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Pregnant women's dietary patterns and knowledge of gestational weight gain: A cross-sectional study

Busisiwe Dikgale¹ | Fuziwe Dlakavu¹ | Andries Masenge² | Slava De Gouveia³ | Sumaiya Adam^{1,4} 

¹Department of Obstetrics and Gynaecology, University of Pretoria, Pretoria, South Africa

²Department of Statistics, University of Pretoria, Pretoria, South Africa

³Dietetics, Kalafong Tertiary Hospital, Pretoria, South Africa

⁴Diabetes Research Centre, University of Pretoria, Pretoria, South Africa

Correspondence

Sumaiya Adam, Department of Obstetrics and Gynaecology, Steve Biko Academic Hospital, Room 72450, Level 7, Bophelo Road, Pretoria 0001, South Africa.
Email: sumaiya.adam@up.ac.za

Abstract

Objective: Excess gestational weight gain (GWG) is a risk factor for various unfavorable maternal and neonatal outcomes that may be preventable. Maintaining a healthy lifestyle while pregnant can help prevent uncontrollable weight gain. The aim of this study was to assess pregnant women's knowledge on weight, GWG, diet, and knowledge of obesity-related complications among women who seek care at our semi-urban, regional setting.

Methods: A prospective observational study was conducted at the prenatal clinic at Kalafong Academic Hospital. Prospective participants completed a questionnaire on their perception of GWG, attitudes toward GWG, knowledge of GWG, associated complications of obesity, and food choices. Data analysis was performed using SAS version 9.4.

Results: The majority of the 500 individuals were overweight or obese prior to pregnancy. By the end of the third trimester, this increased by 10.1% ($n=420$; 86.1%). Nearly half ($n=240$; 48.78%) of the overweight and obese women underestimated their weight. Only 26.53% ($n=26$) of women who checked their body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) gained weight according to recommendations. However, less than half ($n=96$; 30.5%) gained weight within the recommended range, despite the fact that the majority of them ($n=315$; 64%) were aware of the harmful effects of obesity on the cardiovascular system and the effects of high calories on weight gain ($n=321$; 65%).

Conclusion: Despite basic knowledge of the impact of high-caloric intake on weight gain and cardiovascular complications, less than half of the study population gained weight within the recommended range.

KEYWORDS

gestational weight gain, high calories, nutrition, obesity, recommendations

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1 | INTRODUCTION

Understanding appropriate diet and nutrition has an impact on weight gain, especially during pregnancy.^{1,2} Research has shown that low socioeconomic status and lack of knowledge are among the main reasons why women gain excessive weight during pregnancy.³ The South African guidelines place a minimal emphasis on proper nutrition, food portions, and appropriate weight gain.⁴ The implications of obesity and its problems, particularly during pregnancy, on both mother and infant receive scant attention in The Saving Mothers Guide.⁵

In order to improve postpartum weight loss and decrease instrumental deliveries, cesarean sections, cardiovascular, and other obesity-related complications to both mother and newborn, strategies that will ensure appropriate weight gain during and after pregnancy need to be implemented in our setting.^{6,7}

Gestational weight gain (GWG) is defined as the change in weight measured before pregnancy or during the first trimester to the weight measured prior to delivery.^{4,8} According to the Institute of Medicine, the recommended GWG is dependent on the pre-pregnancy weight:

- underweight: body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) less than 18.5; suggested weight gain 12.7–18.1 kg;
- normal weight: BMI 18.5–24.9; suggested weight gain 11.3–15.9 kg;
- overweight: BMI 25–29.9; suggested weight gain 6.8–11.3 kg;
- obese: BMI 30 or above; suggested weight gain 5–9.1 kg.

GWG outside these ranges would be considered poor or excessive GWG.⁸

According to observational research, a high pre-pregnancy BMI is strongly associated with adverse pregnancy outcomes. Gestational diabetes mellitus, hypertensive disorders, and an increased risk for operative vaginal deliveries are among the list of common complications. Miscarriages, preterm birth, large for gestational age, shoulder dystocia, congenital malformations, stillbirths, and neonatal death are examples of fetal complications in this regard.^{6,9} According to research, maternal obesity is linked to childhood obesity, metabolic diseases, coronary heart disease, and diabetes mellitus in the offspring.¹⁰

The nutritional situation in South Africa as a whole is complex and largely influenced by socioeconomic level, urbanization, and culture.¹ Undernutrition in children and an increase in adult obesity rates, particularly among women, are the two main characteristics of malnutrition trends.¹ It has been shown that the pattern of obesity and being overweight is more prevalent in urban areas than in rural areas.¹¹ As a result of sedentary lifestyles, processed foods, high-calorie foods, and globalization, obesity has increased, fueling the current global epidemic. Urbanization-related eating patterns and nutrient intake have changed as a result of the quick nutritional transition in South Africa.^{12,13}

According to the dietary guidelines of the American Heart Association, individuals need to follow a certain diet and lifestyle

throughout their lifespan in order to achieve and maintain cardiovascular and general health.¹⁴ This refers to habits of eating from all food groups over an extended period of time and not just a single meal.¹⁵ Limiting the consumption of alcohol and foods high in saturated fatty acids and cholesterol, and following a dietary pattern that emphasizes the inclusion of vegetables, fruits, low-fat and fat-free dairy products may lead to maintaining a healthy body weight.^{9,16} According to reports, nutritional knowledge during pregnancy ensures optimal GWG, positive birth outcomes, and the overall health of both mothers and babies.²

A healthy pregnancy is largely dependent on maternal nutrition. There are recommendations for appropriate GWG to limit the risk of adverse pregnancy outcomes.^{8,15,16} However, knowledge of these recommendations for GWG and adverse obstetric effects of being overweight or obese is poor, resulting in few women gaining the appropriate weight during their pregnancies.¹⁶ Sixty-eight per cent of women in South Africa are overweight or obese and 46% have hypertension.¹² Nutritional discussions about energy balance, weight gain, and physical activity should be prioritized. Knowledge, attitudes, and practices of pregnant women regarding a healthy diet, regular prenatal care visits, psychosocial support, danger signs and complications during pregnancy may limit excessive weight gain to achieve the best possible outcomes.^{2,12} In this study we assessed the knowledge of pregnant women on weight, GWG, diet, and knowledge of obesity-related complications.

2 | MATERIALS AND METHODS

We conducted an observational study of pregnant women attending the Kalafong prenatal clinic for routine prenatal care between 1 October 2022 and 30 November 2022. The study received approval from the Health Sciences Research Ethics Committee (Protocol 859/2020).

Kalafong Academic Hospital (KAH) is a tertiary hospital in Pretoria, South Africa. The obstetric unit is a referral center for hospitals in the South-West Tshwane district, as well as areas of Mpumalanga province. The population in question was considered to be of low–middle socioeconomic status.

Pregnant women were recruited into the study using convenience sampling. A total population sampling method was applied. The study population consisted of approximately 500 participants, determined as follows: the number of pregnant women visiting the facility was estimated to be 100 per day; an estimation of 20–30 patients were interviewed per day over a period of 4–6 weeks until the target population was reached.

Women in the third trimester of pregnancy who had booked early in pregnancy (before 18 weeks) were recruited at the KAH prenatal clinic. Following informed consent, women were interviewed irrespective of their BMI and socioeconomic status. Women were excluded from the study if they were unable to provide informed consent, were under 18 years of age, or were known to have a multiple pregnancy. Women with multiple pregnancies were excluded

from our study because of a lack of consensus on recommended guidelines on their GWG.

Gestational age was determined by an early ultrasound scan carried out before 24 weeks of gestation or from the date of the last normal menstrual period if available. In cases of uncertain gestation, the combination of a late ultrasound scan and history was used to determine the gestational age. A Likert scale questionnaire, completed on the day of recruitment at the prenatal clinic, was used to collect information on perception of GWG, attitudes, knowledge of GWG, associated complications, and food choices. Also included were questions on the women's demographics, obstetric and medical history, anthropometric measurements (height in meters, weight in kilograms, mid-upper arm circumference in centimeters), food intake, and physical activity, such as brisk walking or exercising. Information on weight and mid-upper arm circumference at booking was obtained from the prenatal records.

The researcher was able to converse fluently in English, Nguni, and Sotho languages and was able to recruit and give guidance to those who struggled with reading or understanding the questionnaire. Anthropometric measurements were carried out according to the standard operating procedure.

The data analysis was performed using SAS version 9.4. The analysis included frequency tables, counts, and percentages for categorical variables, as well as means and standard deviations for continuous variables. If the data were skewed, the median and interquartile range were presented. Statistical significance was considered at $P < 0.05$.

3 | RESULTS

In total, 500 women were recruited at the KAH prenatal clinic. Five (1%) participants were excluded in the data analysis because their questionnaire was incomplete; thus, 495 (99%) women were included in the data analysis. Table 1 illustrates the characteristics of the study population.

Women aged between 18 and 40 years (mean 31 years) were recruited. At recruitment, the mean gestational age was 29.5 weeks (interquartile range 24.4–36) due to KAH being a referral center. Most women ($n=444$, 89.9%) had a parity of 3 (interquartile range 1–3). Fifty-six (11.36%) women had previously delivered a stillborn fetus. Minor complaints of pregnancy, such as morning sickness, constipation, and cramps, were reported in 330 (65.82%) women; 61 (12.32%) women had purchased over the counter medications. Most of the participants ($n=430$; 86.85%) were using prenatal vitamins as per South African basic prenatal care guidelines.¹⁵

Among the women, 115 (24.06%) had hypertensive disorders, 54 (10.91%) had diabetes (type I, type II, or gestational), 161 (32.53%) had HIV, and 151 (30.51%) were taking lifelong highly active antiretroviral therapy. Only 10 women were not receiving treatment because they had recently been diagnosed with HIV or were not yet ready to initiate treatment. At booking, only 112 (22.76%) had a normal body weight, 6 (1.22%) were underweight, 166 (33.74%) were

TABLE 1 Characteristics of the study population ($n=495$).

Variable	<i>n</i> (%)
Age (years)	Mean 31 (18–40)
Gestational age	
Third trimester/last visit	Mean 29.5 (IQR 24.4–36)
Chronic medical conditions	
Hypertension	115 (24.1)
Diabetes mellitus	54 (10.9)
HIV	161 (32.5)
ART	151 (30.5)
Substance use	
Smoking	22 (4.4)
Alcohol	10 (2.0)
Other drugs	2 (0.4)
Lives with a smoker	173 (35.0)
Socioeconomic status ($n=493$)	
Full-time employment	187 (37.8)
Receiving social grants	145 (29.3)
Running water (tap/bore hole)	481 (97.2)

Abbreviations: ART, antiretroviral therapy; IQR, interquartile range.

TABLE 2 Comparison of weight at the beginning and end of pregnancy ($n=495$).

	First prenatal visit	Third trimester–last prenatal care visit
Weight (kg)	76.9	82.5
Height (m)	163.6	163.6
Mid-upper arm circumference (cm)	30.1	30.1
BMI	22.7	30.4
Underweight (BMI < 18.5)	6 (1.2%)	2 (0.4%)
Normal (BMI = 18.5–24.9)	112 (22.8%)	66 (13.5%)
Overweight (BMI = 25–29.9)	166 (33.7%)	140 (28.7%)
Obese (BMI ≥ 30)	208 (42.3%)	280 (57.4%)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

overweight, and 208 (42.28%) were obese. At the third trimester visit, 66 (13.52%) maintained a normal BMI and 2 (0.41%) were still underweight. The number in the overweight group had decreased to 140 (28.69%), whereas the number in the obese group had increased to 280 (57.38%) (see Table 2).

Twenty-two women (4.4%) thought they had not gained any weight since the start of pregnancy, 213 (43.0%) felt they had gained an appropriate amount of weight, 86 (17.4%) thought they had gained too little weight, while 53 (10.7%) felt they had gained too much weight. One hundred and twenty-one (24.4%) were uncertain about their weight gain. Most women ate either four to five

TABLE 3 Correlation between meal/food type frequency and gestational weight gain (GWG).

Meal/food type	Frequency per week	GWG below recommended range (n, %)	GWG within weight range (n, %)	GWG above recommended range (n, %)	Total (n)	P-value
Breakfast	1-2	2 (5.9)	0 (0.0)	0 (0.0)	34	0.007
	3-4	6 (17.6)	3 (8.8)	1 (2.9)		
	>5	11 (32.4)	6 (17.6)	1 (2.9)		
Bread	1-2	15 (8.8)	5 (2.9)	1 (0.59)	170	<0.001
	3-4	28 (16.5)	21 (12.4)	5 (2.9)		
	>5	45 (26.5)	25 (14.7)	13 (7.6)		
Hot beverage (tea/chocolate)	1-2	26 (13.3)	13 (6.6)	3 (1.5)	196	<0.001
	3-4	56 (28.6)	26 (13.3)	14 (7.1)		
	>5	24 (12.2)	16 (8.2)	4 (2.0)		
Fruits and vegetables	1-2	32 (12.9)	18 (7.3)	9 (3.6)	247	<0.001
	3-4	51 (20.6)	29 (11.7)	8 (3.2)		
	>5	52 (21.0)	23 (9.3)	9 (3.6)		
Fresh salad	1-2	42 (25.3)	19 (11.4)	10 (6.0)	166	<0.001
	3-4	26 (16.7)	12 (7.2)	6 (3.6)		
	>5	29 (17.5)	8 (4.8)	3 (1.8)		
Pap (maize meal)	1-2	17 (10.6)	10 (6.3)	2 (1.3)	160	<0.001
	3-4	45 (28.1)	16 (10.0)	7 (4.4)		
	>5	26 (16.3)	19 (11.9)	10 (6.3)		
Pasta/rice (all types)	1-2	58 (24.2)	43 (17.9)	14 (5.8)	240	<0.001
	3-4	37 (15.4)	26 (10.8)	9 (3.8)		
	>5	25 (10.4)	10 (4.2)	5 (2.1)		
Chicken	1-2	39 (12.3)	16 (5.1)	10 (3.2)	316	<0.001
	3-4	80 (25.3)	41 (12.9)	11 (3.5)		
	>5	54 (17.1)	38 (12.0)	10 (3.2)		
Beef	1-2	66 (34.0)	36 (18.6)	10 (5.2)	194	<0.001
	3-4	23 (11.6)	16 (8.4)	5 (2.6)		
	>5	13 (6.7)	10 (5.2)	4 (2.1)		
Fresh fish (all types)	1-2	39 (35.8)	21 (19.3)	6 (5.5)	109	<0.001
	3-4	13 (11.9)	5 (4.6)	3 (2.8)		
	>5	10 (9.7)	6 (5.5)	1 (0.9)		
Pilchards	1-2	21 (15.7)	16 (11.9)	9 (6.7)	134	<0.001
	3-4	30 (22.4)	12 (8.9)	4 (2.9)		
	>5	18 (13.4)	14 (10.4)	3 (2.2)		
Eggs	1-2	43 (21.4)	24 (11.9)	9 (4.5)	201	<0.001
	3-4	31 (15.4)	18 (8.9)	12 (5.9)		
	>5	28 (13.9)	22 (10.9)	5 (2.5)		
Nuts (all types)	1-2	33 (26.2)	9 (7.1)	6 (4.8)	126	<0.001
	3-4	23 (18.3)	19 (15.1)	2 (1.6)		
	>5	16 (12.7)	11 (8.7)	0 (0.0)		
Yoghurt	1-2	37 (21.8)	16 (9.4)	7 (4.1)	170	<0.001
	3-4	38 (22.4)	15 (8.8)	5 (2.9)		
	>5	24 (14.1)	16 (9.4)	4 (2.4)		

TABLE 3 (Continued)

Meal/food type	Frequency per week	GWG below recommended range (n, %)	GWG within weight range (n, %)	GWG above recommended range (n, %)	Total (n)	P-value
Fast food (burger/slap chips, etc.)	1-2	36 (23.2)	17 (10.9)	6 (3.9)	155	<0.001
	3-4	29 (18.7)	19 (12.3)	5 (3.2)		
	>5	20 (12.9)	12 (7.7)	1 (0.6)		
Potato chips (snacks)	1-2	53 (26.4)	33 (16.4)	6 (2.9)	201	<0.001
	3-4	31 (15.4)	17 (8.5)	10 (4.9)		
	>5	21 (10.4)	14 (6.9)	4 (1.9)		
Candy (all types)	1-2	36 (19.4)	23 (12.4)	8 (4.3)	186	<0.001
	3-4	32 (17.2)	11 (5.9)	8 (4.3)		
	>5	29 (15.6)	17 (9.1)	6 (3.2)		
Cookies/cake/dessert	1-2	29 (15.8)	20 (10.9)	8 (59.0)	183	<0.001
	3-4	43 (23.5)	24 (13.1)	8 (59.0)		
	>5	22 (12.0)	12 (6.6)	5 (2.7)		

($n=237$; 47.9%) or six or more ($n=209$; 42.2%) times per day. Thirty-four women (6.9%) ate between zero and three meals per day and 15 (3.0%) were uncertain of their meal frequency. Most women ($n=308$; 62.2%) ate more during pregnancy, whereas 53 (10.7%) women ate less than prior to pregnancy. One hundred and eighteen (23.8%) noted no change in their appetite during pregnancy. Four hundred and thirty-nine (88.7%) women reported experiencing pica during their pregnancy.

Women were generally less active in pregnancy ($n=236$; 47.7%), with a minority of patients either remaining the same level of activity ($n=74$; 25.7%) or being more active ($n=58$; 11.7%). The different food groups the women consumed weekly were assessed and analyzed. Although women knew about healthy food choices, only 34 (7.4%) women ($P=0.007$) actually ate breakfast, 198 (40%) women ($P<0.0001$) drank tea, 167 (33.7%) women ($P<0.0001$) ate fresh salads, and 247 (49.9%) women ($P<0.0001$) ate fruits and vegetables. Rice/pasta was the highest consumed food group ($n=240$; 48.5%, $P<0.0001$), with pap being the second ($n=160$; 32.3%, $P<0.0001$). Even though pilchards are affordable and rich in vitamins and omega-3 fatty acids, they were only consumed by 134 (27%) women ($P<0.0001$). Protein such as chicken was significantly more common in the diet ($n=316$; 63.8%, $P<0.0001$). Healthy snacks, such as nuts, were eaten by 126 (25.5%) women ($P<0.0001$) and yoghurt by 170 (34%) women ($P<0.0001$).

The correlation between the weekly meal selections and frequency and the recommended GWG was explored (Table 3).

Women were asked about their perception of their body weight (they were asked the question: are you obese?). At the first prenatal booking visit and at the last visit in the third trimester most women were either overweight or obese but denied it (Table 4: BMI first visit: $n=348$, 70.73%; BMI last visit in third trimester: $n=279$, 57.17%).

The impact of the women's knowledge about obesity and its complications and the correlation with GWG was assessed by asking various questions. Four participants had no second BMI recorded (Table 5).

4 | DISCUSSION

This study illustrates that even though the majority of women were aware of the dangers of obesity and the harmful effects of over-nutrition, less than half gained weight within the Institute of Medicine recommendations.⁸ This may be due to low maternal education and socioeconomic status and a lack of knowledge of food quantities or ratios, similar to other studies.¹⁷⁻¹⁹ Only a few of those women who were aware of their BMI status gained the appropriate weight as per recommendations. In the study population, most women were overweight or obese prior to pregnancy, and they continued to gain excess weight during the pregnancy. Studies have previously shown a relationship between a higher pre-pregnancy weight and excessive weight gain during pregnancy, which is in keeping with our findings.^{1,8,19,20}

Obesity and being overweight are major public health issues in South Africa.^{11,21} Their prevalence is one of the greatest in sub-Saharan Africa at the moment and is rising.^{11,21} In 2002, 29% of males and 56% of women in South Africa were overweight or obese. By contrast, these percentages had increased to 68% for women and 31% for males by the end of 2016.²¹ An obesogenic environment, which is characterized by widespread availability of inexpensive, unhealthy meals, intense marketing, and a fast-food sector that is expanding exponentially, is one of the main causes of the burgeoning obesity epidemic.²¹ In parallel, sedentary lifestyles and the use of ultraprocessed foods and beverages have increased.^{11,19,21} The burden of an overweight and obese population has been rising in low-income countries, particularly in Africa, and several studies have documented these trends.^{1,11,21,22}

In our study, women tended to underestimate how overweight or obese they were. Previous studies have shown that this impression of one's body is a significant factor in the epidemic of obesity and the associated health risks among Africans.^{23,24} Our study has shown that, despite some fundamental familiarity with food groups, this knowledge had minimal bearing on appropriate GWG.

TABLE 4 Pregnant women's perception of their weight.

"Are you obese?"	Underweight (BMI < 18.5) (n, %)	Normal (BMI = 18.5–24.9) (n, %)	Overweight (BMI = 24–29.9) (n, %)	Obese (BMI ≥ 30) (n, %)
BMI first visit (n = 492)				
No	6 (1.22)	102 (20.7)	122 (24.8)	118 (23.9)
Yes	0 (0)	10 (2.03)	44 (8.9)	90 (18.3)
BMI last visit in third trimester (n = 488)				
No	2 (0.2)	63 (12.9)	110 (22.5)	169 (34.6)
Yes	0 (0)	3 (0.6)	30 (6.2)	111 (22.8)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

TABLE 5 Correlation of knowledge of obesity and its risks with women's knowledge of appropriate gestational weight gain (GWG) based on Institute of Medicine guidelines (n = 492).

Questions asked to assess knowledge of obesity and its associated risks	What is appropriate GWG in your pregnancy?								P-value
	Weight unchanged/lost		GWG below recommendation		GWG within recommendation		GWG above recommendation		
	No	Yes	No	Yes	No	Yes	No	Yes	
Do you know what a normal BMI is?	21 (6.4)	10 (6.1)	179 (54.7)	82 (49.7)	90 (27.5)	59 (35.8)	37 (11.3)	14 (8.5)	<0.001
Do you check your BMI?	25 (6.4)	6 (6.1)	202 (51.3)	59 (60.2)	123 (31.2)	26 (26.5)	44 (11.2)	7 (7.1)	<0.001
Do you think you are obese?	27 (7.8)	4 (2.8)	205 (58.9)	56 (38.9)	88 (25.3)	61 (42.4)	28 (8.1)	23 (16.0)	<0.001
Can obesity lead to cardiac disease?	16 (9.0)	15 (4.8)	92 (52.0)	169 (53.7)	53 (29.9)	96 (30.5)	16 (9.0)	35 (11.1)	<0.001
Can high calories cause high BMI?	12 (7.0)	19 (5.9)	89 (52.1)	172 (53.6)	52 (30.4)	97 (30.2)	18 (10.5)	33 (10.3)	0.001
Do you think stress affects eating habits?	13 (7.9)	18 (5.5)	87 (53.1)	174 (53.1)	48 (29.3)	101 (30.8)	16 (9.8)	35 (10.7)	<0.001
Can junk food increase the risk of obesity?	5 (6.1)	26 (6.3)	45 (54.9)	216 (52.7)	26 (31.7)	123 (30.0)	6 (7.3)	45 (11.0)	0.002
Do you modify habits to lose weight?	20 (7.1)	11 (5.3)	162 (57.2)	78 (27.6)	78 (27.6)	71 (34.0)	23 (8.1)	28 (13.4)	<0.001
Have you been to a doctor to try lose weight?	30 (6.7)	1 (2.4)	242 (53.7)	19 (46.3)	136 (30.2)	13 (31.7)	43 (9.5)	8 (19.5)	<0.001

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters).

This could be a result of having a low socioeconomic status or lack of knowledge of portion sizes or portion control. The South African basic prenatal care guidelines give minimal attention to food and nutrition throughout pregnancy.^{4,25} Emphasis should be placed on educating primary healthcare providers about GWG, fundamental nutritional guidance, meal quantities, calorie consumption, and sustained activity throughout pregnancy in order to improve their knowledge of GWG.²⁵ Meaningful interactions with women themselves are necessary to facilitate the creation of sensitive and suitable training in dialogues about prenatal weight gain and to boost women's satisfaction.²⁵ Emphasis on calorie restriction and exercise may be effective in weight control programs. Typical lifestyle weight loss programs recommend a low-calorie diet of approximately 1200–1500 kcal/day, depending on a patient's weight.

However, weight loss in pregnancy is not without risks, and further research is required before such recommendations can be made.²⁶

Women who are more knowledgeable may be more driven to maintain GWG, although the best strategies to prevent excessive GWG remain unknown.²⁶ Recent literature reviews and meta-analyses have found that nutrition and physical activity interventions may typically result in a relatively modest decrease in GWG.²⁶ These reviews agreed that additional investigation into the mechanisms relating to effective lifestyle interventions to lower GWG was required.^{26–28} More emphasis on psychological factors, body image, and motivational techniques, diet, exercise, and weight monitoring techniques, attitude and motivational changes through education, cost-effective interventions, support from family, community, and the environment were among the suggested strategies.²⁶

FIGO (the International Federation of Gynecology and Obstetrics) also recommends a “nutritional checklist” strategy for pre-pregnant and early pregnant women.²⁷ This puts further emphasis on a holistic approach that includes a multidisciplinary team (dietitians, community health, midwives, family doctors, and obstetricians), preconceptional lifestyle modifications (alcohol, smoking, and recreational drugs), screening, and management of chronic conditions.²⁷

One of the strengths of the study was the large sample size. Also, that it may improve future knowledge of patient outcomes on GWG through nutrition and dietetic interventions. Limitations of this study were that women were recruited at the prenatal clinic at various gestational ages. As women were not seen pre-conceptually or in the first trimester, we cannot accurately assess GWG; therefore, BMI, which is a poor marker in pregnancy, was used. The women were not followed up for intrapartum complications and postpartum weight loss. This study described patterns of recall bias in self-reported dietary information and under- or over-estimation of body weight, not an intervention study, and we did not have pre-pregnancy weight.

Future research foci should include more emphasis on health provider education, psychological factors, body image, motivational techniques, diet, exercise, and weight monitoring techniques, attitude and motivational changes through education, cost-effective interventions, support from family, community, and the environment.

5 | CONCLUSION

At the start of their pregnancies, most of the women in our research study were overweight or obese. Despite some knowledge of the impact of high-caloric diets on weight gain and cardiovascular complications, less than half the women had GWG within the recommended weight. Much work is still required to optimize preconceptional BMI and appropriate GWG in all pregnancies. Empowering healthcare providers to be able to educate women on basic nutrition and exercise appropriate for pregnancy, and a patient-centered holistic approach to pregnancy care is essential. More research on effective strategies on GWG is still required.

AUTHOR CONTRIBUTIONS

BD and SA were responsible for the conceptualization of the study. BD, FD, AM, and SA developed the protocol. BD and SDG were responsible for data collection. AM carried out the statistical analysis. All authors contributed to the compilation of the article.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

ORCID

Sumaiya Adam  <https://orcid.org/0000-0001-8769-3273>

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