

Original Article

Dietary Pattern of Dengue Patients in District Mardan, Khyber Pakhtunkhwa, Pakistan

Sawaira Shahid^{1*}, Maisam Ali^{1, 2}, Adnan Habib³, Dr. Palwasha Javed⁴, Dr. Saad Javed⁵, Haider Ali⁶, Muhammad Wasif Jamal⁷, Husnul Maab³, Ayesha Bibi¹, Humaira Jamal¹

¹ MS in Human Nutrition & Dietetics, Department of Human Nutrition, Faculty of Nutritional Sciences, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan

² Clinical Dietitian, Combined Military Hospital, Jhelum, Punjab, Pakistan

³ Research Associate, Office of Research Innovation and Commercialization, Khyber Medical University, Peshawar, Khyber Pakhtunkhwa, Pakistan

⁴ Department of General Surgery, Mardan Medical Complex, Mardan, Khyber Pakhtunkhwa, Pakistan

⁵ MBBS, Khyber Medical University, Peshawar, Khyber Pakhtunkhwa, Pakistan

⁶ MS in Food Science and Technology, Department of Food Science and Technology, Faculty of Nutritional Sciences, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan

⁷ Bachelor's in human nutrition and Dietetics, Faculty of Health and Medical Sciences, Mirpur University of Science and Technology, Azad Jammu and Kashmir, Pakistan

*Corresponding author: Sawaira Shahid, sawairashahid17@gmail.com

“Cite this Article” | Received: 21 April 2026; Accepted: 19 June 2026; Published: 30 June 2026.

ABSTRACT

Background: Dengue is an important public-health problem in Pakistan. Dietary intake may be disrupted during acute illness; however, the nutritional status and dietary practices of patients with dengue in District Mardan remain insufficiently described. **Objective:** To describe the sociodemographic and clinical characteristics, nutritional status, dietary practices, and selected household environmental characteristics of patients with laboratory-confirmed dengue in District Mardan. **Methods:** This hospital-based cross-sectional study included 75 patients selected through convenience sampling from DHQ Hospital Mardan, LMC, and Type-D Hospital Lundkhwar. A structured interviewer-administered questionnaire collected sociodemographic, clinical, dietary, and household information. Height and weight were measured, and body mass index was calculated. Data were summarized using frequencies, percentages, and 95% confidence intervals. **Results:** Of the 75 participants, 42 (56.0%) were male and 30 (40.0%) were aged 17–29 years. Sixty-two (82.7%) were classified as being overweight or obesity. Fever occurred in all participants, while fatigue, headache, and myalgia were reported to be 84.0%, 80.0%, and 61.3%, respectively. Vegetable and juice consumption was reported by 76.0% and 70.7%, whereas 37.3% consumed vitamin-C-rich foods and 40.0% reported following a proper diet. Standing water around the residence was reported by 76.0%, and 66.7% required hospital admission. **Conclusion:** Patients commonly presented with constitutional symptoms, excess BMI classifications, variable dietary practices, and household standing water. These findings support more detailed local nutritional and environmental assessment but do not establish effects on dengue occurrence, severity, or recovery. **Keywords:** Dengue; dietary patterns; nutritional status; body mass index; environmental factors; Pakistan.

EDITORIAL INFORMATION

Author Contributions: Concept: SS, MA; Design: SS, MA, AH; Data Collection: SS, MA, PJ, SJ, HA, MWJ, HM, AB, HJ; Analysis: SS, MA, AH, HM; Drafting: SS, MA, AH, PJ, SJ, HA, MWJ, HM, AB, HJ.

Ethical Approval: The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan

Informed Consent: Written informed consent was obtained from all participants

Conflict of Interest: The authors declare no conflict of interest; **Funding:** No external funding; **Data Availability:** Available from the corresponding author on reasonable request; **Acknowledgments:** N/A.

INTRODUCTION

Dengue is an acute mosquito-borne viral infection transmitted primarily by infected female *Aedes aegypti* and *Aedes albopictus* mosquitoes. It represents a substantial global public-health burden, with an estimated 390 million infections occurring annually, including both clinically apparent and inapparent infections (1). Dengue virus comprises four antigenically distinct serotypes, DENV-1 to DENV-4, and infection with one serotype does not provide complete long-term protection against the others (2,3). Clinical manifestations vary from a self-limiting febrile illness to dengue with warning signs or severe dengue, which may involve plasma leakage, hemorrhage, organ impairment, or circulatory shock (2).

Pakistan has experienced recurrent dengue outbreaks since the first laboratory-confirmed outbreak reported in Karachi in 1994, and the infection has subsequently become an important public-health problem in several regions of the country (4). Previous Pakistani studies have documented variations in the demographic characteristics, clinical manifestations, disease severity, and circulating dengue serotypes

among affected populations (5–7). Rapid urbanization, population movement, climatic conditions, inadequate vector surveillance, and the presence of mosquito-breeding sites have been identified as important factors contributing to continued dengue transmission in Pakistan (4,6). Nevertheless, the distribution of dengue and the characteristics of affected patients may differ considerably between geographical areas, emphasizing the need for locally generated evidence.

Fever, headache, fatigue, myalgia, gastrointestinal complaints, and other systemic manifestations may influence food intake during acute dengue illness (2,5). Maintaining adequate nutrition and fluid intake may be challenging when patients experience anorexia, nausea, vomiting, weakness, or altered dietary preferences. Previous publications have described feeding patterns among patients with dengue and have discussed the possible supportive role of dietary practices during the illness (8,9). However, such evidence does not establish that any particular food or nutrient independently improves platelet counts, accelerates recovery, or prevents severe dengue. Moreover, dietary intake reported during an acute episode may be affected by disease severity, clinical advice, household practices, and the availability of foods.

Despite the recurring burden of dengue in Pakistan, limited information is available regarding the nutritional status and self-reported dietary practices of patients with dengue in District Mardan. Local evidence may help identify commonly reported dietary practices and inform the development of appropriate nutrition education for patients and caregivers. Therefore, this hospital-based cross-sectional study aimed to describe the sociodemographic and clinical characteristics, nutritional status based on body mass index, self-reported dietary practices, and selected household environmental characteristics of patients with laboratory-confirmed dengue presenting to three hospitals in District Mardan, Khyber Pakhtunkhwa, Pakistan.

MATERIALS AND METHODS

A hospital-based cross-sectional study was conducted to describe the sociodemographic and clinical characteristics, nutritional status, dietary practices, and selected household environmental characteristics of patients with dengue in District Mardan, Khyber Pakhtunkhwa, Pakistan. Participants were recruited from District Headquarters Hospital Mardan, LMC, and Type-D Hospital Lundkhwar. The target population comprised patients presenting to these healthcare facilities with laboratory-confirmed dengue. Patients with confirmed dengue who consented to participate were enrolled using convenience sampling until a sample of 75 participants was obtained. No intervention was administered, and the study did not include a non-dengue comparison group.

Data were collected through a structured, interviewer-administered questionnaire. The questionnaire recorded age, sex, marital status, clinical manifestations, dietary practices, and selected household and environmental characteristics. Clinical variables included fever, fatigue, headache, myalgia, and gastrointestinal symptoms. Dietary variables included self-reported consumption of vegetables, juices, and vitamin-C-rich foods, together with participants' reported adherence to a proper diet during dengue illness. Household and environmental variables included the presence of standing water around the residence, access to clean water, occurrence of dengue among family members, and the participant's perceived source of infection. Hospital admission status was also recorded.

Height was measured using a stadiometer, and body weight was measured using a calibrated weighing scale. Body mass index was calculated as weight in kilograms divided by the square of height in metres. Participants were classified as having normal weight at a BMI of 18.5–24.9 kg/m², overweight at 25.0–29.9 kg/m², or obesity at ≥30.0 kg/m², according to the WHO classification reported in the study. Anthropometric, clinical, dietary, and environmental information was collected at the time of participant assessment. The use of an interviewer-administered questionnaire reduced dependence on participants' ability to complete a written form, while direct measurement of height and weight limited reliance on self-reported anthropometric information.

Data were entered and organized in Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Because the study was descriptive, categorical variables were summarized as frequencies and

percentages. The analysis described the distribution of demographic characteristics, BMI categories, clinical manifestations, dietary practices, household environmental characteristics, and hospital admission status in the overall sample. No comparative, subgroup, adjusted, or multivariable analyses were undertaken.

Institutional permission was obtained from each participating hospital before data collection. Verbal informed consent was obtained from all participants before enrollment, and participation was voluntary.

RESULTS

A total of 75 patients with dengue were included. Thirty participants (40.0%; 95% CI: 29.7–51.3%) were aged 17–29 years, 42 (56.0%; 95% CI: 44.7–66.7%) were male, and 55 (73.3%; 95% CI: 62.4–82.0%) were married (Table 1).

Based on BMI classification, 13 participants (17.3%; 95% CI: 10.4–27.4%) had normal weight, whereas 62 (82.7%; 95% CI: 72.6–89.6%) were classified as having overweight or obesity (Table 2).

Fever was reported in all 75 participants (100.0%; 95% CI: 95.1–100.0%). Other frequently reported clinical manifestations included fatigue in 63 participants (84.0%; 95% CI: 74.1–90.6%), headache in 60 (80.0%; 95% CI: 69.6–87.5%), and myalgia in 46 (61.3%; 95% CI: 50.0–71.5%) (Table 3).

Table 1. Reported Sociodemographic Characteristics of Participants (N=75)

Characteristic	n (%)	95% CI (%)
Age 17–29 years	30 (40.0)	29.7–51.3
Male	42 (56.0)	44.7–66.7
Female	33 (44.0)	33.3–55.3
Married	55 (73.3)	62.4–82.0

CI, confidence interval. Confidence intervals were calculated using the Wilson score method.

Table 2. Body Mass Index Classification of Participants (N=75)

BMI category	n (%)	95% CI (%)
Normal weight	13 (17.3)	10.4–27.4
Overweight or obesity	62 (82.7)	72.6–89.6

BMI, body mass index; CI, confidence interval. Percentages were recalculated using N=75. Confidence intervals were calculated using the Wilson score method.

Table 3. Clinical Manifestations Reported by Participants (N=75)

Clinical manifestation	n (%)	95% CI (%)
Fever	75 (100.0)	95.1–100.0
Fatigue	63 (84.0)	74.1–90.6
Headache	60 (80.0)	69.6–87.5
Myalgia	46 (61.3)	50.0–71.5

CI, confidence interval. Clinical manifestations were not mutually exclusive. Confidence intervals were calculated using the Wilson score method.

Table 4. Self-Reported Dietary Practices Among Participants (N=75)

Dietary practice	n (%)	95% CI (%)
Consumed vegetables	57 (76.0)	65.2–84.2
Consumed juice	53 (70.7)	59.6–79.8
Consumed vitamin-C-rich foods	28 (37.3)	27.3–48.6
Followed a proper diet	30 (40.0)	29.7–51.3

CI, confidence interval. Percentages were recalculated using N=75. Confidence intervals were calculated using the Wilson score method.

Table 5. Self-Reported Household Characteristics and Hospital Admission Status (N=75)

Characteristic	n (%)	95% CI (%)
Standing water around residence	57 (76.0)	65.2–84.2
Access to clean water	57 (76.0)	65.2–84.2
Family member with dengue	30 (40.0)	29.7–51.3

Characteristic	n (%)	95% CI (%)
Perceived infection from another person	13 (17.3)	10.4–27.4
Required hospital admission	50 (66.7)	55.4–76.3

CI, confidence interval. Percentages were recalculated using N=75. Confidence intervals were calculated using the Wilson score method.

Vegetable consumption was reported by 57 participants (76.0%; 95% CI: 65.2–84.2%), while 53 (70.7%; 95% CI: 59.6–79.8%) reported consuming juice. Consumption of vitamin-C-rich foods was reported by 28 participants (37.3%; 95% CI: 27.3–48.6%), and 30 (40.0%; 95% CI: 29.7–51.3%) reported following a proper diet (Table 4).

Standing water around the residence and access to clean water were each reported by 57 participants (76.0%; 95% CI: 65.2–84.2%). Thirty participants (40.0%; 95% CI: 29.7–51.3%) reported that another family member had dengue, while 13 (17.3%; 95% CI: 10.4–27.4%) perceived that they had acquired the infection from another person. Hospital admission was required for 50 participants (66.7%; 95% CI: 55.4–76.3%) (Table 5).

DISCUSSION

This hospital-based cross-sectional study identified a modest male predominance, a substantial proportion of participants classified as having overweight or obesity, frequent constitutional symptoms, and variable self-reported dietary practices among patients with dengue in District Mardan. Although vegetables and juices were commonly consumed, fewer than half of the participants reported consuming vitamin-C-rich foods or following what the questionnaire classified as a proper diet. Standing water around the residence was also frequently reported. These findings describe characteristics of the selected patients but do not establish the prevalence of dengue, identify determinants of infection, or demonstrate an effect of diet on clinical recovery.

The slight male predominance observed in the present sample is broadly comparable with previous findings from Pakistan. Khan et al. reported that males comprised 61% of patients who tested positive for dengue immunoglobulin M between 2003 and 2007, although the distribution of patients varied by age, setting, and time (5). A large proportion of the present participants belonged to the 17–29-year age group, which is also compatible with the younger age distribution documented in the Pakistani study (5). Greater healthcare-seeking opportunities, occupational or outdoor exposure, and differences in mosquito exposure may plausibly influence the observed sex and age distributions. However, the convenience sampling method and absence of information about the underlying hospital population prevent estimation of age- or sex-specific infection rates.

Fever was reported by every participant, while fatigue, headache, and myalgia were also common. These findings correspond to the recognized systemic presentation of dengue and to clinical reports from Pakistan and other hospital populations (2,5,10). Differences in individual symptom frequencies across studies may reflect variation in participant age, disease phase, severity, diagnostic criteria, referral patterns, and methods of symptom assessment. The present study did not classify dengue severity or report warning signs, laboratory findings, platelet counts, complications, or clinical outcomes. Consequently, the reported symptoms cannot be used to distinguish uncomplicated from severe disease or to evaluate prognostic relationships.

More than four-fifths of the participants were classified as having overweight or obesity. This finding identifies a potentially important feature of the study population, but the cross-sectional data do not establish that excess body weight increased susceptibility to dengue or affected its severity. Body weight measured during an acute febrile illness may also be influenced by dehydration, reduced food intake, or fluid administration. Furthermore, the combined reporting of overweight and obesity prevents assessment of differences between these BMI categories. Separate categories, age-appropriate classification for participants younger than 18 years, and clinical-outcome data would be required to examine whether BMI was associated with dengue severity or recovery.

The dietary findings indicate that vegetable and juice consumption was reported more frequently than consumption of vitamin-C-rich foods or adherence to a proper diet. Previous observational research among hospitalized patients with dengue has shown that food tolerance and nutritional intake may vary with clinical condition and that energy and protein intake may remain below dietary requirements during hospitalization (8). Diet-based supportive approaches have also been discussed in the literature, although evidence for therapeutic effects of individual foods or nutrients remains limited (9). The present study measured broad self-reported food categories and did not assess quantities, portion sizes, energy or nutrient intake, food tolerance, hydration, or changes over time. It therefore cannot determine dietary adequacy or show that vegetables, juices, vitamin C, or another dietary component influenced platelet counts, symptom duration, hospitalization, or recovery.

Standing water around the residence was commonly reported, consistent with the importance of household and community environments in sustaining *Aedes* mosquito breeding and dengue transmission in Pakistan (4,6). The occurrence of dengue among family members may indicate shared household or neighbourhood exposure rather than direct transmission between individuals. Similarly, participants' reports that infection was acquired from another person should be interpreted as perceived sources of infection because ordinary dengue transmission occurs primarily through infected mosquito vectors (2). These findings support continued attention to household awareness and elimination of mosquito-breeding sites, but the absence of a non-dengue comparison group means that the reported environmental characteristics cannot be interpreted as statistically established risk factors.

The findings may assist local healthcare professionals in identifying areas requiring further nutritional assessment and patient education. Dietary counselling should remain supportive and should consider food tolerance, hydration, overall nutritional adequacy, and clinical status rather than presenting a particular food as a proven treatment for dengue. Environmental education may likewise emphasize removal of standing water and prevention of mosquito exposure. Nevertheless, the study did not evaluate the effectiveness of nutritional counselling, dietary interventions, or vector-control measures.

A strength of this study was the inclusion of patients from three healthcare facilities in District Mardan, providing preliminary local evidence on a topic for which district-specific information is limited. The inclusion of laboratory-confirmed cases and direct measurement of height and weight also strengthened the descriptive assessment. However, the convenience sample was small and restricted to healthcare-attending patients, limiting representativeness and generalizability. The cross-sectional design prevented determination of temporal or causal relationships. Dietary practices and household conditions were self-reported, and the dietary variables lacked documented portion sizes, frequency thresholds, nutrient quantification, and a validated adequacy score. The timing of dietary assessment relative to illness onset was also unclear, creating the possibility of reverse temporality because illness may have altered food intake. Additional limitations included the absence of hospital-specific results, dengue severity classification, laboratory and recovery outcomes, missing-data reporting, and adjusted analysis. Accordingly, the findings should be interpreted as descriptive observations from the participating facilities rather than estimates for all patients or residents of District Mardan.

CONCLUSION

Patients with dengue attending three hospitals in District Mardan commonly presented with fever, fatigue, headache, and myalgia, while a substantial proportion were classified as having overweight or obesity. Although vegetable and juice consumption was frequently reported, fewer than half reported consuming vitamin-C-rich foods or following a proper diet, and standing water around the residence was common. These findings identify areas for more detailed nutritional and environmental assessment but do not establish that the reported dietary or household characteristics affected dengue occurrence, severity, or recovery.

REFERENCE

1. Bhatt S, et al. The global distribution and burden of dengue. *Nature*. 2013;496(7446):504–507.

2. Henchal EA, Putnak JR. The dengue viruses. *Clin Microbiol Rev.* 1990;3(4):376–396.
3. Wang E, et al. Evolutionary relationships of endemic/epidemic and sylvatic dengue viruses. *J Virol.* 2000;74(7):3227–3234.
4. Rasheed S, et al. A review of dengue as an emerging disease in Pakistan. *Public Health.* 2013;127(1):11–17.
5. Khan E, et al. Demographic and clinical features of dengue fever in Pakistan, 2003–2007. *PLoS One.* 2010;5(9):e12505.
6. Ahmad S, et al. Epidemiology of dengue in Pakistan, present prevalence and guidelines for future control. *Int J Mosq Res.* 2017;4(6):25–32.
7. Humayoun MA, et al. Multiple dengue serotypes and high frequency of DHF in Lahore. *Int J Infect Dis.* 2010;14:e54–e59.
8. Poornima S, Begum K. Feeding pattern followed by hospitals for dengue patients. *Indian J Public Health Res Dev.* 2021;12(2):256–265.
9. Mishra S, et al. Prevention and control of dengue by diet therapy. *Int J Mosq Res.* 2017;4(1):13–18.
10. Asrita P, et al. A prospective study of prevalence rate, risk factors and clinical course of dengue fever. *UPI J Pharm Med Health Sci.* 2020:12–18.