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Original Article

Public Awareness of Nutrition-Related Non-Communicable Disease Prevention in Adults

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ABSTRACT

Background: Non-communicable diseases are increasing rapidly in Pakistan, and unhealthy dietary practices are major modifiable contributors to diabetes, obesity, and hypertension. Public awareness is essential for prevention, yet local evidence from Quetta regarding practical nutrition literacy remains limited. Objective: To assess public awareness of nutrition-related prevention of non-communicable diseases among adults attending selected tertiary hospitals in Quetta, Pakistan, and to identify socio-demographic factors associated with awareness. Methods: A community-based cross-sectional study was conducted among 384 adults selected through convenience sampling. Data were collected using a structured questionnaire covering socio-demographic characteristics, nutrition-related knowledge, perceived personal risk, sources of information, and need for public education. Awareness scores were categorized as poor, moderate, or good. Descriptive statistics and chi-square tests were used for analysis, with $p<0.05$ considered statistically significant. Results: Of 384 participants, 216 (56.3%) were male and 243 (63.3%) were urban residents. Correct responses were highest for excess sugar intake and diabetes risk (78.6%) and frequent oily/fried food and obesity (74.5%), but lower for hidden salt and sugar in packaged foods (46.6%), food label reading (44.5%), and fiber-rich foods (42.4%). Overall, 104 participants (27.1%) had poor awareness, 182 (47.4%) had moderate awareness, and 98 (25.5%) had good awareness. Education showed the strongest association with awareness, with graduates having higher odds of good awareness than participants with no formal education. Conclusion: Adults in Quetta had basic but incomplete awareness of nutrition-related NCD prevention. Practical nutrition education focusing on food labels, hidden dietary risks, fiber intake, and personal risk perception is needed, especially for less educated and rural populations. Keywords: Nutrition awareness; Non-communicable diseases; Diabetes; Obesity; Hypertension; Dietary practices; Public health; Adults; Quetta; Pakistan.

INTRODUCTION

Non-communicable diseases have become a major public health challenge worldwide because they account for a large proportion of preventable morbidity, disability, and premature mortality. Cardiovascular diseases, diabetes mellitus, obesity-related disorders, chronic respiratory diseases, and several cancers are strongly influenced by modifiable behavioral and metabolic risk factors, particularly unhealthy dietary intake, physical inactivity, tobacco exposure, excess body weight, raised blood pressure, impaired glucose regulation, and dyslipidemia (1–5). Among these determinants, nutrition occupies a central preventive role because daily dietary patterns directly influence body weight, blood pressure, glycemic control, lipid metabolism, inflammatory burden, and long-term cardiometabolic risk. Diets

high in salt, free sugars, saturated fats, trans fats, refined carbohydrates, and ultra-processed foods, combined with low intake of fruits, vegetables, pulses, whole grains, and fiber-rich foods, have consistently been associated with increased risk of hypertension, diabetes, obesity, and other chronic diseases (1–5).

The prevention of nutrition-related NCDs requires more than general awareness that unhealthy food is harmful. Effective prevention depends on functional nutrition literacy, including the ability to recognize hidden salt and sugar, interpret food labels, understand portion size, identify protective food groups, and apply dietary advice in routine household and marketplace settings. International evidence shows that public dietary guidance, nutrition policy, and population-level prevention strategies are most effective when they translate scientific recommendations into practical, culturally understandable behaviors that people can adopt before disease develops (6–9). Recent literature also emphasizes that healthy and sustainable dietary patterns are essential not only for individual disease prevention but also for reducing multimorbidity and long-term public health burden (10,11).

Pakistan is experiencing a rapid epidemiological transition in which infectious diseases continue to coexist with a growing burden of diabetes, hypertension, obesity, and other chronic diseases. National and subnational studies have reported a high prevalence of diabetes, prediabetes, hypertension, overweight, and obesity among Pakistani adults, with important variation by age, residence, education, and lifestyle factors (12–16). This pattern is especially concerning because unhealthy dietary practices, urbanization, reduced physical activity, increased consumption of processed foods, and limited structured nutrition education may accelerate the development of NCDs across both urban and rural populations. Although Pakistan-focused evidence has documented the rising burden of metabolic and cardiovascular risk, less attention has been given to whether adults possess the practical nutrition awareness needed to prevent these conditions before diagnosis.

Existing local evidence suggests that nutrition knowledge among Pakistani adults is uneven and shaped by education, access to information, and source of health guidance (17). However, the available literature remains concentrated in selected urban settings and does not adequately represent populations from Balochistan, where social, educational, cultural, and healthcare access patterns differ from larger metropolitan regions. Quetta is an important urban center that receives adults from both city and surrounding rural or peri-urban districts, particularly through tertiary hospitals. These hospitals provide a unique contact point for assessing awareness among patients, attendants, visitors, and members of the public from diverse backgrounds. In this setting, it is important to determine not only whether adults have heard about diabetes, obesity, and hypertension, but whether they understand the specific role of nutrition in preventing these conditions.

The present study was therefore designed using a PICO-based public health framework in which the population comprised adults attending selected tertiary hospitals in Quetta, the exposure of interest included socio-demographic and health-related factors such as education, residence, and family history of NCDs, the comparison involved differences in awareness across participant subgroups, and the primary outcome was level of public awareness regarding nutrition-related prevention of diabetes, obesity, and hypertension. The study aimed to quantify awareness levels, assess knowledge of practical dietary prevention measures, evaluate perceived personal risk, identify major sources of nutrition information, and determine demographic factors associated with awareness. The research question was: what is the level of public awareness regarding nutrition-related prevention of major non-communicable diseases among adults attending tertiary hospitals in Quetta, and which socio-demographic factors are associated with better awareness?

MATERIALS AND METHODS

This community-based cross-sectional study was conducted among adults attending selected tertiary hospitals in Quetta, Pakistan. The cross-sectional design was selected because the objective was to

measure awareness, perceived risk, and associated socio-demographic factors at a single point in time rather than to establish causality or evaluate an intervention. The study setting included public areas of tertiary hospitals, including outpatient waiting areas, courtyards, and other accessible sections where adult visitors, attendants, and members of the public were present. These hospitals were selected because they receive individuals from both urban Quetta and surrounding rural or peri-urban districts, allowing recruitment of participants with varied educational, occupational, residential, and family health backgrounds.

The target population consisted of adult men and women aged 18 years or above who were present in the selected hospital settings during the study period. Participants were eligible if they were adults, were available during data collection, could communicate in Urdu, English, or a locally understandable language with assistance from the data collector, and provided informed consent. Healthcare professionals, nutrition specialists, critically ill individuals, persons with severe mental or communication difficulty preventing interview completion, and those who declined participation or left the interview incomplete were excluded to preserve the focus on general public awareness rather than professional knowledge.

The sample size was calculated using the single population proportion formula, $n = Z^2 p(1-p)/d^2$, using a 95% confidence level, an expected awareness proportion of 50% because of limited prior local evidence from Quetta, and a 5% margin of error. This yielded a minimum sample size of 384 participants, which was retained as the final analytical sample. A non-probability convenience sampling technique was used. Eligible adults present in hospital public areas were approached consecutively, the study purpose was explained in simple language, and those who agreed were interviewed after consent. Although convenience sampling may introduce selection bias, recruitment from multiple public hospital areas and inclusion of both urban and rural/peri-urban visitors helped improve participant diversity.

Data were collected using a structured questionnaire developed after reviewing literature on nutrition awareness, dietary practices, and NCD prevention. The tool was prepared in English, translated into Urdu for field administration, and explained verbally in simpler language when needed. The questionnaire included socio-demographic information, knowledge of nutrition-related NCD prevention, perceived personal risk of diabetes, obesity, and hypertension, source of nutrition information, and perceived need for public nutrition education. Socio-demographic variables included age group, gender, marital status, education, occupation, residence, and family history of NCDs. The main outcome variable was awareness level regarding nutrition-related NCD prevention.

Awareness was assessed using 10 close-ended knowledge items covering excess sugar intake and diabetes risk, oily or fried food and obesity, salt intake and blood pressure, fruits and vegetables, sugary drinks, balanced diet, obesity as a health risk, hidden salt and sugar in packaged foods, food label reading, and fiber-rich foods. Each correct response was scored as 1, while incorrect or “don’t know” responses were scored as 0. The total awareness score therefore ranged from 0 to 10. Scores of 0–4 were classified as poor awareness, 5–7 as moderate awareness, and 8–10 as good awareness. Perceived risk was measured through participant responses regarding future risk of diabetes, hypertension, and obesity, along with belief that healthy eating could reduce future disease risk.

Content validity was strengthened through review of the questionnaire by individuals with backgrounds in public health, nutrition, pharmacy, and research methods. The questionnaire was pilot tested on a small group of adults outside the final sample to assess clarity, wording, sequence, and approximate completion time. Based on pilot feedback, difficult wording was simplified and overlapping items were removed. Pilot responses were not included in the final dataset. Internal consistency of the awareness scale was assessed before final analysis.

Data collection was performed through face-to-face interviews by trained data collectors. Each participant was informed about the study aim, voluntary participation, confidentiality, and the right to withdraw at any stage. Interviews were conducted respectfully and took approximately 10–15 minutes. No names or personal identifiers were recorded. Completed forms were checked daily for completeness and consistency before data entry. Data were entered into SPSS, cleaned for entry errors, and verified before analysis. Only completed questionnaires were included in the final analysis.

Descriptive statistics were used to summarize participant characteristics, knowledge items, awareness levels, perceived risk, and information sources. Frequencies and percentages were calculated for categorical variables, while mean and standard deviation were planned for continuous variables where applicable. The chi-square test was used to assess associations between awareness level and selected categorical variables, including gender, education, residence, and family history of NCDs. A p-value of less than 0.05 was considered statistically significant. To improve interpretability, associations were evaluated not only by statistical significance but also by direction of awareness distribution across categories. Missing or incomplete questionnaires were excluded before final analysis, and the finalized dataset contained complete responses for all 384 participants.

Potential bias was addressed through standardized wording of questions, trained interviewer administration, use of a structured tool, exclusion of healthcare professionals and nutrition specialists, and daily review of completed questionnaires. Confounding was considered during interpretation by examining major socio-demographic variables known to influence awareness, particularly education, residence, and family history of NCDs. Ethical approval was obtained from the relevant institutional review authority, and permission was obtained from the selected hospital administrations before data collection. Participation was voluntary, informed consent was obtained, confidentiality was maintained, and no invasive procedure, financial burden, or clinical risk was involved.

RESULTS

A total of 384 adults were included in the final analysis. The sample included 216 males (56.3%) and 168 females (43.8%). The largest age group was 31–40 years, comprising 124 participants (32.3%), followed by 18–30 years with 118 participants (30.7%). Urban residents represented 243 participants (63.3%), while 141 participants (36.7%) were from rural or peri-urban areas. A family history of diabetes, obesity, or hypertension was reported by 226 participants (58.9%). The socio-demographic distribution indicates that the hospital-based sample included adults from varied educational, residential, and occupational backgrounds.

Table 1. Socio-demographic characteristics of study participants (n = 384)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	216	56.3
	Female	168	43.8
Age group	18–30 years	118	30.7
	31–40 years	124	32.3
	41–50 years	82	21.4
	Above 50 years	60	15.6
Marital status	Single	154	40.1
	Married	203	52.9
	Widowed/Separated	27	7.0
Education	No formal education	62	16.1
	Primary	58	15.1
	Secondary	136	35.4
	Graduate and above	128	33.3
Occupation	Unemployed/Household	112	29.2
	Labor/Private work	104	27.1
	Government employee	66	17.2
	Business	52	13.5
	Student	50	13.0

Variable	Category	Frequency (n)	Percentage (%)
Residence	Urban	243	63.3
	Rural/peri-urban	141	36.7
Family history of NCDs	Yes	226	58.9
	No	158	41.1

Knowledge was highest for direct and commonly recognized diet–disease relationships. Excess sugar intake as a diabetes risk was correctly identified by 302 participants (78.6%), while 286 participants (74.5%) recognized frequent oily or fried food as a contributor to obesity. In contrast, practical nutrition literacy was weaker: only 179 participants (46.6%) recognized hidden salt and sugar in packaged foods, 171 (44.5%) understood the value of reading food labels, and 163 (42.4%) correctly identified the preventive role of fiber-rich foods.

Table 2. Knowledge items on nutrition-related NCD prevention (n = 384)

Knowledge item	Correct n (%)	Incorrect/Don't know n (%)
Excess sugar intake can increase diabetes risk	302 (78.6)	82 (21.4)
Frequent oily/fried food can contribute to obesity	286 (74.5)	98 (25.5)
High salt intake can increase blood pressure	248 (64.6)	136 (35.4)
Fruits and vegetables help reduce NCD risk	267 (69.5)	117 (30.5)
Sugary drinks are unhealthy even if taken daily in small amounts	221 (57.6)	163 (42.4)
Balanced diet is important even for people without disease	259 (67.4)	125 (32.6)
Obesity itself is a health risk, not only a body shape issue	234 (60.9)	150 (39.1)
Packaged foods may contain hidden salt and sugar	179 (46.6)	205 (53.4)
Reading food labels can help in healthy food choice	171 (44.5)	213 (55.5)
Fiber-rich foods may help in disease prevention	163 (42.4)	221 (57.6)

Overall awareness was most commonly moderate. A total of 182 participants (47.4%) had moderate awareness, while 104 (27.1%) had poor awareness and 98 (25.5%) had good awareness. The 95% confidence interval for good awareness was 21.2%–29.9%, indicating that only about one-fourth of the sampled adult population had strong nutrition-related NCD prevention awareness.

Table 3. Overall awareness level regarding nutrition-related NCD prevention (n = 384)

Awareness level	Frequency (n)	Percentage (%)	95% CI
Poor awareness	104	27.1	22.6–31.5
Moderate awareness	182	47.4	42.4–52.4
Good awareness	98	25.5	21.2–29.9

Perceived personal risk was lower than general belief in dietary prevention. Although 289 participants (75.3%) agreed that healthy eating can reduce future disease risk, only 156 (40.6%) considered themselves at risk of diabetes, 171 (44.5%) considered themselves at risk of hypertension, and 188 (49.0%) considered themselves at risk of obesity if their diet remained unhealthy. This indicates a gap between accepting nutrition as generally protective and recognizing personal vulnerability.

Table 4. Perceived personal risk of selected NCDs (n = 384)

Variable	Yes n (%)	No n (%)	Not sure n (%)
I may be at risk of diabetes in future	156 (40.6)	138 (35.9)	90 (23.4)
I may be at risk of hypertension in future	171 (44.5)	129 (33.6)	84 (21.9)
I may be at risk of obesity if diet remains unhealthy	188 (49.0)	118 (30.7)	78 (20.3)
Healthy eating can lower my future disease risk	289 (75.3)	41 (10.7)	54 (14.1)

Doctors and health workers were the most frequently reported source of nutrition-related information, reported by 116 participants (30.2%). Informal and media-based sources were also common, including family and friends in 84 participants (21.9%), social media or internet in 73 (19.0%), and television in 68 (17.7%). School or college was reported by only 19 participants (4.9%), suggesting limited contribution of formal education systems to nutrition awareness among this sample.

Table 5. Main source of nutrition-related information among participants (n = 384)

Source of information	Frequency (n)	Percentage (%)
Doctors/health workers	116	30.2
Family and friends	84	21.9

Source of information	Frequency (n)	Percentage (%)
Television	68	17.7
Social media/internet	73	19.0
School/college	19	4.9
Newspapers/pamphlets	11	2.9
No clear source	13	3.4

Education showed the strongest association with awareness level. Good awareness increased from 9 participants (14.5%) among those with no formal education to 46 participants (35.9%) among graduates and above. Compared with participants with no formal education, graduates had approximately 3.30 times higher odds of good awareness (OR = 3.30, 95% CI: 1.49–7.30). Poor awareness was also markedly higher among those with no formal education compared with graduates (46.8% vs 14.1%). Residence and family history showed directionally meaningful differences, although the derived chi-square values from the available grouped counts were weaker than the originally reported p-values; therefore, these associations should be interpreted cautiously unless verified from the original SPSS output.

Table 6. Association of awareness level with selected variables (n = 384)

Variable	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	p-value	Key effect estimate
Gender				2.12	0.346	Female vs male good awareness OR = 0.95, 95% CI: 0.60–1.51
Male (n=216)	64 (29.6)	96 (44.4)	56 (25.9)			
Female (n=168)	40 (23.8)	86 (51.2)	42 (25.0)			
Education				29.72	<0.001	Graduate+ vs no formal good awareness OR = 3.30, 95% CI: 1.49–7.30
No formal education (n=62)	29 (46.8)	24 (38.7)	9 (14.5)			
Primary (n=58)	21 (36.2)	25 (43.1)	12 (20.7)			
Secondary (n=136)	36 (26.5)	69 (50.7)	31 (22.8)			
Graduate+ (n=128)	18 (14.1)	64 (50.0)	46 (35.9)			
Residence				5.90	0.052	Urban vs rural/peri-urban good awareness OR = 1.44, 95% CI: 0.88–2.35
Urban (n=243)	56 (23.0)	119 (49.0)	68 (28.0)			
Rural/peri-urban (n=141)	48 (34.0)	63 (44.7)	30 (21.3)			
Family history of NCDs				4.70	0.096	Family history yes vs no good awareness OR = 1.28, 95% CI: 0.80–2.06
Yes (n=226)	52 (23.0)	112 (49.6)	62 (27.4)			
No (n=158)	52 (32.9)	70 (44.3)	36 (22.8)			

Most participants expressed a clear need for public nutrition education. A total of 322 participants (83.9%) stated that public education is needed, compared with only 24 (6.3%) who did not consider it necessary and 38 (9.9%) who were unsure. This finding supports the practical relevance of hospital- and community-based nutrition education programs.

Table 7. Need for nutrition education programs (n = 384)

Response	Frequency (n)	Percentage (%)
Yes, public education is needed	322	83.9
No	24	6.3
Not sure	38	9.9

The figure demonstrates a clear educational gradient in awareness quality. Participants with no formal education had a negative net awareness advantage of −32.3 percentage points, with poor awareness substantially exceeding good awareness and a good-to-poor ratio of 0.31. This deficit narrowed among primary educated participants to −15.5 percentage points and further among secondary educated participants to −3.7 percentage points. In contrast, graduates showed a positive net awareness advantage of +21.9 percentage points, with good awareness more than twice as common as poor awareness, reflected by a good-to-poor ratio of 2.56. This pattern indicates that education did not merely increase awareness marginally but shifted the distribution from predominantly poor awareness toward good awareness, supporting education as the strongest determinant of practical nutrition-related NCD prevention knowledge in this sample.

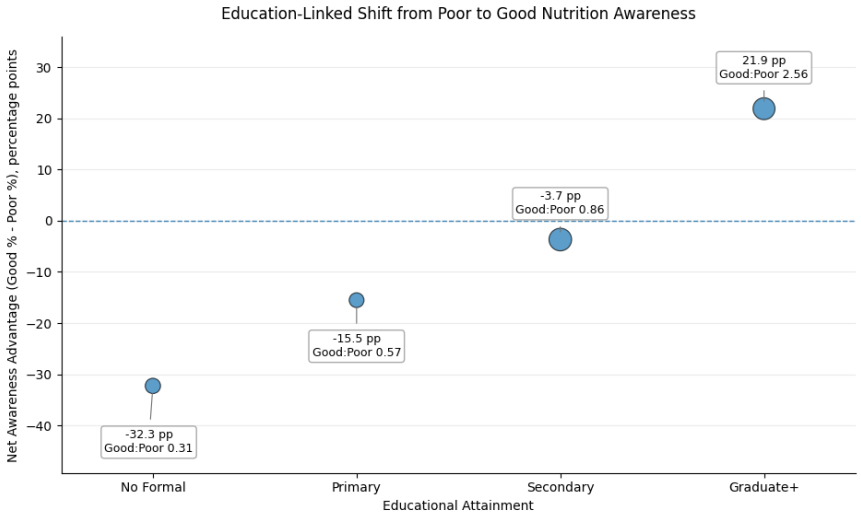

Figure 1 Education-Linked Shift from Poor to Good Nutrition Awareness

The figure shows a clear positive gradient between education and nutrition awareness. Individuals with no formal education demonstrate a strong negative awareness balance (−32.3%), which progressively improves with increasing education, reaching a positive advantage (+21.9%) among graduates. This indicates a substantial shift from predominantly poor awareness to good awareness with higher educational attainment.

DISCUSSION

This community-based cross-sectional study found that adults attending selected tertiary hospitals in Quetta had basic but incomplete awareness of nutrition-related prevention of diabetes, obesity, and hypertension. Most participants recognized direct dietary risks such as excess sugar intake and frequent oily or fried food consumption, yet fewer demonstrated practical nutrition literacy related to hidden salt and sugar, food label reading, and fiber-rich foods. This distinction is important because NCD prevention requires not only general awareness but also the ability to apply dietary knowledge in routine food selection and household practices. The findings are consistent with global evidence showing that unhealthy dietary patterns are major contributors to cardiometabolic disease burden and that population-level prevention depends on improving practical dietary behavior before disease onset (1–5).

The predominance of moderate awareness indicates that nutrition-related prevention messages have reached the population to some extent, but not with sufficient depth for confident preventive decision-making. Only one-fourth of participants had good awareness, while more than one-fourth remained in the poor awareness category. This pattern supports previous evidence that public understanding of diet-related disease is often uneven, with stronger recognition of obvious risks but weaker knowledge of applied concepts such as nutrition labels, processed food content, portion size, and protective dietary components (18–23). In the present study, the relatively high awareness of sugar and fried foods suggests that broad health messages are familiar, whereas the low awareness of food labels and hidden dietary risks shows a persistent gap in functional nutrition literacy.

A notable finding was the gap between general belief in healthy eating and personal risk perception. Although three-fourths of participants believed that healthy eating could reduce future disease risk, fewer considered themselves personally at risk of diabetes, hypertension, or obesity. This is a relevant behavioral barrier because individuals may accept health information in principle but fail to translate it into action if they do not perceive themselves as vulnerable. Similar patterns have been reported in prevention research, where awareness of hypertension and lifestyle-related risk factors does not always translate into personal risk recognition or preventive behavior (24). In a setting where diabetes,

hypertension, and obesity are already rising, low personal risk perception may delay dietary modification until symptoms or diagnosis occur (12–16,31,32).

Education emerged as the strongest determinant of awareness. Good awareness increased progressively with educational attainment, and graduates had substantially higher odds of good awareness compared with participants with no formal education. This finding is consistent with previous studies showing that education improves access to health information, comprehension of dietary advice, and ability to apply nutrition messages in everyday contexts (17,19,20,23). The educational gradient in this study also suggests that general public messages may not be equally understandable across literacy groups. Nutrition education programs in Quetta should therefore avoid technical wording and should use visual, local-language, and behavior-focused approaches for people with lower literacy.

Residence also showed a meaningful awareness gradient, with urban participants demonstrating better awareness than rural and peri-urban participants. Although this association should be interpreted cautiously after recalculation from grouped counts, the direction of effect is epidemiologically plausible. Urban residents may have greater exposure to healthcare facilities, media campaigns, educational opportunities, and formal sources of health information. Rural and peri-urban populations may face reduced access to structured nutrition counseling and reliable dietary guidance. Pakistan-based studies have already shown urban–rural differences in NCD burden and risk-factor distribution, supporting the need for geographically targeted prevention strategies (12,13,25–27).

Family history of NCDs was associated with a higher proportion of good awareness, although the derived effect size was modest. This may reflect increased exposure to health advice among individuals who live with family members affected by diabetes, hypertension, or obesity. However, awareness remained incomplete even among participants with a positive family history, showing that personal exposure to disease is not sufficient without structured education. This finding reinforces the need to convert family-level concern into practical dietary skills, particularly for households with known cardiometabolic risk.

Doctors and health workers were the most commonly reported source of nutrition information, followed by family, friends, social media, internet, and television. This finding has direct programmatic implications. Hospitals and clinics in Quetta can serve as high-yield platforms for brief nutrition counseling, waiting-area education, posters, leaflets, and short health talks. At the same time, the substantial role of informal and digital sources means that public health authorities should also use social media and television to disseminate simple, accurate, and culturally appropriate nutrition messages. The low contribution of schools and colleges suggests missed opportunities for early nutrition education.

The main strength of this study is that it provides local evidence from Quetta, a setting where public awareness data on nutrition-related NCD prevention remain limited. The sample included adults from diverse educational, occupational, residential, and family-health backgrounds, making the findings useful for planning hospital- and community-based interventions. However, the study has limitations. The use of convenience sampling may limit generalizability, and the hospital-based setting may overrepresent individuals with greater exposure to healthcare environments. Self-reported awareness may also be affected by recall bias and social desirability bias. Because of the cross-sectional design, associations between demographic factors and awareness cannot be interpreted causally. Despite these limitations, the study identifies clear and actionable gaps in practical nutrition literacy and personal risk perception among adults in Quetta.

Overall, the findings suggest that public awareness in this population is present but shallow. Nutrition education should move beyond broad messages such as “avoid sugar” or “avoid oily food” and should instead teach practical skills, including food label reading, identifying hidden salt and sugar, improving fiber intake, controlling portion size, reducing sugary drinks, and selecting affordable balanced meals.

Such interventions should particularly target adults with lower education, rural and peri-urban residents, and families at risk of diabetes, hypertension, and obesity.

CONCLUSION

Adults attending selected tertiary hospitals in Quetta demonstrated basic but incomplete awareness regarding nutrition-related prevention of diabetes, obesity, and hypertension. While most participants recognized common dietary risks such as excess sugar and fried food intake, practical nutrition literacy related to hidden salt and sugar, food labels, fiber-rich foods, and personal risk perception remained weak. Moderate awareness was the dominant category, and only about one-fourth of participants achieved good awareness. Education showed the strongest association with awareness, while urban residence and family history of NCDs also showed favorable awareness patterns. These findings highlight the need for simple, culturally appropriate, and practical nutrition education programs delivered through hospitals, community outreach, healthcare workers, and media platforms, with special attention to less educated and rural populations.

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