OPEN ACCESS
ISSN: 3106-4264

Original Article
DOI: 10.55735/cvn13s02

The Healer Journal of Biomedical and Health Sciences
HJBHS

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Journal homepage: www.healerjournal.com

Prevalence, Dietary Patterns and Associations with Body Weight among Women of Reproductive Age in Pakistan: A Cross-Sectional Study

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Submitted: 12-08-2025
Revised: 22-09-2025
Accepted: 12-10-2025
Published: 01-12-2025

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ABSTRACT

Background: Overweight and obesity are widely emerging among women of reproductive age in Pakistan. Changes in lifestyle and dietary habits, sedentary lifestyles, and reduced physical activity contribute to unhealthy weight gain, risk of metabolic disorders, and pregnancy-related complications. **Objective:** To determine the prevalence of BMI categories, characterize dietary and lifestyle patterns, and assess their associations with body weight among women aged 25 to 40 years in Pakistan. **Methodology:** This cross-sectional study included 200 women aged 25–40 from urban and semi-urban areas. Only non-pregnant, non-lactating women willing to participate were included, while those with chronic illnesses affecting weight were excluded. Participants provided informed consent and were briefed about the study. Dietary intake was assessed using a semi-quantitative Food Frequency Questionnaire. Major dietary patterns were identified via factor analysis, primarily Principal Component Analysis with varimax rotation. Associations between diet patterns and BMI were analyzed using chi-square tests and logistic regression to determine the likelihood of being overweight or obese based on diet pattern scores. **Results:** Among participants, 30% were overweight, and 14% were obese; 48% had a normal body mass index, and 8% were underweight. Two dominant patterns emerged: a traditional home-cooked pattern (high intake of roti, rice, lentils, and vegetables) and a high-fat/snacking pattern (fried foods, sugary drinks, and packaged snacks). Women with high adherence to the high-fat/snacking pattern combined with low physical activity had significantly higher odds of being overweight or obese ($p<0.01$). Regular exercise, daily fruit intake, and consistent breakfast consumption were associated with healthier body mass index levels. **Conclusion:** Excess body weight is highly prevalent among Pakistani women aged 25 to 40 years. Diets high in fried foods and sugary snacks, along with low physical activity, are strongly associated with higher body mass index, whereas healthy eating and regular exercise are protective. These findings highlight the need for integrated interventions promoting balanced nutrition and active lifestyles to prevent obesity in this population.

Keywords: Dietary patterns, Exercise, Healthy eating, Obesity, Physical activity, Reproductive age

How to cite the article: Khan MA, Ahmad S. Prevalence, Dietary Patterns and Associations with Body Weight among Women of Reproductive Age in Pakistan: A Cross-Sectional Study. The Healer Journal of Biomedical and Health Sciences. 2025; 1(2): 15-20.

INTRODUCTION

Globally, overweight and obesity are rapidly emerging as major health concerns. Many countries have to face a double burden of undernutrition and overnutrition.[1] Women of reproductive age are particularly affected, with rising rates of overweight and obesity due to changes in dietary patterns and lifestyle behaviors.[1] In Pakistan, national-level data indicate that overweight and obesity are increasingly prevalent among adult women, with urban residence, marital status, and wealth identified as key risk factors.[2] Dietary changes, including higher consumption of energy-dense foods and lower intake of traditional whole grains and vegetables, are contributing to weight gain in this population.[3]

Traditional diets in South Asia, once dominated by legumes, whole grains, and home-cooked meals, are increasingly being replaced by processed foods, sugary snacks, fast food, refined carbohydrates, and fried foods.[4] This shift, combined with metabolic predispositions common in South Asians, increases the susceptibility to overweight and obesity.[5] A study was conducted in the UAE, and it claimed that food preferences and eating behavior in females, along with low physical activity and sedentary behaviors, further exacerbate the problem.[6] Urban women often have limited opportunities for exercise due to work, household responsibilities, and cultural constraints. As a result, high calorie intake coupled with low physical activity is driving the rise in overweight and obesity among women aged 25–40.[7] There are widely available studies that support these observations.

A study was conducted in India that looked at women and found majority of them were overweight or obese. It also concluded that married women and those living in cities had a higher probability of obesity.[8,9] Similarly, one study looked at university students from the UK and UAE and found that sugary drinks or ate fast food a lot had higher weight.[10] Previous studies conducted in Pakistan on this matter reported BMI, focusing on diet or social factors by themselves.[11] Women in this 25–40 age group are at a stage in life with family responsibilities, maybe pregnancies, and social pressures. Women's diet and physical activity can affect their long-term health and pregnancy outcomes. This study aims to assess the prevalence of underweight, normal weight, overweight, and obesity among women aged 25–40 years, and how their dietary and lifestyle patterns are related to body weight. The findings can help guide nutrition education and lifestyle programs.[12] The study was designed to determine the prevalence of BMI categories, characterize dietary and lifestyle patterns, and assess their associations with body weight among women aged 25–40 years in Pakistan.

METHODOLOGY

This is a cross-sectional study that includes 200 women aged 25–40 years who belong to urban and semi-urban areas. Only women who were not pregnant or breastfeeding and were willing to participate were included. Women with chronic illnesses like thyroid problems or other conditions that could affect weight were excluded. All participants were briefed about the study, and informed consent was taken. Participants' confidentiality was maintained, and they had the right to withdraw at any time. A structured questionnaire was used to collect demographic and lifestyle information from the participants. These questions were similar to those in the previous study in Pakistan.[13]

For diet, we used a semi-quantitative Food Frequency Questionnaire (FFQ). It had a long list of foods that women in Pakistan eat, and how often they eat. After data collection, the responses were coded and turned into estimated servings so they could be analysed. To identify the major dietary patterns in the participants, factor analysis was done, mainly Principal Component Analysis (PCA) with varimax rotation. This method has been previously used to find the association of dietary patterns with the risk of obesity in Iran.[14] Before running PCA, foods were grouped into broader categories like grains, pulses, vegetables, sweets, snacks, and processed foods. Based on the factor loadings, pattern scores were created for each woman.

Physical measures were recorded, which include weight, height, and body mass index (BMI) was calculated. We categorized BMI into underweight, normal, overweight, and obese. These categories were also used in previous cross-sectional studies on diet and obesity.[15] Data analysis was performed in SPSS version 23. Descriptive statistics were done for different variables like diet pattern scores, BMI, age, and lifestyle habits. Means and standard deviations were used for continuous variables,

while categories such as BMI groups or physical activity levels were shown as percentages. In order to determine how diet patterns were linked with BMI, chi-square tests and logistic regression analysis were performed to see the chances of being overweight or obese based on the diet pattern scores. We also used some multivariate regression models so we could adjust for things like age, education, income, and physical activity. A p-value below 0.05 was considered significant. This approach is similar to many other studies where researchers used FFQ, PCA, and measured BMI to understand diet-weight links. Cross-sectional studies conducted among Iranian women and in India also used almost the same methods.[16,17]

RESULTS

A total of 200 women aged 25–40 years participated in this study, and the mean age was 32.4 ± 4.7 years. Most participants were between 30–34 years (43%), followed by those aged 35–40 years (31%), while the youngest group, 25–29 years, constituted 26%. Urban residents made up 62% of the sample, and 48% had completed secondary education or higher. Income distribution showed that 36% belonged to low-income families, 40% to middle-income, and 24% to higher-income households. Regarding lifestyle patterns, 45% reported low physical activity, 38% moderate activity, and only 17% engaged in high or regular exercise routines. These demographic and lifestyle characteristics are summarized in Table 1.

The BMI distribution showed a mixed but worrying picture among women of reproductive age in Pakistan. The mean BMI was 24.9 ± 5.1 kg/m^2, which is near the upper limit of normal. Almost half of the women (48%) had a normal weight, showing some balance in this group. However, overweight and obesity together made up 44% of the sample (30% overweight and 14% obese), which is high for women aged 25–40 years and matches trends seen in South Asian countries where low activity and calorie-dense diets are common. Underweight was low at 8%, reflecting the shift from undernutrition to overnutrition. Overall, many women have already moved into higher BMI categories, highlighting the need to closely examine diet and physical activity patterns.

Three major dietary patterns were extracted from the factor analysis of FFQ responses: Traditional home-cooked pattern, high-fat & snacking pattern, and mixed modern diet pattern. Their distribution showed that 34% adhered strongly to the traditional dietary pattern, 35% to the high-fat snack consumption pattern, and 31% to the mixed modern pattern, reflecting a gradual shift toward more processed and convenience-based foods among younger women. Detailed narration and distribution are provided in Table 1

Associations between BMI, dietary behaviors, physical activity, and sedentary time were assessed using multivariable logistic regression. Adherence to the high-fat & snacking pattern

Table 1: Demographics and lifestyle characteristics of participants

	Variables	Frequency (Percentage, %)
Age (years)	mean±SD	32.4 ± 4.7
	25–29 years	52 (26%)
	30–34 years	86 (43%)
	35–40 years	62 (31%)
Residence	Urban residence	124 (62%)
	Semi-urban/rural residence	76 (38%)
	Education ≥Secondary school	96 (48%)
Income status	Low income	72 (36%)
	Middle income	80 (40%)
	High income	48 (24%)
Physical activity	Low	90 (45%)
	Moderate	76 (38%)
	High	34 (17%)
BMI category	Underweight (<18.5)	16 (8%)
	Normal weight (18.5–<25)	96 (48%)
	Overweight (25–<30)	60 (30%)
	Obese (≥30)	28 (14%)
Dietary patterns	Traditional home-cooked	68 (34%)
	High-fat & snacking	70 (35%)
	Mixed modern diet	62 (31%)

significantly increased the odds of overweight or obesity (OR=2.85; 95% CI: 1.54–5.26; p=0.001). Low physical activity showed a similar effect (OR=2.10; 95% CI: 1.08–4.06; p=0.029), while sedentary behavior ≥6 hours/day was also an independent predictor (OR=1.75; 95% CI: 1.01–3.03; p=0.046). The traditional dietary pattern showed a protective trend but did not reach statistical significance. These results are shown in Table 2.

Table 2: Adjusted associations of dietary and lifestyle factors with overweight/obesity

Predictor	OR (95% CI)	p-value
High-fat & snacking	2.85 (1.54–5.26)	0.001
Low physical activity (vs high)	2.10 (1.08–4.06)	0.029
Sedentary ≥6h/day	1.75 (1.01–3.03)	0.046
Traditional home-cooked	0.58 (0.32–1.04)	0.067
Mixed modern diet	1.12 (0.62–2.01)	0.70

DISCUSSION

This study shows that many women aged 25–40 years in Pakistan are already facing weight problems. Almost half of them were overweight or obese. This is worrying because this age is critical for women's health and future pregnancies. Weight issues now can affect health for many years and may increase the risk of chronic diseases later. When we compare with other research, similar patterns appear. A study by Amin et al. (2015) concluded that adult women are gaining weight due to changes in lifestyle, urbanization, and easy access to high-calorie foods.[18] In India, recent surveys also show that urban women and those with indoor jobs are more likely to be overweight or obese.[19] Kumar et al. (2022) also concluded in an Indian study that there is a continuous rise in obesity among reproductive-age women.[20] These regional trends confirm that the problem is widespread and increasing.

Dietary habits in our study were an important factor. Many women reported eating fried snacks, sweets, and fast foods regularly. These women showed higher BMI. A study from Jordan reported similar findings and a shift from traditional foods towards consumption of sugary drinks, fast foods, in females, increased body weight.[21] Saudi Arabia also shows a dietary shift toward Western-style meals, which is linked with rising obesity.[22] These patterns suggest that diet changes are a strong driver of weight gain in young women. Physical activity also played a key role. Women with low daily movement or prolonged sitting were more likely to be overweight. This is consistent with global findings that dietary patterns and sedentary behavior contribute to obesity, even when the diet is not extremely unhealthy.[23] It shows that diet and activity together influence weight outcomes, and both need attention.

Interestingly, women who mostly followed home-cooked meals had slightly better weight outcomes. Home-cooked diets usually include vegetables, legumes, and whole grains and are lower in fats and sugar. Portion size, meal frequency, and cooking methods also matter. Even a small shift toward home-cooked meals can be beneficial.[24] Many participants had a mixed dietary pattern, eating some traditional foods but also fast foods. Research from Europe and the US calls this a "transitional" or "modernized" pattern.[25,26] People gradually move from traditional diets to more processed and convenient foods. This shift is linked with a higher risk of overweight and obesity. Our study suggests that Pakistani women are also experiencing this transition.

Biological explanations support our findings. Unhealthy dietary patterns can alter cholesterol, triglycerides, and hormones, which may lead to increased fat storage and hormonal imbalance.[27] This explains why diet patterns and BMI showed strong associations in this study. Our findings have practical implications. Small changes can make a difference. Encouraging healthier food choices, reducing fried and sugary items, and promoting simple daily activities like walking can help. Policy measures such as food labeling, reducing the availability of sugary drinks, and promoting healthy options in schools and workplaces can also support weight management.[28]

The limitations of this study are that it is a cross-sectional study, so we cannot say that diet caused weight gain. We only report associations. The dietary recall method may have errors because participants can forget or misreport food. The sample size is not large, so some findings may be

less precise. Despite this, the results are consistent with similar studies from other countries around the world. Overall, our study shows that unhealthy diets and low physical activity are common among women of reproductive age. Early interventions and small changes in daily habits might prevent bigger health problems later. Addressing diet and activity together is essential to reducing overweight and obesity in this population.

CONCLUSION

This study shows that many women aged 25–40 in Pakistan are already facing weight problems. A lot of them were overweight or obese. It seems strongly connected with what they eat and how much they move. Women who ate more fried snacks, sweets, and fast food had higher weights. The ones who mostly ate home-cooked meals were a bit better, but not perfect. Low activity also made things worse and appeared in almost all the results. These patterns are similar to what other studies in India, the UAE, and Saudi Arabia found. Small adjustments like eating a bit healthier, regular exercise, and adopting a healthy lifestyle can be helpful to maintain a healthy weight.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.

Competing interests: None.

Funding: No funding source involved.

Authors' contributions: All authors had read and approved the final manuscript.

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