JMCJMS

Research Article

Daily Fruit-Vegetable Consumption, Morbidity Pattern and Healthcare Seeking Behaviour in General Adults Living on the Outskirts of a Sub-Metropolitan City

Jitendra Kumar Singh[1*], Kshitiz Shrestha[2], Alina Poudel[3], Raman Mishra[4], Rajan Paudel[5], Dilaram Acharya[6]

Author's Affiliations

[1]Department of Community Medicine, Janaki Medical College, Tribhuvan University, Nepal
[2]MBBS Program, Janaki Medical College, Tribhuvan University, Nepal
[3]MPH Program, Chitwan Medical College, Tribhuvan University, Chitwan, Nepal
[4]Department of Medicine, Janaki Medical College, Tribhuvan University, Nepal
[5]Central Department of Public Health, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal
[6]Department of Medicine, Cumming School of Medicine, University of Calgary, Canada

Correspondence to:
Dr. Jitendra Kumar Singh,
Department of Community Medicine, Janaki Medical College,
Tribhuvan University,Nepal
Email : jsingdj@gmail.com
ORCID: https://orcid.org/0000-0002-1387-4642

ABSTRACT

Background & Objectives: Fruits and vegetables are essential for a healthy diet, yet global consumption remains below recommended levels, particularly in developing countries like Nepal, increasing the risk of non-communicable diseases. This study examines fruit and vegetable intake, morbidity patterns, and healthcare-seeking behavior among adults in the outskirts of Janakpur Sub-Metropolitan.

Materials and Methods: A community-based cross-sectional study was conducted between September 2024 and December 2024 with a sample of 466 general adult population aged 18 years and above. Data were collected through face-to-face interviews with structured questionnaire selected through multistage random sampling. Binary logistic regression was employed to identify predictors of fruit and vegetable consumption.

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Results: Out of 466 participants, only 15.23% of participants consumed fruit on a daily basis. Majority (68.3%) sought care from qualified doctors followed by qualified paramedical (23.8%) and few (7.9%) sought care from non-health professionals. Further, people who sought health care from qualified doctor had a significantly higher likelihood of consuming leafy vegetable 2-3 times per week. Similarly, Participants with anaemia were significantly less likely to consume leafy vegetable frequently. **Conclusion:** This study highlights the low consumption of fruits and vegetables, with a higher likelihood of consuming leafy vegetables among those who seeks care from qualified medical doctors. However, frequent consumption of leafy greens has been observed to be greatly constrained among anaemic. Public health education should focus on the importance of fruit and vegetable intake and its impact on overall health.

Keywords: daily fruit vegetable, healthcare seeking behaviour, morbidity pattern

INTRODUCTION

Fruits and vegetables (FV) are vital components of a healthy diet, as they are rich in vitamins, minerals, phytochemicals, and fiber, providing effective solutions to micronutrient deficiencies [1, 2]. Adequate consumption of FV are associated with a reduced risk of Non-Communicable Diseases (NCDs) such as cardiovascular diseases, diabetes, hypertension, and cancer. However, despite the well-documented benefits of fruit and vegetable consumption, global intake remains significantly below the World Health Organization's recommendation of at least 400 grams per day, equivalent to five servings of 80 grams each [3]. A study across 28 low- and middle-income countries found that over 80% of people aged 15 and above consume insufficient fruits and vegetables [4, 5]. In 2017, inadequate fruit and vegetable intake contributed to approximately 3.9 million deaths worldwide [6]. In Nepal, the average daily consumption was 3.3 servings, significantly below the WHO's recommended >5 servings [6, 7], while the WHO STEPS Survey 2019 reported an even lower average of 2.0 servings per day [8]. Globalization and urbanization have driven dietary shifts in low- and middle-income countries, increasing reliance on processed foods and raising NCDs disease risks [9]. The WHO STEPS Survey 2019 found 24.5% of the population has hypertension, 5.8% have elevated blood sugar or require diabetes medication [8], and multimorbidity affects 33.1% globally and 13.96% in Nepal, with higher rates among older obese males [10, 11]. The prevalence of morbid conditions raises concerns about healthcare-seeking behaviors among adults, which are influenced by various factors, including socio-economic status, social beliefs, education level, health awareness, daily activities, chronic diseases, medication use, physical environment, and individual characteristics and behaviors [12].

Health-seeking behavior varies among individuals [13]. A study in Sunsari, Nepal, found that 58.7% of elderly individuals preferred hospitals, while 46% relied on traditional healers [14]. Similarly, a survey in Dharan reported that 26.3% sought private care, 36.3% visited tertiary hospitals, 3.2% used health posts, and 2% opted for alternative medicine [15]. Research on comorbidities and healthcare utilization in Nepal primarily focuses on the elderly, with limited data on fruit and vegetable intake, health-seeking behavior, and morbidity among younger adult [16].

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With Janakpur Sub-Metropolitan now the capital of Madhesh Province and incorporating rural villages, the health status, healthcare-seeking behavior, and fruit and vegetable intake among adults in its outskirts remain unclear. This study aims to assess the pattern of fruit and vegetable intake, morbidity patterns, and healthcare-seeking behavior among adults in the outskirts of Janakpur Sub-Metropolitan.

MATERIALS AND METHODS

Study settings and participants

A community-based cross-sectional study was conducted among adults residing in the peripheral areas of Janakpur Sub-Metropolitan City, Nepal, from September to December 2024. These locations were previously separate villages or the wards near to sub-metropolitan. Individuals aged 18 years and older were invited to participate in the study. Inclusion Criteria were as follows: i) aged 18 years and above (17), ii) permanent resident of study area and iii) provision of informed consent to participate in the study. Exclusion criteria included: (a) residing in the area for less than six months, (b) current pregnancy, and (c) having severe malabsorption disorders or being on a liquid-only diet.

Sample size and sampling technique

The sample size for this study was calculated based on the Cochran's Formula $n=Z^2p*q/d2$. Assuming p as 40% of people who usually go to a government facility or provider for raised blood pressure in Nepal [8], 95% confidence intervals (CI) and a 5% margin of error and 20% of non-response, the sample size calculated as 443 participants. However, we approached 480 participants for data collection. Among them, 3% of the participants refused to participate or were not available during the household visits, 466 participants were included in this study who provided complete information on frequency of fruit and vegetable intake, health seeking behaviour and morbidity pattern. Multistage sampling technique was used to select 466 participants. First, we defined the peripheral zones in each cardinal direction north, east, south, and west of Janakpur sub metropolitan. Next, four locations (wards) are chosen randomly from each outer zone in the cardinal directions of north, east, south, and west. The selected locations (wards) were: 1. Mujheliya, 2. Pirari 3. Kuwa Hanumannagar and 4. Kapileshwar. Within each selected locations, household were selected by systematic random sampling using calculated every Kth interval. Individual participant was then chosen as respondents from each household. If more than one adult present in the household, single adult was selected by lottery method.

Data collection tools and procedure

Data were collected through face-to-face interviews conducted using a door-to-door approach. The interviews were administered by the investigators, with the assistance of trained undergraduate medical students who had received instruction on the study tools and interviewing techniques. Prior to participation, all individuals were informed about the purpose and procedures of the study, and written informed consent was obtained from each participant. A structured questionnaire adapted from the "Noncommunicable Disease Risk Factors: STEPS Survey Nepal 2019 [8] of Nepal Health Research Council was used in the study. Pretesting was done in 10% of the sampling population. Amendment was made after pre-testing.

Socio-demographic information

Socio-demographic information was collected and categorized as follows: gender (male or female); age groups (18–29 years, 30–44 years, and 45–62 years); caste/ethnicity (Dalit, non-Dalit Terai caste, and upper caste); and educational attainment (primary or less, up to secondary, and higher secondary). Additional variables included primary source of income (remittance, service or business, and farming or livestock), type of family structure (nuclear or joint), and dietary habits (vegetarian or non-vegetarian).

Morbidity

The presence of morbidity among participants was assessed either through documentation in their medical records or inferred from the use of prescribed medications. Morbidity status was recorded as either present or absent.

Healthcare-Seeking Behaviour

Health-seeking behavior was assessed based on participants' actions undertaken to address health-related concerns. Responses were categorized into three groups: (1) qualified doctors, including those who sought care from medical graduates at private clinics, government hospitals, private hospitals, or primary health care centers (PHCs); (2) qualified paramedical personnel, referring to individuals who visited PHCs or health posts (HPs) and received services from trained paramedical staff such as Health Assistants (HA), Auxiliary Health Workers (AHW), or Auxiliary Nurse Midwives (ANM); and (3) non-health personnel, which included individuals who sought care from medical shops, Female Community Health Volunteers (FCHVs), or traditional healers (e.g., *dhami/jhakri*).

Fruit and vegetable consumption

Participants were asked about the frequency of their consumption of fruits, green vegetables, and leafy vegetables. Responses were recorded using three categories: (a) daily, (b) 2–3 times per week, and (c) once a week or less. For analytical purposes, these variables were reclassified into binary categories. Fruit and green vegetable consumption were grouped as daily versus 2–3 times per week or once a week or less. In the case of leafy vegetable consumption, responses were categorized as 2–3 times per week versus once a week or less, as no participants reported consuming leafy vegetables daily.

Statistical analysis

All the data was entered in excel sheet and quality control was ensured by checking for missing and duplicate values and then transferred to SPSS version 23 for analysis. Descriptive statistics, including frequencies and percentages, were used to summarize categorical socio-demographic variables and discrete variables were presented as median and inter quartile range (IQR). Chi-square test was performed to examine the association between fruit and vegetable intake and health seeking behaviour, presence of morbidity, and socio-demographic factors whereas Mann-Whitney U test was performed for family size. Binary logistic regression analysis was performed to find out the predictors of fruit and vegetable consumption among participants. Binary logistic regression model was performed separately for three distinct dietary variables of fruit and vegetable consumption: first for daily fruits consumption, second for daily green vegetables consumption, and third for 2-3 times/week leafy vegetables consumption as outcome variable.

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Sociodemographic (age, sex, ethnicity, education, source of income, types of family, and family size), food habits, morbidity (anaemia, asthma, diabetes mellitus and thyroid) factors and health seeking behaviour were the independent variables. Adjusted odds ratios were reported along with 95% confidence intervals (CI). All-important variables considered with a p-value < 0.1 within the framework of the binary logistic regression were included. A p-value <0.05 were considered statistically significant.

Ethics approval and consent to participate
The study protocol was approved by the Nepal Health Research Council (Reference No. 67/2024). All participants were informed about the objectives and procedures of the study, and written informed consent was obtained from each participant prior to data collection. Confidentiality and privacy were maintained.

RESULTS

Out of 466 participants, predominantly the participants were aged 30-44 years (40.1%), most were male (87.6%), and majority belongs to Non-Dalit Terai caste groups(71.2%). In terms of education, more than half (60.5%) attained up to secondary level of education whereas for source of income, predominantly relies on service or business (42.7%) and farming or livestock (46.8%), with few (10.5%) on remittance. Majority (60.9%) lived in joint families with family size of 6 (median) persons and the most (94.2%) were non-vegetarian. Comorbidities indicate diabetes was the most common (13.7%), followed by hypertension (10.3%), asthma and thyroid disorder 4.1% and 4.3% respectively and 5.4% suffered from either diarrhea, dengue, flu, kidney

diseases, or skin diseases. In regard to health seeking behavior, majority sought care from qualified doctors (n=318; 68.24%), followed by qualified paramedical (n=111; 23.82%), and few (n=37; 7.94%) from non-health professionals. Association between Socio-demographic characteristics and healthcare-seeking behavior shows, participants education level (p<0.0001) and morbid condition of diabetes (p=0.017) significantly associated with health care seeking behavior (Table 1).

Table 2 shows the association between socio-demographic characteristics and daily fruit-vegetable consumption among general adults. Only 15.23% of participants consumed fruit on a daily basis. Approximately two third (64.37%) consumed green vegetables daily, while less than half (46.48%) reported eating leafy vegetable 2-3 times per week. Participants aged 18-29 years had the greater daily fruit consumption (22.3%, p<0.0001) whereas daily green vegetable consumption among aged 30-44 years (70.6%, p=0.011), though leafy vegetable consumption showed no significant difference across age groups. Consumption of leafy vegetable significantly associated with gender among more female participants (p=0.013), while green vegetable and leafy vegetable consumption showed no gender differences. Caste/ethnicity exhibits the association for daily fruit consumption (p=0.043) as well daily green vegetable consumption (p=0.008) while leafy vegetable consumption showed no significant difference across it.

Though education level did not influence daily fruit consumption (p=0.07), it significantly influenced consumption of green vegetable (p<0.0001) and leafy vegetable (p<0.0001). Income sources were associated

with dietary habits for both daily fruit (p=0.028) and green vegetable consumption, however, is not associated with leafy vegetable consumption. Types of family and food habits did not show any associations with either fruit or vegetable consumption. Among health conditions, anemia was significantly linked to both green vegetable consumption (p=0.011) and leafy vegetable (p=0.008) consumption and diabetes

Table 1. Socio-demographic characteristics associated with healthcare-seeking behaviour among general adult population (n=466).

Characteristics	All Participants (N= 466)		Care Sought from						p-value
			Qualified Doctors (n=318)		Qualified Paramedical (n=111)		Non-Health Personnel (n=37)		
	Number	%	Number	%	Number	%	Number	%	
Age group									
18-29 years	112	24.0	78	69.6	27	24.1	7	6.3	0.187
30-44 years	187	40.1	129	69.0	48	25.7	10	5.3	
45-62 years	167	35.8	111	66.5	36	21.6	20	12.0	
Gender									
Male	408	87.6	279	68.4	95	23.3	34	8.3	0.594
Female	58	12.4	39	67.2	16	27.6	3	5.2	
Caste/Ethnicity									
Dalit	79	17.0	49	62.0	22	27.8	8	10.1	0.485
Non-Dalit Terai caste	332	71.2	231	69.6	74	22.3	27	8.1	
Upper caste	55	11.8	38	69.1	15	27.3	2	3.6	
Education									
Primary & less	96	20.6	49	15.4	30	27.0	17	45.9	<0.0001
Up to secondary	282	60.5	197	61.9	68	61.3	17	45.9	
Higher secondary	88	18.9	72	22.6	13	11.7	3	8.1	
Source of income									
Remittance	49	10.5	35	71.4	12	24.5	2	4.1	0.219
Service/business	199	42.7	145	72.9	41	20.6	13	6.5	
Farming/livestock	218	46.8	138	63.3	58	26.6	22	10.1	
Types of Family									
Nuclear	182	39.1	126	69.2	43	23.6	13	7.1	0.867
Joint	284	60.9	192	67.6	68	23.9	24	8.5	
Family size									
Median (IQR)	6	4 - 8	6	4 – 8	6	5 - 8	6	5 - 9	0.066
Food Habits									
Non-vegetarian	439	94.2	300	68.3	105	23.9	34	7.7	0.817
Vegetarian	27	5.8	18	66.7	6	22.2	3	11.1	
Morbidities									
Tuberculosis	4	0.9	3	0.9	1	0.9	0	0.0	0.840
Anaemia	15	3.2	7	2.2	5	4.5	3	8.1	0.106
Asthma	19	4.1	11	3.5	8	7.2	0	0.0	0.091
Diabetes mellitus	64	13.7	53	16.7	10	9.0	1	2.7	0.017
Hypertension	48	10.3	39	12.3	6	5.4	3	8.1	0.111
Thyroid	20	4.3	18	5.7	2	1.8	0	0.0	0.091
Others	25	5.4	14	4.4	7	6.3	4	10.8	0.230

(p=0.028) is associated with green vegetable intake, while other morbidities, including, tuberculosis, asthma, hypertension, and thyroid, had no significant dietary associations of fruit and vegetable intake.

Table 3 presents the fruit and vegetable consumption patterns among participants and its association with health-seeking behavior. Among 466 participants, majority (n=318; 68.3%) sought care from qualified doctors followed by qualified paramedical (n=111; 23.8%) and few (n=37;

Table 2. Socio-demographic characteristics associated with daily fruit -vegetable consumption among general adult population (n=466).

Characteristics	Fruit - vegetable consumption (Yes)								
	Daily fruits Consumption [n=71; (15.23%)]			Daily green vegetables consumption [n=300; 64.37%]			2-3 times/week leafy vegetables consumption [n=218 ;(46.48%)]		
	Number	%	p-value	Number	%	p-value	Number	%	p-value
Age group									
18-29 years (n=112)	25	22.3	<0.0001	75	67.0	0.011	53	47.3	0.109
30-44 years (n=187)	36	19.3		132	70.6		97	51.9	
45-62 years (n=167)	10	6.0		93	55.7		68	40.7	
Gender									
Male (n=408)	61	15.0	0.650	260	63.7	0.436	182	44.6	0.013
Female (n=58)	10	17.2		40	69.0		36	62.1	
Caste/Ethnicity									
Dalit (n=79)	5	6.3	0.043	39	49.4	0.008	30	38.0	0.212
Non-Dalit Terai caste (n=332)	55	16.6		222	66.9		160	48.2	
Upper caste (n=55)	11	20.0		39	70.9		28	50.9	
Education									
Primary & less (n=96)	15	15.6	0.075	34	35.4	<0.0001	28	29.2	<0.0001
Up to secondary (n=282)	36	12.8		188	66.7		121	42.9	
Higher secondary (n=88)	20	22.7		78	88.6		69	78.4	
Source of income									
Remittance (n=49)	12	24.5	0.028	29	59.2	0.025	22	44.9	0.241
Service/business (n=199)	35	17.6		142	71.4		102	51.3	
Farming/livestock (n=218)	24	11.0		129	59.2		94	43.1	
Types of Family									
Nuclear (n=182)	33	18.1	0.164	117	64.3	0.974	78	42.9	0.174
Joint (n=284)	38	13.4		183	64.4		140	49.3	
Family size (n=466)									
Median (IQR)	5	4 - 7	0.004	6	4 - 8	0.578	5	6 - 8	0.886
Food Habits									
Non-vegetarian (n=439)	64	14.6	0.111	281	64.0	0.503	204	46.5	0.586
Vegetarian (n=27)	7	25.9		19	70.4		14	51.9	
Morbidities									
Tuberculosis (n=4)	0		-	2	50.0	0.546	1	25.0	0.381
Asthma (n= 19)	4	21.1	0.471	11	57.9	0.547	7	36.8	0.375
Diabetes mellitus (n=64)	15	23.4	0.049	49	76.6	0.028	35	54.7	0.172
Hypertension (n=48)	6	12.5	0.578	33	68.8	0.504	26	54.2	0.279
Anaemia (n= 15)	2	13.3	0.835	5	33.3	0.011	2	13.3	0.008
Thyroid (n=20)	2	10.0	0.505	9	45.0	0.064	6	30.0	0.124
Others (n=25)	3	12.0	0.643	14	14.0	0.369	11	44.0	0.775

7.9%) sought care from non-health professionals. Among those who sought care from qualified doctors had the highest rates of daily fruit consumption (18.0%) and daily green vegetable consumption (69.2%). Similarly, leafy vegetable consumption 2–3 times per week was also most common among participants who sought care from qualified doctors (52.5%). The frequency of daily fruit consumption and daily green vegetable consumption, as well as leafy vegetable consumption 3–4 times per week indicates statistical significance with health seeking behavior (p<0.05).

health care from qualified doctor had a significantly higher likelihood of consuming leafy vegetable 2-3 times per week (OR = 2.40; 95%CI: 1.03-5.61, p = 0.042), indicating a potential link between health seeking preferences and dietary habits. Adults particularly those aged 18-29 years (OR = 5.13; 95%CI: 2.18-12.09, p < 0.0001) and 30-44 years (OR = 3.91; 95%CI: 1.77-8.63, p = 0.001) were significantly more likely to consume fruit daily. In contrast, males have a significantly lower likelihood of consuming

Table 3. Fruit-vegetable consumption, dietary preference, and morbidity pattern associated with health-seeking behaviour among general adult population (n=466).

Fruit-vegetable consumption	All Participants (N= 466)		Care Sought from						p-value
			Qualified Doctors (n=318)		Qualified Paramedical (n=111)		Non-Health Personnel (n=37)		
	Number	%	Number	%	Number	%	Number	%	
Daily Fruit consumption									
Yes	71	15.2	58	18.2	11	9.9	2	5.4	0.024
No	395	84.8	260	81.8	100	90.1	35	94.6	
Daily Green vegetable consumption									
Yes	300	64.4	220	69.2	63	56.8	17	45.9	0.003
No	166	35.6	98	30.8	48	43.2	20	54.1	
Leafy-vegetable consumption 2-3 times/week									
Yes	218	46.8	167	52.5	41	36.9	10	27.0	0.001
No	248	53.2	151	47.5	70	63.1	27	73.0	

Table 4 presents result from logistic regression analysis for factors associated with daily fruit and vegetable consumption patterns with health seeking behavior and morbidity pattern. Lastly, people who sought

green vegetable daily (OR = 0.38; 95%CI: 0.16-0.89, p = 0.027) and leafy vegetable 2-3 times per week (OR = 0.28; 95%CI: 0.13-0.62, p = 0.002) compared to females. Additionally, participants from non-dalit terai caste group

were more likely to consume leafy vegetable 2-3 times per week (OR = 2.27; 95%CI: 1.01- 5.09, p = 0.046). Participants with education

Table 4. Association of daily fruit-vegetable consumption, health-seeking behaviour and morbidity pattern among general adult population by logistic regression analysis.

Characteristics	Fruit - vegetable consumption (Yes)								
	Daily fruits consumption			Daily green vegetables consumption			2-3 times/week leafy vegetables consumption		
	OR	95%CI	p-value	OR	95%CI	p-value	OR	95%CI	p-value
Care Sought from									
Qualified Doctors	2.75	0.58-13.04	0.200	1.47	0.67-3.21	0.329	**2.40**	**1.03-5.61**	**0.042**
Qualified Paramedical	1.33	0.25-6.90	0.733	1.06	0.46-2.44	0.889	**1.50**	**0.60-3.71**	**0.376**
Non-Health Personnel	1.00	-	-	1.00	-	-	1.00	-	-
Age group									
18-29 years	**5.13**	**2.18-12.09**	**<0.0001**	1.24	0.70-2.19	0.450	0.96	0.56-1.67	0.906
30-44 years	**3.91**	**1.77-8.63**	**0.001**	1.46	0.89-2.41	0.126	1.18	0.73-1.91	0.477
45-62 years	1.00	-	-	1.00	-	-	1.00	-	-
Gender									
Male	0.83	0.35-1.98	0.650	**0.38**	**0.16-0.89**	**0.027**	**0.28**	**0.13-0.62**	**0.002**
Female	1.00	-	-	1.00	-	-	1.00	-	-
Caste/Ethnicity	-								
Dalit	0.47	0.13-1.71	0.254	0.56	0.21-1.46	0.240	1.70	0.67-4.30	0.260
Non-Dalit Terai caste	1.24	0.51-3.02	0.623	0.99	0.42-2.32	0.983	**2.27**	**1.01-5.09**	**0.046**
Upper caste	1.00	-	-	1.00	-	-	1.00	-	-
Education									
Primary & less	1.23	0.52-2.88	0.628	**0.08**	**0.03-0.20**	**<0.0001**	**0.10**	**0.04-0.22**	**<0.0001**
Up to secondary	0.89	0.41-1.93	0.777	**0.31**	**0.13-0.71**	**0.006**	**0.14**	**0.06-0.30**	**<0.0001**
Higher secondary	1.00	-	-	1.00	-	-	1.00	-	-
Source of income									
Remittance	**2.70**	**1.15-6.34**	**0.022**	1.01	0.49-2.03	0.999	1.07	0.53-2.14	0.842
Service/business	1.75	0.95-3.19	0.068	1.75	1.10-2.77	0.017	1.41	0.91-2.19	0.119
Farming/livestock	1.00	-	-	1.00	-	-	1.00	-	-
Family size	**0.862**	**0.75-0.98**	**0.032**	1.01	0.93-1.11	0.696	**1.09**	**1.01-1.19**	**0.042**
Morbidities *(Ref: no)*									
Anaemia	2.25	0.27-18.19	0.445	0.30	0.07-1.32	0.112	**0.09**	**0.01-0.60**	**0.013**
Asthma	1.92	0.54-6.78	0.308	0.98	0.32-2.96	0.977	0.65	0.22-1.96	0.453
Diabetes mellitus	1.67	0.80-3.47	0.171	1.38	0.69-2.77	0.359	1.03	0.56-1.90	0.911
Thyroid	0.51	0.07-3.57	0.503	0.56	0.18-1.76	0.327	0.65	0.20-2.12	0.481

levels primary and less were significantly less likely to consume green vegetable daily (OR = 0.08; 95%CI: 0.03-0.20, p < 0.0001) or leafy vegetable 2-3 times per week (OR = 0.10; 95%CI: 0.04-0.22, p < 0.0001), while those with education up to secondary level also show lower odds of consuming green vegetable (OR = 0.31; 95%CI: 0.13-0.71, p = 0.006) and leafy vegetable (OR = 0.14; 95%CI: 0.06-0.30, p < 0.0001). Participants whose income source was remittance were more likely to consume daily fruits (OR=2.70; 95%CI: 1.15-6.34, p=0.022) while Participants those income sources were significantly more likely to consume green vegetable daily (OR = 1.75; 95%CI: 1.10-2.77, p = 0.017). Additionally, people who belongs to larger family sizes are less likely to consume fruit daily (OR = 0.862; 95%CI: 0.75-0.98, p = 0.032) and more likely to consume leafy vegetable regularly (OR = 1.09; 95%CI: 1.01-1.19, p = 0.042). In terms of morbidity conditions, participants with anemia were significantly less likely to consume leafy vegetable frequently (OR = 0.09; 95%CI: 0.01-0.60, p = 0.013), which may be due to dietary preference or lack of health concerns.

DISCUSSION

The findings of this study underscore the inadequate consumption of fruits and vegetables among adults in the outskirts of Janakpur Sub-Metropolitan, particularly fruits, with few participants consuming them daily. While a higher proportion reported daily consumption of green vegetables, leafy vegetables were consumed less frequently, with more than half only consuming them 2-3 times per week. The study also identified significant associations between healthcare-seeking behavior and vegetable consumption. Specifically, individuals who sought care from

qualified medical doctors had a higher likelihood of consuming leafy vegetables regularly. Additionally, anaemia was found to be a significant barrier to the frequent consumption of leafy vegetables.

Our study found that adults who sought care from qualified doctors and paramedics were more likely to consume leafy vegetables 2-3 times per week, consistent with a European study indicating that healthcare professionals provide nutritional counselling on the benefits of leafy vegetables for disease prevention [17]. Access to qualified healthcare services has also been associated with healthier dietary practices and improved food choices. Conversely, study participants with anemia in our study were less likely to consume leafy vegetables 2-3 times per week, consistent with findings from Tanzania and Indonesia [18, 19]. This may be due to dietary preferences, as individuals with anemia often prioritize meat products over leafy vegetables. Additionally, cultural influences and taste preferences contribute to lower vegetable intake, as some cultures do not consider leafy vegetables as staple foods, leading to their limited consumption.

Socio-demographic factors play a crucial role in dietary habits. Males were less likely than females to consume green and leafy vegetables 2-3 times per week, aligning with studies from Canada, South Africa, the United States, the United Kingdom, and Europe, which suggest that men prefer meat-based diets and are more resistant to plant-based foods, whereas women exhibit more positive attitudes toward vegetable consumption [17, 20-23]. However, a study from Brazil found no significant gender differences in leafy vegetable intake [24]. Additionally, individuals from the non-Dalit Terai caste

were more likely to consume leafy vegetables 2-3 times per week, consistent with research from India indicating that lower castes face economic and social barriers that limit access to nutritious foods [25]. Education level also influenced vegetable consumption, with individuals with only primary or secondary education being less likely to consume green and leafy vegetables, a trend supported by studies from Europe, the United States, and Sweden [22, 26, 27]. Limited education is often associated with lower income and reduced awareness of the importance of vegetable consumption, although findings from Bangalore showed no significant association between education and leafy vegetable intake [28].

Economic factors further influenced dietary patterns. Households' dependent on remittances were more likely to consume fruits, while those engaged in service or business sectors had higher daily green vegetable consumption. This aligns with findings from Mauritius and Sub-Saharan Africa, where higher income is linked to better access to fruits and vegetables [29, 30]. Larger families were less likely to consume fruits daily, as financial constraints often lead them to prioritize staple foods over costly fruits, consistent with research from Sub-Saharan Africa [30]. However, larger families in our study were more likely to consume leafy vegetables 2-3 times per week, possibly due to home-cooked meals and bulk purchasing, contrasting with findings from Bangalore, which reported no association between family size and leafy vegetable consumption [28]. Regarding age groups, adults aged 18–29 and 30–44 years had higher odds of daily fruit consumption, contrasting with studies from Canada and South Africa [17, 20]. Younger adults are generally more health-conscious, prioritizing nutrient-dense foods that support weight management and overall well-being.

This study provides valuable insights into fruit and vegetable consumption, morbidity patterns, and healthcare-seeking behavior among adults in the outskirts of Janakpur Sub-Metropolitan. A key strength is the use of a community-based approach with a multistage sampling technique, ensuring diverse representation of the population. Additionally, face-to-face interviews with a structured questionnaire minimized recall bias and improved data accuracy.

However, several limitations should be noted. The cross-sectional design prevents establishing causal relationships between dietary habits and health outcomes. Self-reported data may be subject to social desirability and recall bias, potentially affecting accuracy. Additionally, the study's findings may not be generalizable to other regions of Nepal due to cultural and socio-economic differences. Lastly, factors such as seasonal variations in fruit and vegetable availability were not accounted for, which may have influenced consumption patterns.

CONCLUSION

This study reveals insufficient fruit and vegetable consumption among adults in the outskirts of Janakpur Sub-Metropolitan, with healthcare access playing a crucial role in dietary choices. Individuals seeking care from qualified doctors were more likely to consume leafy vegetables. However, frequent consumption of leafy greens has been observed to be greatly constrained among anaemic. These findings emphasize the need for targeted public health interventions, including nutrition education and improved accessibility to affordable fresh produce, to

promote healthier dietary habits and reduce the risk of diet-related diseases.

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