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# Body Weight Gain During Pregnancy: An Narrative Review

**Valmin Ramos-Silva, MD[1], PhD; Janine Pereira da Silva, PhD[2]; Andresa Machado e Silva[3]; Alessandra Cecília de Souza Reis[3]; Maria Fernanda Reis Silva[3]; Wendel Costa Bila, PhD[4]**

[1] Research and Studies Group on Human Health Assessment (GAVA), State University of Minas Gerais (UEMG), Divinópolis, Brazil. Pediatrician at Padre Humberto Hospital, Anchieta, Espírito Santo, Brazil.
[2] Research and Studies Group on Human Health Assessment (GAVA), State University of Minas Gerais (UEMG), Divinópolis, Brazil. Pediatrician at Padre Humberto Hospital, Anchieta, Espírito Santo, Brazil. Professor. Faculty of Medicine. FAESA. Espírito Santo. Brazil
[3] Student. State University of Minas Gerais (UEMG), Divinópolis, Brazil.
[4] Professor. State University of Minas Gerais (UEMG), Research and Studies Group on Human Health Assessment (GAVA), State University of Minas Gerais (UEMG), Divinópolis, Brazil

## ABSTRACT

**Introduction:** Maternal body mass index (BMI) and gestational weight gain (GWG) are strongly associated with obstetric and neonatal outcomes. Inadequate values of these parameters may result in complications such as macrosomia, cesarean delivery, gestational hypertension, preeclampsia, and gestational Diabetes mellitus (GDM), as well as negatively affecting offspring health. **Objective:** To evaluate the influence of pre-pregnancy BMI and weight gain during pregnancy trimesters on perinatal outcomes, including maternal and neonatal morbidities, based on different diagnostic criteria and clinical contexts. **Method:** This narrative review analyzed the impacts of excessive and insufficient maternal weight gain on maternal-fetal health. A PubMed database search yielded 507 articles between July 5–10, 2025. After a rigorous selection process, 14 studies were included, highlighting risks associated with gestational weight imbalance.

**Data synthesis:** Studies indicated that both elevated BMI and excessive GWG significantly increased risks for adverse outcomes such as macrosomia and gestational hypertension. Conversely, inadequate GWG was associated with small-for-gestational-age newborns and preterm birth. Women who quit smoking during pregnancy had higher rates of GWG and hypertensive disorders. Structured physical activity interventions proved effective in mitigating excessive GWG. Additionally, GWG influenced adiposity and cardiometabolic markers in children.

**Conclusion:** Pre-pregnancy BMI and weight gain throughout gestation directly impact maternal and neonatal health. Monitoring strategies, nutritional interventions, and physical activity should be prioritized to ensure appropriate GWG and improve obstetric and pediatric outcomes.

**Keywords:** Excessive or insufficient weight gain, pregnancy, maternal-fetal health, and last year period maternal-fetal; health and last year period.

## 1. INTRODUCTION

The prevalence of overweight and obesity among women of reproductive age has risen in recent decades, posing a major global public health challenge. In pregnancy, maternal nutritional status—particularly as indicated by pre-pregnancy BMI—has significant implications for obstetric and neonatal outcomes. Literature has shown that both inappropriate BMI and gestational weight gain (GWG) outside recommended ranges are linked to increased risks of complications, including GDM, preeclampsia, cesarean section, fetal macrosomia, stillbirth, and childhood morbidities such as early obesity and metabolic changes (Lin et al., 2023).

GWG is a key clinical parameter monitored during prenatal care, based on international guidelines from institutions like the Institute of Medicine (IOM) and the World Health Organization (WHO), and adjusted for the pregnant woman's initial BMI. However, despite clear guidance, most women fail to achieve ideal GWG, particularly those who are overweight or obese, who often exceed the recommended limits. This inadequacy has been linked to higher risks of macrosomia, shoulder dystocia, cesarean delivery, and neonatal hospitalization (Boone-Heinonen et al., 2024; Wang et al., 2024).

Beyond birth outcomes, maternal BMI and GWG have long-term effects on child health. Evidence suggests that children born to mothers with obesity and excessive GWG are more likely to develop overweight or obesity in childhood, and exhibit abnormal lipid profiles, larger waist circumference, and higher blood pressure. These factors contribute to increased early cardiovascular and metabolic risks, reinforcing the fetal programming hypothesis or the "fetal origins of adult disease" theory (Österroos et al., 2024; Wen et al., 2025).

In contrast, insufficient weight gain—often seen in women with low BMI or socioeconomic vulnerability—is associated with increased risks of small-for-gestational-age newborns (SGA), higher neonatal morbidity, and greater chances of chronic conditions like hypertension and dyslipidemia in adulthood. These findings underscore the importance of early, individualized weight monitoring, especially in the first 20 weeks of pregnancy, when BMI still reflects the mother's pre-pregnancy nutritional status and forms the basis for clinical guidance (Hu et al., 2024; Lichtwald et al., 2024).

Recent studies also highlight the effectiveness of behavioral interventions such as nutritional education and regular physical activity in maintaining GWG within recommended limits. Structured moderate-intensity exercise programs, initiated before or early in pregnancy, have shown positive outcomes in reducing maternal and neonatal complications. However, adherence to such programs remains limited, especially among populations with reduced access to health information and care, indicating the need for public health initiatives to support these women (Grau González et al., 2024; Dikgale et al., 2024).

Therefore, understanding the multifaceted variables influencing maternal BMI and GWG—as well as their consequences for mother and child—is essential. Public policies and clinical protocols should consider not only ideal weight targets but also biopsychosocial factors affecting maternal health, enabling a comprehensive and effective prenatal approach (Victor et al., 2024; Bodnar et al., 2024).

## 2. METHOD

A narrative review was conducted from July 5 to 10, 2025, in which two researchers independently selected articles addressing the effects of excessive and insufficient maternal weight gain during pregnancy on maternal-fetal health. The search was performed in the PubMed database (https://pubmed.ncbi.nlm.nih.gov/) using the descriptors “Excessive or insufficient weight gain,”

"pregnancy," "maternal-fetal health," and "last year period." A total of 507 articles were found. After reviewing titles, abstracts, and excluding duplicates, case reports, and studies irrelevant to the topic, 14 articles were included in the data synthesis.

## 3. DATA SYNTHESIS

The analysis of maternal body mass index (BMI) and gestational weight gain (GWG) proved to be a crucial strategy in identifying obstetric and neonatal risks. Studies across different populations indicate that pre-pregnancy BMI significantly influences outcomes such as macrosomia, cesarean delivery, gestational Diabetes mellitus (GDM), hypertension, and childhood metabolic changes. Initial BMI is widely used as a marker of maternal nutritional status and forms the basis for determining ideal GWG ranges during pregnancy (Lin et al., 2023).

Evidence shows a linear relationship between rising BMI and increased risk of large-for-gestational-age (LGA) newborns. For instance, each 1 kg/m² increase in maternal BMI was associated with elevated childhood BMI, systolic blood pressure, and waist circumference, reinforcing the role of maternal obesity in fetal programming (Wen et al., 2025). Moreover, GWG during the second and third trimesters was linked to adverse cardiometabolic profiles, including higher triglycerides and fasting glucose levels (Mariot et al., 2025).

Another key aspect is the influence of GWG on different clinical groups. In women with GDM or gestational hypertension, excessive GWG significantly increased maternal and perinatal complications. The combination of elevated BMI and GWG above recommended levels potentiated neonatal morbidity risks, including hypoxia, NICU admission, and shoulder dystocia (Chiossi et al., 2024).

Additionally, mothers with excessive GWG had children with higher BMI scores during childhood, especially when the mothers were also classified as obese (Österroos et al., 2024).

Conversely, insufficient weight gain also carries risks, particularly for women with low BMI. These cases are associated with SGA newborns, increased rates of intrauterine growth restriction (IUGR), preterm birth, and fetal metabolic alterations. Studies showed changes in umbilical cord blood lipid profiles among infants born to mothers with BMI below 18.5 kg/m², potentially impacting infant metabolism (Lichtwald et al., 2024).

Although nutritional recommendations are widely disseminated, adherence to ideal GWG ranges remains low. In a study by Dikgale et al. (2024), fewer than half of pregnant women, even when aware of the risks, achieved adequate weight gain during pregnancy. Underestimation of one's own weight and infrequent monitoring contributed to this inadequacy.

To address this issue, supervised physical activity during pregnancy has proven effective in preventing excessive GWG. Interventions involving moderate-intensity exercise, performed at least twice a week, yielded positive results in reducing perinatal complications and maintaining appropriate postpartum weight (Grau González et al., 2024). However, initiatives aimed at the pre-conception period—critical for establishing healthy habits and preventing adverse outcomes—remain scarce.

Literature also emphasizes the importance of trimester-specific stratification. The second and third trimesters are particularly sensitive to accelerated GWG, with rates above 0.32 kg/week associated with increased risks of macrosomia and related complications (Wang et al., 2024). Therefore, continuous monitoring of maternal weight, coupled with individualized GWG targets based on initial BMI, is essential to preventing risks and promoting better maternal-infant outcomes.

Thus, GWG plays a decisive role in maternal and fetal health. Both insufficient and excessive weight gain are associated with a broad spectrum of obstetric and neonatal complications. Studies show that women with GWG below recommended levels face increased risks of preterm birth, IUGR, SGA newborns, and greater neonatal morbidity. This is particularly concerning in women with pre-pregnancy BMI below 18.5 kg/m², who already face increased nutritional risks and lower energy reserves (Zhang et al., 2024; Lichtwald et al., 2024).

On the other hand, excessive GWG is consistently associated with adverse maternal outcomes such as gestational hypertension, preeclampsia, GDM, cesarean delivery, and postpartum hemorrhage. Fetal outcomes include higher rates of macrosomia, shoulder dystocia, neonatal ICU admission, and perinatal death. Observational studies also show that excessive GWG may compromise offspring metabolic health, increasing blood pressure, insulin, triglyceride levels, and adiposity during childhood (Lin et al., 2023; Wen et al., 2025).

These complications are influenced not only by total weight gain but also by its distribution across pregnancy trimesters. Accelerated GWG in the second and third trimesters has been linked to higher risks of macrosomia and GDM, especially in overweight and obese women. In contrast, insufficient GWG in these periods is associated with higher rates of neonatal ICU admission, perinatal mortality, and low fetal energy reserves (Boone-Heinonen et al., 2024; Wang et al., 2024).

Additionally, robust evidence indicates that children born to mothers with excessive GWG—regardless of pre-pregnancy BMI—are at greater risk of overweight, obesity, and dyslipidemia in childhood. This reinforces the fetal programming theory, which states that the intrauterine environment directly influences the child's predisposition to chronic diseases later in life (Österroos et al., 2024; Chiossi et al., 2024).

Therefore, GWG control should be individualized, based on pre-pregnancy BMI, and systematically monitored during prenatal care. Early interventions such as nutritional counseling and supervised physical activity have proven effective in significantly reducing inappropriate GWG and improving maternal-infant outcomes (Grau González et al., 2024; Dikgale et al., 2024). Complications associated with excessive or insufficient weight gain during pregnancy are described in Tables 1 and 2.

**Table 1** – Complications Associated with Excessive Gestational Weight Gain (GWG)

| Associated Event | Reference |
|---|---|
| **Fetal macrosomia** – Excessive GWG significantly increases the risk of large-for-gestational-age (LGA) newborns. | Lin et al., 2023; Wang et al., 2024 |
| **Cesarean delivery** – Women with GWG above recommended levels have higher rates of scheduled and intrapartum cesareans. | Zeevi et al., 2024 |
| **Gestational Diabetes mellitus (GDM)** – Excessive weight gain, particularly in overweight women, is an independent risk factor for GDM. | Lin et al., 2023; Liu et al., 2024 |
| **Gestational hypertension and preeclampsia** – Associated with increased BMI and GWG during the second and third trimesters. | Boone-Heinonen et al., 2024; Kung et al., 2024 |
| **Shoulder dystocia and neonatal trauma** – Frequently observed in cases of excessive GWG and fetal macrosomia. | Chiossi et al., 2024 |

| Associated Event | Reference |
|---|---|
| **Postpartum hemorrhage** – Elevated GWG increases the risk of excessive bleeding after delivery. | Lin et al., 2023 |
| **Childhood obesity and metabolic disorders** – Excessive GWG is linked to higher risk of obesity, hypertension, and dyslipidemia in offspring. | Österroos et al., 2024; Wen et al., 2025 |

**Source**: Prepared by the authors

**Table 2** – Complications Associated with Insufficient Gestational Weight Gain

| Associated Event | Reference |
|---|---|
| **Intrauterine growth restriction (IUGR)** – Common in women with low BMI and insufficient GWG. | Lichtwald et al., 2024; Zhang et al., 2024 |
| **Small for gestational age (SGA)** – Directly associated with low GWG, especially in women with BMI < 18.5 kg/m². | Zhang et al., 2024 |
| **Preterm birth** – Inadequate GWG increases the incidence of preterm delivery. | Zhang et al., 2024; Victor et al., 2024 |
| **Higher neonatal hospitalization rates** – Newborns of mothers with insufficient GWG more frequently require intensive care. | Lin et al., 2023 |
| **Metabolic and lipid deficits in the newborn** – Alterations in lipid profile and body composition of the newborn. | Lichtwald et al., 2024 |

## 4. CONCLUSION

Monitoring pre-pregnancy BMI and gestational weight gain is essential to reducing obstetric and neonatal risks. Individualized follow-up strategies and early interventions contribute to improved maternal-infant outcomes, preventing future metabolic complications and promoting the health of both mother and child.

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