Kebutuhan Gizi selama Kehamilan: Sistematik Review

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ABSTRACT

Background: Gestational weight gain that does not follow the standards can cause long-term problems for maternal and fetal outcomes. Research has found that most pregnant women cannot achieve gestational weight gain according to health standards.
Objectives: This review explores the perspectives of pregnant women and antenatal care providers regarding gestational weight gain and nutritional needs.
Methods: A systematic review follows the PRISMA guidelines. Several databases were accessed, namely PubMed, Google Scholar, and ScienceDirect databases, using a combination of the following Medical Subject Heading terms and relevant keywords. The inclusion criteria applied were studies written in English, evaluating the relevant topics, providing full text, and the study was published starting in 2019-2023.
Results: A total of 12 articles were reviewed. Respondents were midwives, family doctors, obstetricians, health trainers, administrative officers, and pregnant and postpartum women. The nutritional status of pregnant women studied included normal and obese pregnant women. Obstacles encountered in counseling are patient attitudes, sociocultural issues (sensitive issues), accessibility of resources, and lack of communication training with patients and across professions. Sociocultural, economic status, and interpersonal factors such as social support influence patient beliefs, attitudes, and experiences. Patients may remember their positive experiences in health facilities, but there is also a fear of discrimination they face.
Conclusions: This study finds the need for training in counseling and cross-professional communication techniques to health service providers regarding gestational weight gain. Appropriate counseling increases patient comfort during pregnancy and prevents adverse effects that arise during and after pregnancy.

INTRODUCTION

Countries worldwide, including Indonesia, are struggling to achieve Sustainable Development Goals (SDGs) 3, namely ensuring a healthy life and promoting well-being for all people of all ages, including maternal health[1]. Preventing complications that appear during pregnancy is the main focus. Complications during pregnancy can impact both people, namely the mother, and child, in the long term. Pregnancy symptoms and complications can range from mild discomfort and bothersome to severe illness and can be life-threatening. Complications found in pregnant women such as obesity, preeclampsia, diabetes mellitus in pregnancy, stillbirth, and cesarean delivery[2].

Maternal weight gain during pregnancy has been a topic discussed in previous studies. Institute of Medicine (IOM) 2009 has launched recommendations for weight gain during pregnancy, which are associated with various short-term risks for the mother, such as the risk of sectio caesarea and large and small birth weight for gestational age[3]. The risk of baby death after birth and within one year is higher if born to mothers who experienced inadequate weight gain during pregnancy. Failure to initiate early breastfeeding and preterm birth is also associated with low gestational weight. Not only is the lack of weight gain terrible, but excess weight gain is also a risk for the mother. Mothers are faced with the long-term consequences of metabolism[4].

In addition to the short-term impact,

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inadequate weight gain for pregnant women impacts the condition of stunting and obesity in children. The 2.15 times higher risk for stunting in children aged 12-24 months occurs in children born to mothers with less weight gain than mothers with a history of sufficient pregnancy weight gain[5]. The likelihood of stunting by 4% can be reduced by increasing one unit of Body Mass Index (BMI) during pregnancy[6]. Maternal BMI before pregnancy is often overlooked. The consequence is an increase in maternal weight that is not compared with BMI before pregnancy, coupled with an inaccurate calculation of the increase can be an unfavorable situation for children aged 6-23 months[7]. Being overweight or obese in childhood is associated with a history of maternal excess weight gain during pregnancy[4].

Weight gain in pregnant women, according to standards, is still rare. Helms et al. (2006) found that from 1988 to 2003, the number of pregnant women in North Carolina who experienced under or excessive weight gain increased. There was a significant decrease in the percentage of pregnant women who achieved the recommended weight gain[8]. As many as 40 to 60% of women in the United States experience excessive pregnancy weight gain[7]. Only 30-35% of Canadian women achieve the recommended weight gain during pregnancy, and the rest gain more than the recommended weight[9]. Research in West Sumatra, Indonesia, conducted by Soltani et al. (2017), found that most pregnant women gain weight during pregnancy which is not per IOM recommendations, especially women who, before pregnancy, had an average BMI of [10]. Firdaus et al. (2015) found that most pregnant women in Makassar experience poor weight gain compared to ideal weight gain during pregnancy[11].

Nutrition recommendations and weight gain during pregnancy given to pregnant women can be given during counseling during antenatal care. This concept, if not carried out properly, can impact pregnant women not being able to meet the minimum requirements according to nutritional recommendations[12]. Pregnant women can experience eating disorders that can affect the fetus's growth. Dieting and overeating increase substantially during pregnancy[13]. Maternal and newborn health outcomes are determined by intake obtained during pregnancy. Macronutrients consumed are related to maintaining maternal homeostasis and supporting fetal growth. These macronutrients are in the form of energy and protein. The mother's nutritional status determines diet requirements. The provision of supplementation is also adjusted to the needs of each mother. Regulating carbohydrate intake can prevent gestational diabetes and large babies. In addition to macronutrients, certain micronutrients are crucial for improving pregnancy outcomes, such as folic acid and calcium, often given to pregnant women during antenatal care. The folic acid function is to prevent neural tube defects. Calcium is explicitly given to women at high risk of calcium deficiency. The iodine function is to prevent cretinism[14].

The proper counseling and view of pregnant women are the keys to maintaining gestational weight gain. This study explores the perspective of pregnant women and antenatal service providers regarding gestational weight gain and nutritional needs.

METHODS

Study Design and Search Strategy

A systematic review explored the perspective of pregnant women and antenatal service providers regarding gestational weight gain and nutritional needs. Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines were followed for writing a systematic review[15]. Three databases, PubMed, Google Scholar, and ScienceDirect, were accessed using several keywords. The keywords were searched from Medical Subject Heading (MeSH) terms. 'gestational weight gain,' 'pregnant women,' and 'antenatal care provider' were used. Boolean operators were used in searches using AND, OR, and NOT.

Study Selection and Outcome Measure

The inclusion criteria applied in selecting scientific articles were qualitative and quantitative study, written in English, evaluating the relevant topic, providing full text, and the study was published starting in 2019-2023. Case reports, letters to editors, animal studies, systematic or narrative reviews, and abstracts without full text were excluded from the review.

Data Extraction

A standard Microsoft Excel form is used to screen the database's titles and/or abstracts independently. Disagreements in consensus were resolved with third parties. A formal assessment of the quality of the articles was carried out by an independent research team using CASP for the qualitative study and CEBMa for the cross-sectional study. CASP and CEBMa results were concluded in moderate and low overall quality. The use of critical appraisal tools assists researchers in assessing the quality of research and the possibility of bias in the preparation of methods, implementation, and data analysis.

Data Abstraction and Synthesis

The analysis is based on the results and conclusions of each study according to the guidelines for compiling systematic literature. The relevant results are extracted, sorted, and examined to identify sub-themes and themes. All authors carried out the results of the synthesis. The following data is presented in Table 3. Table 3 presented the authors, year, country, aim, study type, data collection, participant and sample size, pregnant women's nutritional status, analysis technique, and findings.

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Flowchart Study Selection

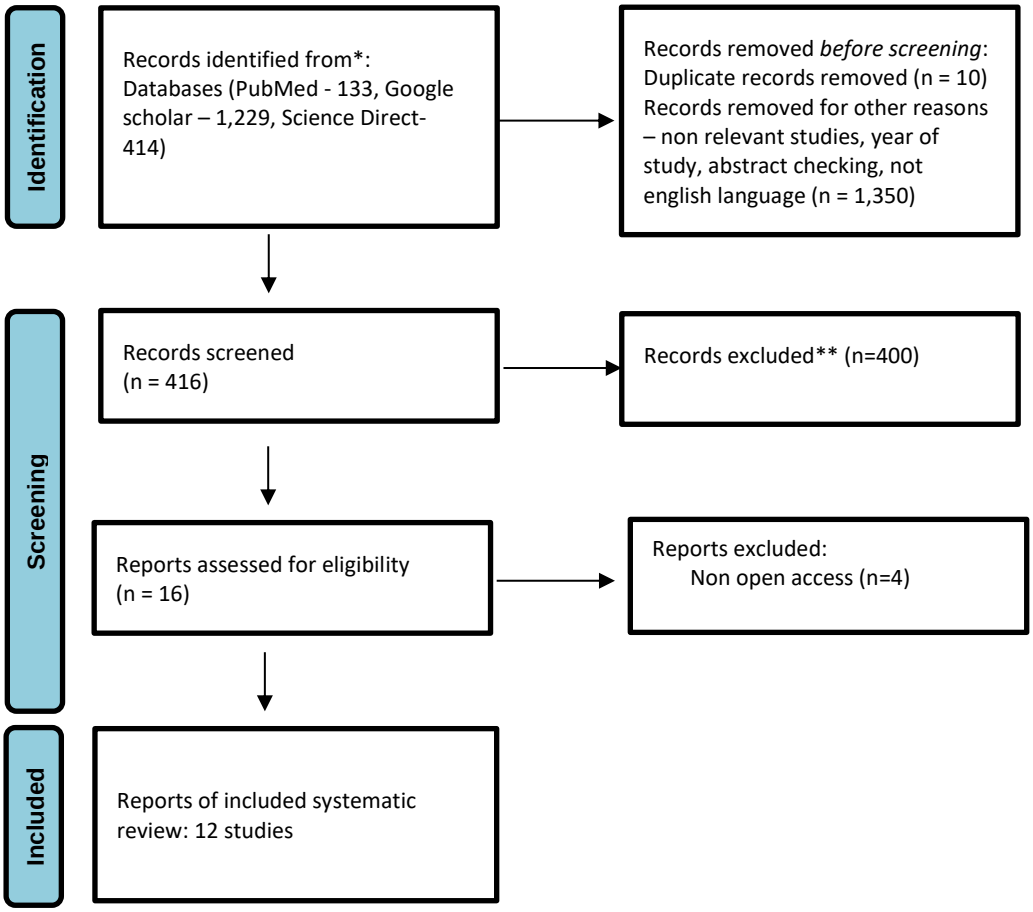

Figure 1. PRISMA flowchart

RESULTS AND DISCUSSION

Screening Results and Assessment of Article Quality

A total of 1776 articles were found in 3 databases. After being examined abstract, the year, topics, and languages, as many as 416 entered the initial screening. There are 16 studies s accessed for eligibility. A total of 4 studies were not open access; therefore, they are excluded. A total of 12 articles were analyzed. PRIMA flow chart is presented in Figure 1. The articles analyzed have the quality of the moderate category and are presented in Table 1 and Table 2.

Aim of the Research

A total of 12 articles were carried out to analyze the perspective of antenatal care providers and pregnant women. Studies involving antenatal care providers analyze the barrier experienced in counseling and antenatal services related to gestational weight gain. This study discusses related factors, including knowledge and appropriate care models. Studies involving pregnant women aim to study the beliefs, knowledge, attitudes, and experiences of pregnant women in regulating weight gain during pregnancy, especially in antenatal services in health facilities.

Methods and Techniques of Analysis

Most of the research included in the review is qualitative research. Data were collected using semi-structured interviews and focus group discussions. Data were analyzed by thematic analysis. Quantitative research is cross-sectional - survey type. Respondents who encountered antenatal care providers consisted of multidisciplinary professionals, namely midwives, family doctors, obstetricians, health trainers, and administrative officers. Respondents of pregnant women involved ages ranging from 18 years, gestational age, primigravida and multigravida pregnant women (a study required primigravida pregnant women and pregnancies at 22 and 36 weeks of gestation), and postpartum mothers. The nutritional status of pregnant women studied included normal pregnant women and obese pregnant women.

Finding

The study found that antenatal care providers provided weight gain counseling to all patients. Topics covered include weight gain goals, nutrition, prevention of gestational diabetes, and physical activity. Providing information is not routine. Obstacles encountered in counseling are patient attitudes, sociocultural issues (sensitive issues), accessibility of resources, and lack of communication training with patients and across

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professions. Antenatal care providers advise patients to consult a nutritionist and support cross-professional collaboration. Studies about pregnant women found that they may not be sure their gestational weight gain is within a healthy range and may not seem to have complete control over their weight gain during pregnancy. Sociocultural, economic status, and interpersonal factors such as social support influence beliefs, attitudes, and experiences. Patients may remember their positive experiences in health facilities, but there is also a fear of discrimination they face. The finding is presented in Table 3.

The study's results indicated that providers and pregnant women experienced constraints. Weight gain during pregnancy is a complex process in the body of pregnant women. As a form of support for fetal growth and development, maternal weight gain consists of maternal, placental, and fetal components. The maternal component comprises fat mass, fat-free mass, and total body water. The placenta's components are the placenta's weight, the placenta's growth, the placenta's development, and the placenta composition. Fetal components include amniotic fluid and fetal growth, fat and fat-free mass. This increase occurs uniquely so that it differs from one woman to another. Some guidelines are made with generalizations so that the pattern and impact on pregnancy can be known[16].

Various efforts need to be made by healthcare providers during pregnancy and collaboration between patients and service providers. Healthcare providers caring for pregnant women play an essential role in educating and advising their patients on the benefits of healthy weight gain[17]. Women who report correct information regarding weight gain targets according to IOM guidelines from their provider will have a greater chance of identifying the recommended weight gain for their pre-pregnancy body mass index[18].

Pregnant women who were obese before becoming pregnant are at risk of having less knowledge about recommendations for weight gain during pregnancy. They can also report incorrect information from the provider[19]. Based on a 2014 national survey in the United States, pregnant women were less likely to receive counseling about weight management than non-pregnant women. Women who are overweight or obese are less likely to receive guidance that does not comply with IOM guidelines[17]. Only 31-53% are aware of weight gain recommendations even though they experience these concerns[20].

According to standards, the increase in pregnant women's weight is based on the perceptions of pregnant women and health workers. The materials provided are often not following IOM recommendations. Research by Moore Simhas et al. (2013) found that few antenatal care providers could correctly explain weight gain for all BMI categories. Difficulties are also encountered when providing information to pregnant women with obesity[21]. In an ideal calculation, the difference between the weight at the first and last prenatal visit just before delivery is called the total weight gain during pregnancy. Sometimes, this increase is calculated before pregnancy. The situation becomes even more complicated if a pregnant woman does not perform on time. Increased maternal fat stores can be identified from accurate weight gain. The time of weight gain is best reflected in the area under the weight gain curve[22].

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Table 1. Article quality assessment for cross-sectional design study using Centre of Evidence-Based Medicine (CEBM) appraisal tools

Author, year	Did the study address a focused question/issue?	Is the research method (study design) appropriate for answering the research question?	Is the method of selection of the subjects (employees, teams, divisions, organizations) clearly described?	Could the way the sample was obtained introduce (selection)bias?	Was the sample of subjects representative regarding the population to which the findings will be referred?	Was the sample size based on pre-study considerations of statistical power?	Was a satisfactory response rate achieved?	Are the measurements (questionnaires) likely to be valid and reliable?	Was the statistical significance assessed?	Are confidence intervals given for the main results?	Could there be confounding factors that have not been accounted for?	Can the results be applied to your organization?	Quality
Moffat et al, 2021[23]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	Y	Y	M
Christenson et al, 2019[24]	Y	Y	Y	Y	C	Y	Y	C	Y	Y	Y	Y	M
Lott et al, 2019[25]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	Y	Y	M
Haakstad et al, 2020[26]	Y	Y	Y	Y	N	N	C	C	Y	Y	Y	Y	M

Notes: Y = yes, C= can't tell, N = No, M= moderate overall quality, L = low overall quality

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Table 2. Article quality assessment for qualitative study using Critical Appraisal Skills Programme (CASP) tools

Author, year	Was there a clear statement of the aims of the research?	Is a qualitative methodology appropriate?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Was the data collected in a way that addressed the research issue?	Has the relationship between the researcher and participants been adequately considered?	Have ethical issues been taken into consideration?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	How valuable is the research?	Quality
Murray-Davis et al., 2020[9]	Y	Y	Y	Y	Y	Y	Y	C	Y	Y	M
Goldstein et al, 2020[27]	Y	Y	Y	Y	Y	C	Y	Y	Y	Y	M
Guthrie et al., 2019[28]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	M
Lindsay et al., 2019[17]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	M
Hurst et al., 2021[29]	Y	Y	Y	Y	Y	C	Y	C	Y	Y	M
Vanstone et al, 2020 [30]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	M
Christenson et al, 2020[31]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	M
Asefa et al., 2020[32]	Y	Y	Y	Y	Y	Y	C	C	Y	Y	M

Notes: Y = yes, C= can't tell, N = No, M= moderate overall quality, L = low overall quality
Further information for the question "What were the results of this study" has been presented in Table 3.

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Table 3. Characteristics of research included in a systematic review

Authors, year	Country	Aim	Study type	Data Collection	Participant and Sample Size	Nutritional Status of Pregnant Women	Analysis Technique	Finding
Murray-Davis et al., 2020	Canada	Factors that act as supports or barriers to family counseling to doctors, midwives, and obstetricians in Ontario about GWG	Qualitative study	Semi-structured interviews	Seven family physicians, six midwives, and five obstetricians	All	Thematic analysis	Gestational weight gain counseling is provided early in pregnancy with topics including gestational weight gain targets, nutrition & exercise, and prevention of gestational diabetes. Weight gain counseling is not done routinely. Obstacles experienced by providers are patient attitudes, social and cultural issues, and accessibility of resources. There is a need for patient enthusiasm and access to a nutritionist in order to obtain more in-depth information.
Goldstein et al, 2020	Australia	A health professional's perspective on healthy lifestyles and supporting standardized pregnancy weight gain for women with obesity	Qualitative study	Semi-structured interviews	A total 14 multidisciplinary staff (Midwife, Obstetrician, Physician, Health coach, an administration clerk	Obesity	Thematic analysis	Staff support services and value developing teamwork with staff and good relationships with patients. Most patients feel relatively comfortable talking about weight gain. The obstacles encountered were that this topic tends to be sensitive to women, there is limited awareness about interventions among new staff, communication between teams, and waiting times.
Guthrie et al., 2019	Australia	Analyzing the influence of continuity and non-continuity models of midwifery care readiness related to pregnancy weight gain, healthy eating and physical activity in Women	Qualitative study	Focus groups	Four focus groups involving 15 participants from the continuity of care model and 53 from the non-continuity model,	All	Thematic analysis	Participants from the continuity model reported greater readiness to provide woman-centered interventions than those from the non-continuity models. Barriers faced included gaps in communication training, education resources, and multidisciplinary support
Lindsay et al., 2019	US	Explore the belief, attitudes, and experiences among primigravida women in low-income Latina	Qualitative study	semi-structured interviews	A Total 23 first-time pregnant Latina women between 22 and 36 weeks of gestation	All	Thematic analysis	Pregnant women are still unsure whether their GWG is within a healthy range, even though most mothers know that GWG should be limited. Some pregnant women seem to believe they have no control over their weight gain during pregnancy due to various factors, such as sociocultural and interpersonal factors. Social support influences beliefs, attitudes, and experiences toward gestational weight gain in low-income immigrant Latino women.

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Authors , year	Country	Aim	Study type	Data Collection	Participant and Sample Size	Nutritional Status of Pregnant Women	Analysis Technique	Finding
Hurst et al., 2021	US	Explore ways to improve the quality of care for pregnant women with high BMIs receiving perinatal care	qualitative study	semi-structured interviews	30 pregnant women	obesity	Thematic analysis	Positive experiences during perinatal care, where they were listened to and respected by providers, are remembered by pregnant women. Other women will also record fears of weight bias or recall discrimination based on weight. Certain words matter to women. The words weight and BMI are expected terms, while obesity and size are not expected from providers
Vanstone et al., 2020	Canada	to identify and explain predictive psychological factors of excess gestational weight gain and relevant factors	Qualitative study	Interview	39 pregnant women's	All	Unconstrained deductive content analysis	Very few pregnant women consistently make choices regarding the definition of weight gain. Priorities, hunger, consideration of the consequences of decisions, and accommodation of pregnancy-related discomfort influence current decisions. Incomplete basic information a woman has regarding previous pregnancy experiences and interactions with health care providers appears to have an impact. This has an impact on them consistently misapplying it because of a wrong understanding of their own BMI.
Moffat et al., 2021	Canada	Explore social and conceptual challenges related to normal GWG and pregnancy diet.	Quantitative and Qualitative study	Survey and focus group	350 pregnant women surveyed, 43 pregnant/postpartum and care-provider participants focus group	All	Were assessed using $\chi 2$ tests and a linear regression model and contextualized with focus group data.	Expectant mothers fear gaining too much weight even though they think of eating for two. Pregnant women with low income tend to experience less GWG. Although they received the GWG advice, they could not identify the recommended range. Pregnancy diet quality was associated with household income but not GWG guidelines' acceptance.
Christenson et al, 2020	Sweden	Provide knowledge about maternity care providers' beliefs and attitudes about obesity and gestational weight management.	Quantitative study	web survey- An open free-text question	Swedish maternity care clinics-274 respondents (75% midwives and 25% obstetricians)	All	Descriptive and statistical analysis	Providers avoid conversations about weight because it makes pregnant women worry and embarrassed. This topic is considered a sensitive topic. Training in motivational interviewing appears to be positively related to the tendency of midwives to talk about weight, especially with obese women, whereas years of work experience are not related. After the

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Authors , year	Country	Aim	Study type	Data Collection	Participant and Sample Size	Nutritional Status of Pregnant Women	Analysis Technique	Finding
								training, 46% of the participants had sufficient knowledge to provide dietary and exercise recommendations to obese pregnant women. The qualitative data reveal great empathy for women with obesity.
Christenson et al, 2019	Sweden	Explore the management of gestational weight in obese women of childbearing age	Qualitative interview	focus groups and individual semi-structured interviews	17 women of reproductive age (19–39 y) with obesity	Obesity	Thematic Analysis	Women want to feel understood and treated with respect, especially in crucial sensitive situations such as weight gain during pregnancy.
Lott et al., 2019	US	Explore perceptions, sources of information, and attitudes of mothers during pregnancy related to GWG and exercise during pregnancy	Quantitative study-survey	an anonymous survey questionnaire	182 women over the age of 18	All	Descriptive and statistical analysis	Patients reported that their providers discussed weight and diet, expected GWG, and exercise during pregnancy. However, a minority of obese women and women who did not plan to exercise during pregnancy reported not receiving exercise counseling.
Haakstad et al., 2020	Norway	to describe the practices and views of service midwives regarding gestational weight gain (GWG), regular physical activity (PA), and nutrition.	Quantitative study- A cross-sectional study	electronic survey	65 midwives	All	Descriptive and statistical analysis	About 40% of providers do not advise on GWG according to standards. GWG was rated as more unpleasant to talk about than physical activity. Minimal chance (3.1%) of providers to discuss weight retention during the postpartum period.
Asefa et al., 2020	Ethiopia	explore midwives' and obstetricians' observations and perspectives about gestational weight gain and postpartum weight management in Ethiopia	Qualitative study	face-to-face interviews	11 midwives and ten obstetricians	all	Thematic analysis	Midwives and obstetricians have limited knowledge about optimal pregnancy weight gain, so pregnant women lack an understanding of standard weight gain. Women in Ethiopia do not want to gain weight during pregnancy but do want to gain weight after giving birth. Pregnant women do not receive counseling about gestational weight gain and postpartum weight management.

Notes: N/A : Not Applicable

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There are different definitions of the ontological concept of weight gain during pregnancy. Various views emerge regarding weight gain during pregnancy. There is a significant gap in the knowledge of midwives and obstetricians in this area[33]. Awareness and practice of antenatal care providers regarding appropriate weight gain are still inconsistent. Midwives lack the confidence to counsel women about weight gain during pregnancy and nutrition, while obstetricians regard other health problems as a higher priority[32]. Different results were conveyed by research conducted by Murray-Davis et al. (2020) which found that the same material was provided during pregnancy weight gain counseling between midwives, obstetricians, and family doctors[9].

The quality of health services for pregnant women affects the mother's weight during pregnancy, but how the health services for pregnant women affect this still needs to be studied, especially among antenatal care providers. There are various reasons underlying women to prevent weight gain during pregnancy. The reasons given were to give birth to a healthy baby, have an easy delivery, return to the body like before pregnancy, avoid stretch marks, and follow the advice of health workers. In Japan, maternal health guidance focuses on overweight or obese women to avoid risks during pregnancy and childbirth. Adequate antenatal education will have an impact on good pregnancy outcomes. The adverse effects of excessive or inadequate weight gain on the mother and fetus's health should be addressed to raise awareness of proper weight gain[34].

Research conducted by Dolatian (2020) shows that the achievement of weight gain during pregnancy is determined by various factors such as BMI before childbirth, prenatal care received, household size, age, food insecurity, and stress during pregnancy. Mothers who experience violence also have an impact on weight gain during pregnancy[35]. Generally, pregnant women do not get proper nutrition education during their pregnancy. This happens in developing countries. In developed countries, nutrition education can be done through online and social media, which the provider carries out directly.

Nutritionists can support pregnant women by providing information on healthy and unhealthy eating patterns, relevant information for everyone, barriers and solutions to healthy eating, and how to make healthy eating patterns. Pregnant women with low socioeconomic status need attention. Cross-professional collaboration to ensure pregnant women get proper nutritional intake. In the Netherlands, nutritionists and midwives work together because midwives are the primary care provider for pregnant women in the Netherlands[36]. However, not all health workers serving pregnant women are competent in providing information. Midwives believe that they have an essential role in health promotion. However, this is not reflected in the advice many of them give, which is passive and medically directed in many ways. Collaborative approaches between midwifery, nutrition and education institutions, and maternity care services can provide effective results[37].

So far, women have actively accessed nutrition information and then received it passively through their health care providers (HCP), the media, and their social networks. They may find biased information on their social media networks. Individual and environmental barriers influence dietary practices[38]. Access to information on the nutritional needs of pregnant women via the Internet has not thoroughly followed evidence-based guidelines. This shows the importance for the government to update and check internet sites[39]. Nutrition counseling shows a positive effect on the nutritional status of pregnant women. Nutrition material should be given to all pregnant women in the setting[40].

This research's weakness is that it consists of various types of research, so it cannot be studied by meta-analysis. The recommendation for further research is to identify a suitable method to provide maintenance counseling for gestational weight gain.

CONCLUSION

This study finds the need for counseling and cross-professional communication training to health service providers regarding gestational weight gain because it is a sensitive issue for mothers with normal nutritional status and obesity. Appropriate counseling increases patient comfort during pregnancy and prevents adverse effects that arise during and after pregnancy.

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