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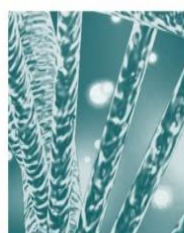
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Socioeconomic determinants of obesity: investigating the link between poverty and excess weight

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ABSTRACT

Objective: To determine the frequency of obesity among low-income adults aged 20–45 years and to identify the socioeconomic, dietary and lifestyle factors associated with it.

Methods: This cross-sectional study was conducted in the outpatient department of THQ Hospital Ferozewala, Punjab, from February 2026 to June 2026. Consecutive sampling was used to enroll 150 adults with a monthly household income below PKR 37,000. Information was collected using a structured questionnaire, and height and weight were measured directly. Obesity was defined as BMI ≥ 30 kg/m² according to WHO criteria. Associations were assessed using chi-square tests and logistic regression.

Results: The mean age was 33.9 ± 7.4 years, and 58.7% of participants were women. Obesity affected 30.0%, while 34.7% were overweight. Obesity was more frequent in the lowest income group (42.3%) than in the highest (16.2%), and among women, older participants and housewives. Dietary habits and sedentary behaviours were associated with obesity. Female sex, age 40–45 years, income below PKR 20,000, fast food consumption, fried food consumption and physical inactivity remained significant predictors after adjustment.

Conclusion: Nearly two-thirds of low-income adults had excess weight, with obesity most frequent among those earning the least. These findings supported nutrition counseling and physical activity advice as part of routine outpatient care.

Keywords: Obesity, Poverty, Socioeconomic Factors, Body Mass Index.

1. INTRODUCTION

Obesity affects communities across all income levels. Between 1990 and 2022, its prevalence among adults more than doubled worldwide. In many low- and middle-income countries, obesity now coexists with persistent underweight¹. Excess adiposity contributes to type 2 diabetes, hypertension, cardiovascular disease and several cancers². The coexistence of under nutrition and over nutrition within communities, and sometimes within the same household, is known as the double burden of malnutrition³.

Pakistan has also experienced this nutritional transition. A pooled analysis of apparently healthy Pakistani adults estimated the prevalence of metabolic syndrome at almost 29%, with central obesity among its most common components⁴. The burden among disadvantaged communities is concerning, as slum populations worldwide have substantial rates of hypertension and diabetes⁵. Income alone, however, does not fully explain excess weight. A Karachi study involving low-, middle- and high-income neighborhoods found that low-density areas and a greater concentration of fast-food outlets were associated with higher BMI⁶. These findings suggest that the local environment and access to affordable food may influence the relationship between poverty and obesity.

Diet and daily activity may help explain how living conditions influence body weight. A study in low-income settlements of Karachi examined sedentary behavior in relation to obesity among adults with type 2 diabetes⁷. Globally, almost one-third of adults do not meet recommended physical activity levels, and this proportion has increased⁸. Regular consumption of sugar-sweetened beverages has been associated with weight gain⁹. Ultra-processed foods, which are often inexpensive and widely marketed, have also been linked to several adverse health outcomes¹⁰. In Punjab, a study of

approximately 4200 schoolchildren and adolescents found associations between nutrition behavior, food intake and excess weight¹¹.

Limited access to food does not necessarily prevent obesity. Food insecurity has been associated with obesity in several settings, although the underlying mechanisms remain uncertain¹². Research using household data identified diet quality as a possible explanation: families with limited budgets may rely on inexpensive, energy-dense foods to meet their daily needs¹³.

Accessible prevention programs for disadvantaged adults remain limited. A pilot study in an urban slum of Karachi found that peer-supported lifestyle counseling delivered through voice calls was feasible, although its effectiveness required further evaluation [14]. Evidence from peri-urban public hospitals is particularly limited, leaving clinicians with little local guidance on excess weight among patients with restricted financial resources. THQ Hospital Ferozewala serves a growing peri-urban population in Sheikhpura district, near Lahore, and provided a relevant setting for examining this issue.

This study assessed the frequency of obesity among low-income adults aged 20–45 years attending the outpatient department of THQ Hospital Ferozewala and examined the socioeconomic, dietary and lifestyle factors associated with it.

2. METHODOLOGY

This descriptive cross-sectional study was conducted in the outpatient department (OPD) of Tehsil Headquarters (THQ) Hospital Ferozewala, a public sector facility serving a peri-urban and semi-rural population in Sheikhpura district, Punjab, Pakistan. Data were collected from February to June 2026.

Adults aged 20–45 years attending the OPD as patients or attendants were eligible if

their total monthly household income was below PKR 37,000 and they agreed to participate. Pregnant women were excluded. Other exclusions included conditions known to affect body weight, such as thyroid disease, Cushing's syndrome, chronic kidney, liver or cardiac disease, malignancy and eating disorders. People taking long-term corticosteroids or antipsychotic medication were also excluded.

Written informed consent was obtained from every participant before enrolment. Participation was voluntary, and withdrawal at any stage did not affect treatment. Data were coded, stored without personal identifiers and used only for research. The study was approved by the ethical review committee of THQ Hospital Ferozewala.

The sample size was calculated using the single-proportion formula, assuming an obesity prevalence of 22%, a 95% confidence level and a 7% margin of error. The minimum sample was 135, which was increased to 150 to allow for incomplete responses. Eligible adults were recruited consecutively on OPD days until the required sample was reached. Sociodemographic, dietary and lifestyle information was collected through structured interviews, while height and weight were measured directly.

The principal investigator and trained assistant collected information through a structured interviewer-administered questionnaire in Urdu or Punjabi, according to each participant's preference. Its five sections covered sociodemographic and socioeconomic characteristics, food and nutrition, physical activity and lifestyle, health status, and personal perceptions. Dietary questions addressed meal frequency, breakfast habits, fruit and vegetable intake, cooking fats, fast and street food, sugary drinks, fried food, financial constraints on food choices, meal skipping and previous dietary advice. Lifestyle questions covered daily exercise or walking of

at least 30 minutes, sitting time, sleep, smoking, alcohol and smokeless tobacco use. The questionnaire was pilot tested with 15 outpatients who were not included in the final sample, and unclear questions were revised. Internal consistency of the dietary items was acceptable (Cronbach's alpha 0.78). Table 1 presents the study variables and the operational definitions used in the analysis.

Height and weight were measured directly, with participant's barefoot and wearing light clothing. Weight was recorded to the nearest 0.1 kg using a calibrated digital scale, and height to the nearest 0.1 cm using a wall-mounted stadiometer. Both measurements were taken twice, and the average was used to calculate BMI as weight in kilograms divided by height in meters squared. Standard WHO categories were applied: underweight, <18.5; normal weight, 18.5–24.9; overweight, 25.0–29.9; and obesity, ≥ 30.0 kg/m².

Data were analyzed using IBM SPSS version 26. Continuous variables were reported as mean $\pm$ SD and categorical variables as frequency (%). Groups were compared using chi-square or Fisher's exact tests. Variables with $p < 0.10$ in bivariate analysis entered backward logistic regression, and AORs with 95% CIs were reported. Statistical significance was set at $p < 0.05$.

3. RESULTS

Of 187 adults screened, 150 were enrolled. Nineteen exceeded the income threshold, 11 met an exclusion criterion and seven declined participation. The mean age was 33.9 ± 7.4 years, and 88 participants (58.7%) were women. Table 1 presents BMI categories overall and by sex; excess weight was more frequent among women.

Table 2 presents obesity prevalence across sociodemographic groups. Obesity was more frequent among older participants, women, housewives and those with lower household

income. Prevalence also increased with lower educational attainment, although this association did not reach statistical significance.

Dietary and lifestyle factors are presented in Table 3. Obesity was associated with frequent fried and fast food consumption, sugary drinks, breakfast skipping and lower fruit and vegetable intake. Physical inactivity, prolonged sitting and short sleep were also more frequent among participants with obesity. Tobacco use did not differ significantly between groups, and only two participants reported alcohol use. Among the 109 participants who did not exercise daily, the reported barriers were lack of time (39.4%), lack of space (24.8%), lack of awareness (20.2%) and health problems (15.6%).

Table 4 presents the adjusted associations. Female sex, age 40–45 years, the lowest income category, frequent fast and fried food consumption, and physical inactivity remained significantly associated with obesity. The Hosmer–Lemeshow test did not indicate poor model fit.

Figure 1 presents participants' views on health and nutrition support. Most reported that financial circumstances affected their health and expressed interest in free nutrition sessions, particularly those with obesity.

Table-1: Distribution of BMI categories among study participants

BMI category (kg/m ²)	All (n = 150)	Men (n = 62)	Women (n = 88)
Underweight (<18.5)	9 (6.0)	6 (9.7)	3 (3.4)
Normal (18.5–24.9)	44 (29.3)	24 (38.7)	20 (22.7)
Overweight (25.0–29.9)	52 (34.7)	20 (32.3)	32 (36.4)
Obese (≥30.0)	45 (30.0)	12 (19.4)	33 (37.5)
Overweight or obese	97 (64.7)	32 (51.6)	65 (73.9)

Table-2: Prevalence of obesity according to sociodemographic characteristics

Characteristic	Total, n	Obese, n (%)	p
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Age group (years)			
20–29	48	7 (14.6)	0.011
30–39	57	19 (33.3)	
40–45	45	19 (42.2)	
Sex			
Male	62	12 (19.4)	0.017
Female	88	33 (37.5)	
Monthly household income (PKR)			
<20,000	52	22 (42.3)	0.027
20,000–29,999	61	17 (27.9)	
30,000–36,999	37	6 (16.2)	
Education			
No formal schooling	31	14 (45.2)	0.083
Primary	34	12 (35.3)	
Secondary	41	12 (29.3)	
Intermediate	27	5 (18.5)	
Graduate	17	2 (11.8)	
Employment			
Employed	41	9 (22.0)	0.011
Daily wager	33	5 (15.2)	
Housewife	52	24 (46.2)	
Unemployed or student	24	7 (29.2)	

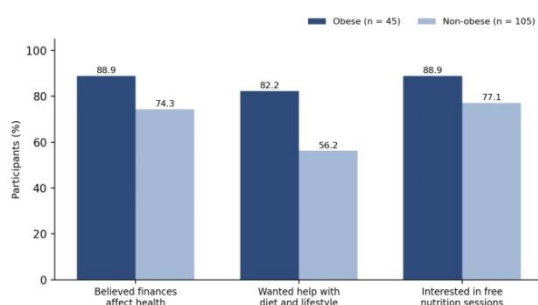
Table-3: Dietary and lifestyle factors in obese and non-obese participants

Factor	Obese (n = 45)	Non-obese (n = 105)	p value
Dietary factors			
Fast or street food ≥2–3 times/week	27 (60.0)	34 (32.4)	0.002
Sugary drinks ≥2–3 times/week	26 (57.8)	32 (30.5)	0.002
Fried food daily or frequently	32 (71.1)	40 (38.1)	<0.001
Fruit ≤2 times/week	39 (86.7)	65 (61.9)	0.003
Vegetables ≤2 times/week	22 (48.9)	27 (25.7)	0.006
Ghee or butter as main cooking fat	26 (57.8)	37 (35.2)	0.010
Diet mostly carbohydrate- or fat-based	35 (77.8)	52 (49.5)	0.001
Breakfast rarely or never	21 (46.7)	23 (21.9)	0.002
Finances affect food choice “very much”	29 (64.4)	37 (35.2)	0.001

Ever received healthy eating guidance	4 (8.9)	27 (25.7)	0.020
Lifestyle factors			
<30 min daily exercise or walking	40 (88.9)	69 (65.7)	0.004
Sitting ≥ 6 hours/day	33 (73.3)	41 (39.0)	<0.001
Sleep <6 hours/night	21 (46.7)	26 (24.8)	0.008
Current smoker	5 (11.1)	24 (22.9)	0.095
Smokeless tobacco use	8 (17.8)	25 (23.8)	0.414
Previously told by a doctor of excess weight	24 (53.3)	17 (16.2)	<0.001

Table-4: Independent predictors of obesity (multivariable logistic regression)

Predictor	AOR	95% CI	p value
Female sex (ref: male)	2.68	1.10–6.55	0.030
Age 30–39 years (ref: 20–29)	2.36	0.78–7.16	0.129
Age 40–45 years (ref: 20–29)	4.12	1.21–14.02	0.023
Income PKR 20,000–29,999 (ref: 30,000–36,999)	1.94	0.62–6.08	0.255
Income <PKR 20,000 (ref: 30,000–36,999)	3.85	1.18–12.54	0.025
Fast or street food ≥ 2 –3 times/week	2.57	1.08–6.11	0.033
Fried food daily or frequently	2.41	1.02–5.70	0.045
Physical inactivity	3.34	1.05–10.63	0.041



4. DISCUSSION

Obesity affected 30.0% of the low-income adults in this study, while 64.7% were overweight or obese. Obesity prevalence was higher than the pooled estimate of

approximately 21% reported for adults in Middle Eastern countries, whereas overweight prevalence was close to the corresponding estimate of 33% [15]. These findings showed that low income did not prevent excess weight in this hospital population. Differences in setting and participant selection should be considered when comparing these figures, as hospital recruitment may have included more people with existing health concerns.

The association with household income was particularly clear. Obesity was more than two and a half times as frequent in the lowest income group as in the highest, and the association persisted after adjustment. Food affordability may partly explain this pattern. An analysis of retail prices in 177 countries found that a nutrient-adequate diet cost approximately 2.7 times as much as a diet that met energy requirements alone [16]. Families with limited resources may therefore depend on inexpensive, energy-dense foods. Nearly two-thirds of participants with obesity reported that financial constraints strongly influenced their food choices.

Frequent consumption of fried food, fast food and sugary drinks, along with carbohydrate- or fat-dominated diets, was more common among participants with obesity. The association with breakfast skipping required cautious interpretation. A meta-analysis of cross-sectional studies found higher odds of overweight or obesity among people who regularly skipped breakfast [17], but longitudinal evidence provided only limited support for an effect on subsequent weight gain [18]. Financial constraints and working hours may influence meal patterns, but this cross-sectional study could not establish why participants skipped meals or whether skipping preceded obesity.

Physical inactivity remained significantly associated with obesity after adjustment. Prolonged sitting and short sleep were also more frequent among participants with

obesity. Reviews have linked short sleep duration with excess adiposity in adults [19]. Lack of time and space were the most commonly reported barriers to daily exercise. Advice that helps participants include walking in their usual routine may therefore be more practical than recommending activities that require dedicated facilities or additional expense.

Obesity was more frequent among women, and housewives had the highest prevalence across occupational groups. Research involving low-income parents found that mothers were more likely to compromise their own diet quality to provide food for their children [20]. Such pressures may influence food choices, although this pathway was not assessed in the present study. Opportunities for physical activity outside the home may also contribute, but mobility restrictions were not measured.

The study used directly measured height and weight, calibrated equipment and standard WHO obesity criteria. Its focus on low-income adults attending a public sector hospital provided evidence from a clearly defined disadvantaged population. Assessing dietary, lifestyle and socioeconomic factors together allowed their adjusted associations with obesity to be examined.

5. CONCLUSION

Obesity was common among low-income adults, and nearly two-thirds had excess weight. Lower income, female sex, older age, unhealthy eating habits and physical inactivity were associated with obesity. These findings highlighted the need for routine BMI checks, simple nutrition counseling and practical physical activity advice during outpatient visits.

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