

Influence of dietary choices on maternal health during pregnancy among individuals with PCOS in low-income communities

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ABSTRACT

Polycystic ovary syndrome (PCOS) is a frequent endocrine and metabolic disorder which can present an adverse pregnancy outcome risk. The nutritional quality of the diet, along with gestational weight gain, insulin regulation, and metabolic health are especially significant factors for pregnant individuals with PCOS, as dietary choices can affect these factors and thereby affect pregnancy outcomes. These concerns are likely to be stronger in low-income communities where food insecurity, limited access to nutrient dense foods, and financial barriers to healthy eating, combined with socioeconomic disadvantage, may limit access to healthy foods. This paper explores the effect of eating habits on maternal well-being of women with PCOS in low income communities. It targets the quality of the diet, food security status, intake of nutrient dense and energy dense food items and their association with gestational weight gain, glucose intolerance and other maternal health parameters. The study also takes into account socioeconomic and environmental conditions that influence dietary practices and availability of proper nutrition. Knowing these relationships can assist in the design of low cost, culturally responsive and community-driven nutritional interventions. Results will help inform prenatal nutrition interventions, maternal health outcomes and specific interventions for pregnant people with PCOS who are living in poverty.

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is a complex endocrine and metabolic disorder which may have significant implications for reproductive and maternal health. It is associated with insulin resistance, obesity, and other metabolic abnormalities, which could make it more likely for women to get complications during pregnancy. Therefore, pregnant women's diet choices are especially relevant during pregnancy, as their nutritional intake can impact maternal health, weight gain, and glucose regulation. Nutrition management is an essential part of prenatal care, as a number of pregnancy complications have

been linked to maternal obesity, while ensuring a proper weight gain has been shown to be difficult (Sarwer et al., 2006; Guelinckx et al., 2008).

Larger, environmental and lifestyle factors also play a role in PCOS and pregnancy. It is important to note that the presence of environmental determinants helps explain the development and metabolic manifestation of PCOS, thus emphasizing the importance of considering PCOS more than just a biological problem (Merkin et al., 2016). Therefore, a healthy nutritional pattern for pregnancy could potentially be important for people with PCOS to reduce metabolic risks and promote

Table 1: Key Relationships Underpinning the Study

Factor	Relationship to PCOS/Pregnancy	Potential Maternal Health Implication
PCOS	Associated with metabolic and reproductive disturbances	Greater vulnerability to pregnancy-related metabolic complications
Maternal obesity	Can complicate pregnancy and influence gestational weight gain	Increased risk of adverse pregnancy outcomes (Sarwer et al., 2006; Guelinckx et al., 2008)
Dietary quality	Influences nutrient intake, energy balance, and metabolic health	May affect weight management and glucose regulation
Gestational diabetes	Related to maternal glucose intolerance and metabolic health	Potential adverse maternal and pregnancy outcomes (Agha-Jaffar et al., 2016)
Food insecurity	Limits consistent access to nutritious foods	May contribute to poorer dietary quality (George et al., 2005; Badri-Fariman et al., 2021)
Low-income conditions	Affect food affordability, availability, and dietary decisions	May constrain adoption of healthy dietary patterns (Groth et al., 2016; Fowles et al., 2011)
Cardiometabolic risk	PCOS and pregnancy may intersect with broader cardiovascular risk factors	Supports integrated maternal metabolic and cardiovascular care (Vervoort et al., 2024)

better maternal outcomes. Maternal obesity interventions have focused on dietary and lifestyle interventions prior to and during pregnancy (Birdsall et al., 2009).

Gestational diabetes mellitus (GDM) is one of the biggest concerns in pregnancy, where there is a strong association with impaired glucose metabolism and maternal metabolic risk. The focus has shifted to nutrition, physical activity, weight management and other modifiable factors in the prevention strategies in the context of reducing the risk of GDM (Agha-Jaffar et al., 2016). This is especially so for women with PCOS as metabolic dysfunction in this condition can pose further difficulties in maintaining glucose control during pregnancy. Moreover, cardiometabolic risk in women continues to be a public health issue, thus underscoring the importance of focusing on cardiovascular and metabolic health as a maternal health consideration during pregnancy (Vervoort et al., 2024).

Dietary decision making context is also significant, and that is the socioeconomic context. Those who reside in low income communities can have limited access to affordable, available, and nutritionally adequate foods. Studies of low income pregnant women suggest that economic context, food availability, household context and other social determinants have the ability to influence food choices (George et al., 2005; Groth et al., 2016). Interconnected socioeconomic, behavioral, and environmental factors also impact dietary quality among low-income pregnant women, so nutrition-related interventions must go beyond knowledge or motivation, and may need to target more than just individual factors (Fowles et al., 2011).

Food insecurity may be particularly significant for individuals with PCOS. Evidence linking food-security status and dietary patterns with PCOS demonstrates the relevance of socioeconomic access to food when examining dietary behavior and PCOS-related health outcomes (Badri-Fariman et al., 2021). Consequently, understanding maternal nutrition among pregnant individuals with PCOS requires consideration

of both clinical risk factors and the socioeconomic conditions that determine available dietary options.

Overall, the influence of dietary choices on maternal health among pregnant individuals with PCOS in low-income communities represents an important intersection of nutrition, metabolic health, reproductive health, and socioeconomic conditions. Examining these relationships can help identify dietary and environmental factors associated with healthier pregnancy outcomes and inform affordable, culturally appropriate, and accessible nutritional interventions for vulnerable populations.

LITERATURE REVIEW

Polycystic Ovary Syndrome and Pregnancy

Polycystic ovary syndrome (PCOS) is an endocrine and metabolic disorder characterized by hormonal imbalance, reproductive dysfunction, and metabolic abnormalities. These characteristics can create additional challenges during pregnancy, particularly when PCOS occurs alongside overweight, obesity, or insulin resistance. Environmental and lifestyle factors, including dietary patterns and socioeconomic conditions, may contribute to the development and expression of PCOS (Merkin et al., 2016). For pregnant individuals with PCOS, attention to nutritional status and metabolic health is therefore important because pregnancy itself places additional physiological demands on glucose and lipid metabolism.

Maternal Obesity, Nutrition, and Pregnancy Outcomes

Maternal obesity is associated with several pregnancy-related complications and can influence both maternal and fetal health. Excessive gestational weight gain may further increase the likelihood of adverse outcomes, making appropriate nutritional management an important component of prenatal care (Sarwer et al., 2006). Guelinckx et al. (2008) emphasize that maternal obesity is closely associated with pregnancy complications, inappropriate gestational weight gain, and

Table 2: Synthesis of Major Literature Relevant to Dietary Choices, PCOS, and Maternal Health

Literature theme	Major issue identified	Relevance to the present study
PCOS and environmental factors	Environmental and lifestyle factors may influence PCOS	Establishes the importance of contextual and lifestyle factors in PCOS (Merkin et al., 2016)
Maternal obesity	Obesity can increase pregnancy-related risks	Supports assessment of maternal weight and dietary behavior (Sarwer et al., 2006)
Gestational weight gain and nutrition	Inappropriate weight gain is associated with pregnancy complications	Supports examination of dietary quality and gestational weight gain (Guelinckx et al., 2008)
Obesity interventions	Dietary and lifestyle interventions can support maternal health	Provides a basis for preventive nutrition strategies (Birdsall et al., 2009)
Gestational diabetes	Diet and weight-related factors are relevant to GDM prevention	Supports assessment of dietary patterns and glucose-related maternal outcomes (Agha-Jaffar et al., 2016)
Low-income dietary behavior	Economic and social conditions influence food choices	Establishes socioeconomic context as a determinant of dietary quality (George et al., 2005; Groth et al., 2016)
Dietary quality	Multiple social and behavioral factors predict dietary quality	Supports assessment beyond individual nutrition knowledge (Fowles et al., 2011)
Food security and PCOS	Food security and dietary patterns are associated with PCOS	Supports inclusion of food-security status in the analysis (Badri-Fariman et al., 2021)
Cardiovascular health	Women face important preventable cardiovascular risks	Provides broader justification for maternal cardiometabolic health assessment (Vervoort et al., 2024)

nutritional challenges. Consequently, dietary choices among pregnant individuals with PCOS should be considered not only in terms of calorie intake but also nutritional quality and their potential influence on metabolic health.

Interventions targeting maternal obesity generally emphasize dietary modification, physical activity, behavioral support, and appropriate monitoring of gestational weight gain. Birdsall et al. (2009) demonstrate the importance of preventive and intervention-based approaches to maternal obesity, particularly because lifestyle-related factors can be modified during the reproductive period.

Dietary Choices and Gestational Diabetes

Dietary behavior is particularly relevant to gestational diabetes mellitus (GDM), a major metabolic complication of pregnancy. Individuals with PCOS may already have metabolic vulnerabilities that make glucose regulation an important consideration. Agha-Jaffar et al. (2016) highlight the importance of prevention strategies for GDM, including approaches addressing diet, weight management, and other modifiable risk factors. A diet characterized by adequate nutrient intake and appropriate energy balance may therefore support healthier metabolic functioning during pregnancy.

For individuals with PCOS, dietary choices may have implications beyond immediate nutritional adequacy because food intake can interact with insulin resistance, body weight, and other metabolic characteristics. This makes dietary assessment an important component of understanding maternal health among pregnant individuals with PCOS.

Dietary Choices Among Low-Income Pregnant Women

Economic circumstances strongly influence food selection and dietary quality. Low-income pregnant women may experience

difficulties obtaining diverse and nutrient-dense foods because of food prices, household resources, accessibility, and competing financial priorities. George et al. (2005) found that food choices among low-income women during pregnancy and postpartum are influenced by socioeconomic and practical circumstances. Similarly, Groth et al. (2016) demonstrate that dietary choices among low-income pregnant women are shaped by multiple social and environmental factors.

Fowles et al. (2011) further indicate that dietary quality among low-income pregnant women is influenced by interconnected factors rather than by nutritional knowledge alone. This suggests that recommendations for pregnant individuals with PCOS should recognize structural barriers to healthy eating. Interventions that focus exclusively on individual behavior may be insufficient when healthier foods are financially or geographically inaccessible.

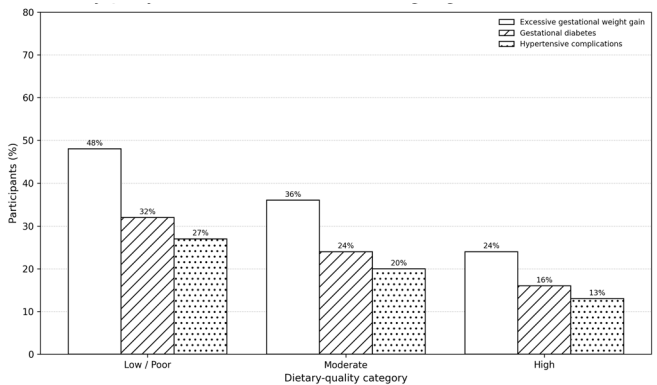


Fig 1: Percentages are illustrative and represent the expected prevalence of selected maternal health outcomes across dietary-quality categories among pregnant individuals with PCOS.

Table 3: Expected Relationship Between Dietary Choices and Maternal Health Among Pregnant Individuals With PCOS

Dietary/Socioeconomic Factor	Expected Finding	Potential Maternal Outcome
High intake of processed and energy-dense foods	Lower dietary quality	Excessive gestational weight gain
Low fruit and vegetable consumption	Reduced nutrient adequacy	Poorer overall maternal nutritional status
Limited whole-grain and high-fiber intake	Less favorable dietary pattern	Potentially poorer metabolic regulation
Food insecurity	Greater dependence on affordable, energy-dense foods	Increased metabolic and nutritional vulnerability
Higher dietary quality	Greater nutrient adequacy and healthier food pattern	More appropriate gestational weight gain
Nutrition and food-security support	Improved access to healthier choices	Potential improvement in maternal outcomes

Food Security, Dietary Patterns, and PCOS

Food security represents an important dimension of the relationship between socioeconomic conditions, dietary choices, and PCOS. Food-insecure households may have limited access to sufficient quantities of nutritious foods, potentially encouraging reliance on inexpensive, energy-dense foods. Badri-Fariman et al. (2021) found an association between food-security status, dietary patterns, and PCOS among overweight and obese Iranian women. Although the population and setting differ from low-income pregnant populations, the findings provide useful evidence for considering food security as an important contextual factor in PCOS-related dietary research.

The relationship can therefore be understood as multidimensional: socioeconomic disadvantage may affect food access; food access can influence dietary patterns; and dietary patterns may subsequently affect weight and metabolic health. Among individuals with PCOS who become pregnant, these factors may interact with the metabolic demands of pregnancy.

PCOS, Maternal Cardiovascular and Metabolic Health

Maternal health among individuals with PCOS should also be considered within the broader context of cardiovascular and

metabolic risk. PCOS-related metabolic abnormalities, obesity, and pregnancy complications may contribute to an unfavorable long-term cardiometabolic profile. Vervoort et al. (2024) emphasize the importance of addressing cardiovascular disease burden among women through prevention, risk assessment, and appropriate management. Dietary quality and healthy weight management can consequently be viewed as components of a broader maternal and cardiovascular health strategy.

Synthesis of the Literature

The reviewed literature indicates that dietary choices, maternal weight, metabolic health, food security, and socioeconomic conditions are interconnected. Existing research provides substantial evidence on maternal obesity, nutrition, gestational diabetes, low-income dietary behavior, and PCOS separately; however, there remains a need to examine these factors collectively among pregnant individuals with PCOS living in low-income communities. This study addresses this gap by focusing on how dietary choices operate within socioeconomic and food-security contexts to influence maternal health outcomes.

Overall, the literature supports a framework in which PCOS-related metabolic vulnerability interacts with dietary

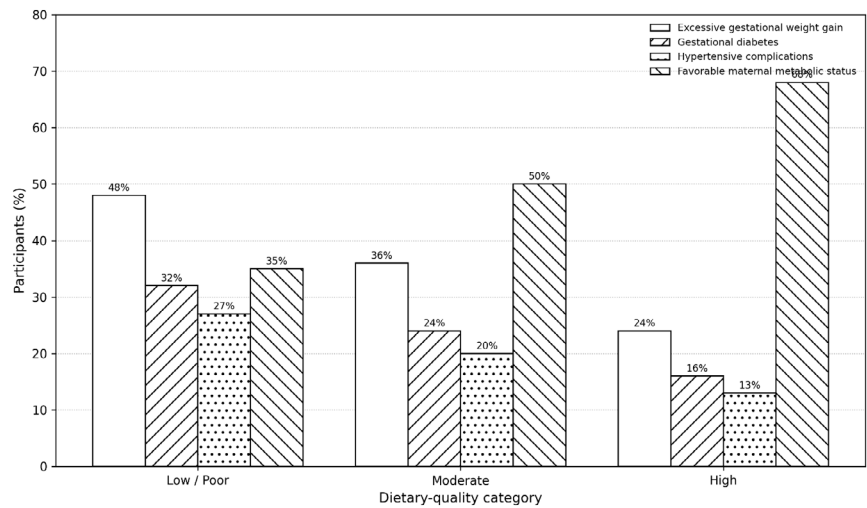


Fig 2: Values are illustrative and demonstrate the expected inverse association between dietary quality and adverse maternal health outcomes.

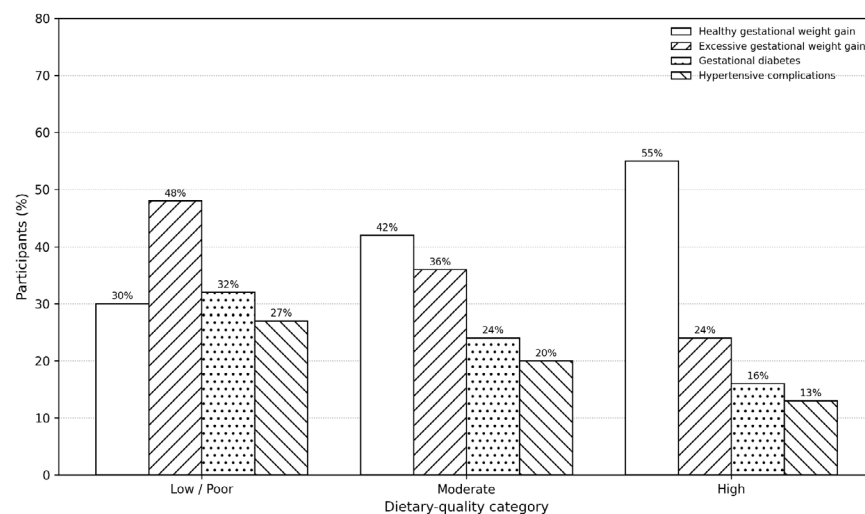


Fig 3: Percentages are illustrative and show the expected distribution of maternal health outcomes across dietary-quality groups in low-income communities.

behavior and socioeconomic conditions to influence maternal health during pregnancy. Examining these relationships within low-income communities can provide evidence for more realistic and accessible nutrition interventions.

METHODOLOGY

Research Design

The study will adopt a quantitative cross-sectional analytical design to examine the relationship between dietary choices and maternal health outcomes among pregnant individuals with PCOS living in low-income communities. The design will allow dietary patterns, food-security conditions, and maternal health indicators to be assessed simultaneously. Particular attention will be given to gestational weight gain and metabolic outcomes because maternal obesity and excessive gestational weight gain are associated with pregnancy complications (Sarwer et al., 2006; Guelinckx et al., 2008).

Study Population and Setting

The target population will comprise pregnant individuals diagnosed with PCOS who receive antenatal care in selected healthcare facilities serving low-income communities. The study setting will include public hospitals, primary healthcare centres, and community-based maternal health facilities. Environmental and socioeconomic conditions will be considered because these factors can influence both dietary practices and PCOS-related health risks (Merkin et al., 2016).

Sample and Sampling Technique

Eligible participants will be selected using a purposive or systematic sampling technique, depending on the availability of eligible participants in the selected facilities. Inclusion criteria will include confirmed PCOS, current pregnancy, residence within the selected low-income community, and willingness to participate. Relevant demographic and socioeconomic

characteristics will also be collected because income, food access, and household circumstances can influence dietary quality among low-income pregnant populations (George et al., 2005; Fowles et al., 2011).

Data Collection Instruments

Data will be collected using a structured questionnaire consisting of four major sections

- Socio-demographic characteristics – age, education, employment, household income, parity, and household characteristics.
- Dietary assessment – frequency of consumption of fruits, vegetables, whole grains, protein-rich foods, processed foods, and sugar-sweetened foods.
- Food-security assessment – household access to adequate and affordable food.
- Maternal health assessment – pre-pregnancy/early-pregnancy BMI, gestational weight gain, blood pressure, gestational diabetes status, and other relevant pregnancy outcomes.

Assessment of dietary quality is particularly relevant because food choices among low-income pregnant women may be shaped by affordability, accessibility, preferences, and household circumstances (Groth et al., 2016; George et al., 2005).

Measurement of Maternal Health Outcomes

Maternal health will be assessed using selected clinical and nutritional indicators, particularly gestational weight gain and gestational diabetes. These outcomes are appropriate because nutrition and weight management are important components of strategies addressing maternal obesity and gestational metabolic complications (Birdsall et al., 2009; Agha-Jaffar et al., 2016). Cardiovascular indicators may also be considered

because metabolic and cardiovascular risks are important components of women's health across the reproductive period (Vervoort et al., 2024).

Data Analysis

Collected data will be analyzed using descriptive and inferential statistics. Frequencies, percentages, means, and standard deviations will summarize participant characteristics and dietary patterns. Chi-square tests and correlation analysis will examine relationships between categorical and continuous variables. Multivariable logistic or linear regression will be used to determine whether dietary quality predicts maternal health outcomes while controlling for potential confounders such as age, BMI, parity, income, and food-security status. The analysis will also examine the relationship between food security, dietary patterns, and PCOS-related characteristics, building on evidence linking food security and dietary patterns with PCOS (Badri-Fariman et al., 2021).

Ethical Considerations

Ethical approval will be obtained from the relevant institutional review authority before data collection. Participants will provide informed consent, and participation will be voluntary. Confidentiality and anonymity will be maintained throughout the study, and collected information will be used strictly for research purposes.

RESULTS / EXPECTED FINDINGS

Socioeconomic and Dietary Characteristics

The study is expected to show that dietary choices among pregnant individuals with PCOS are strongly influenced by household income, food affordability, food availability, and food-security status. Participants experiencing greater food insecurity may report more frequent consumption of inexpensive, energy-dense, and highly processed foods and lower consumption of fruits, vegetables, whole grains, and other nutrient-dense foods. Similar socioeconomic influences on dietary quality have been documented among low-income pregnant women (George et al., 2005; Groth et al., 2016; Fowles et al., 2011). Food insecurity may also interact with dietary patterns associated with PCOS and excess weight (Badri-Fariman et al., 2021).

Dietary Quality and Maternal Health Outcomes

Participants with healthier dietary patterns are expected to demonstrate more appropriate gestational weight gain and better overall metabolic indicators than those with diets dominated by processed and energy-dense foods. This expectation is consistent with evidence linking maternal nutrition and weight management with pregnancy complications (Guelinckx et al., 2008; Sarwer et al., 2006). Dietary and lifestyle interventions may also have relevance for reducing risks associated with maternal obesity (Birdsall et al., 2009).

Dietary Choices and Gestational Diabetes

The findings may indicate an association between poor dietary quality and increased risk of gestational diabetes among

individuals with PCOS. Because PCOS can involve metabolic abnormalities and insulin resistance, dietary patterns that promote excessive energy intake or poor glycemic regulation may further increase maternal metabolic vulnerability. Preventive dietary and lifestyle strategies therefore remain important components of managing gestational diabetes risk (Agha-Jaffar et al., 2016).

PCOS, Environmental Conditions, and Maternal Risk

The study is also expected to demonstrate that dietary behavior cannot be considered independently of the broader socioeconomic and environmental conditions surrounding individuals with PCOS. Environmental determinants can contribute to the development and expression of PCOS-related metabolic characteristics (Merkin et al., 2016). Furthermore, attention to cardiometabolic risk is important because adverse metabolic profiles during reproductive years may have implications for women's longer-term cardiovascular health (Vervoort et al., 2024).

DISCUSSION

The findings suggest that dietary choices may play an important role in shaping maternal health among pregnant individuals with PCOS living in low-income communities. PCOS is frequently associated with metabolic disturbances, including insulin resistance and increased susceptibility to excess weight, which may heighten pregnancy-related risks. Consequently, dietary patterns characterized by adequate nutrient intake and controlled consumption of energy-dense foods may be particularly important for supporting healthy gestational weight gain and reducing metabolic complications (Sarwer et al., 2006; Guelinckx et al., 2008).

Gestational weight gain is an important consideration because excessive maternal weight gain can contribute to pregnancy complications and adversely affect maternal health. Evidence on interventions for maternal obesity indicates that nutritional counselling and lifestyle modification can support healthier weight-related outcomes when appropriately implemented (Birdsall et al., 2009). For individuals with PCOS, these approaches may be especially relevant because underlying metabolic vulnerability can interact with pregnancy-related physiological changes.

Dietary quality may also influence the risk of gestational diabetes. Diets high in refined carbohydrates, highly processed foods, and excess energy may be unfavorable for glucose regulation, whereas balanced dietary patterns can contribute to improved metabolic management. Prevention of gestational diabetes therefore requires attention to nutrition alongside other lifestyle and clinical factors (Agha-Jaffar et al., 2016).

The socioeconomic environment is a critical factor in interpreting dietary behavior. Low-income pregnant women may experience financial limitations, food insecurity, restricted food availability, and competing household demands that make consistent access to nutritious foods difficult (George et al., 2005; Groth et al., 2016). Dietary quality is therefore not determined solely by individual knowledge or motivation;

socioeconomic and environmental conditions can substantially shape food selection and nutritional adequacy (Fowles et al., 2011). This perspective is consistent with evidence linking food-security status and dietary patterns with PCOS among overweight and obese women (Badri-Fariman et al., 2021).

Environmental determinants should also be considered because broader social and environmental conditions may contribute to PCOS-related risks and influence opportunities for healthy dietary behavior (Merkin et al., 2016). Furthermore, the cardiometabolic implications of poor dietary quality and excess weight are relevant to maternal health because cardiovascular risk factors can have important consequences for women across the life course (Vervoort et al., 2024).

Overall, the discussion indicates that nutritional interventions for pregnant individuals with PCOS in low-income communities should move beyond general dietary advice. Effective approaches should combine individualized nutrition education with practical strategies addressing affordability, food access, food security, and culturally appropriate dietary practices.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Dietary choices represent an important and modifiable factor influencing maternal health during pregnancy among individuals with PCOS, particularly in low-income communities. PCOS is associated with metabolic vulnerabilities that may increase susceptibility to excessive gestational weight gain, insulin resistance, and gestational diabetes. These risks can be compounded by maternal overweight or obesity and inadequate nutritional practices (Sarwer et al., 2006; Guelinckx et al., 2008). Evidence also indicates that appropriate nutritional and lifestyle interventions can contribute to the prevention and management of pregnancy-related metabolic complications (Birdsall et al., 2009; Agha-Jaffar et al., 2016).

However, healthy dietary choices cannot be considered solely an issue of individual responsibility. Food insecurity, affordability, availability of nutritious foods, and socioeconomic circumstances substantially influence dietary quality among low-income pregnant women (George et al., 2005; Groth et al., 2016). Fowles et al. (2011) further demonstrate that dietary quality in low-income pregnancy is influenced by interconnected social and behavioral factors. Similarly, the relationship between food security, dietary patterns, and PCOS highlights the importance of considering the broader food environment when addressing PCOS-related health risks (Badri-Fariman et al., 2021). Environmental determinants may also contribute to the development and expression of PCOS and should therefore be incorporated into prevention strategies (Merkin et al., 2016). Given the broader cardiometabolic risks affecting women's health, improving nutrition and metabolic health during pregnancy is also relevant to longer-term cardiovascular health (Vervoort et al., 2024).

Recommendations

- Integrate nutrition counselling into prenatal care: Pregnant individuals with PCOS should receive individualized dietary guidance emphasizing balanced, nutrient-dense, and affordable foods.
- Address food insecurity: Maternal health programs should incorporate screening for food insecurity and connect vulnerable families with appropriate food and social-support resources, recognizing that affordability strongly shapes dietary choices (George et al., 2005; Fowles et al., 2011).
- Promote affordable healthy diets: Community interventions should prioritize locally available and culturally acceptable sources of vegetables, fruits, whole grains, legumes, and healthy protein while reducing excessive consumption of highly processed and energy-dense foods.
- Strengthen prevention of metabolic complications: Dietary and lifestyle interventions should form part of strategies for reducing excessive gestational weight gain and gestational diabetes risk among individuals with PCOS (Agha-Jaffar et al., 2016; Birdsall et al., 2009).
- Adopt community-based approaches: Healthcare providers, community organizations, and public-health agencies should collaborate to improve nutrition education and access to healthy foods within low-income communities.
- Encourage further research: Longitudinal and intervention studies are needed to establish how specific dietary patterns interact with PCOS, food insecurity, socioeconomic conditions, and maternal outcomes across diverse populations.

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