

Patterns in Vegetables Consumption in Kashmir Valley, India

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ABSTRACT

Over the years, the consumption of vegetables has grown. Due to growing consumer concern over health-related issues, this has happened. The purpose of this study is to investigate the patterns in vegetable consumption and exploration of the underlying factors for that existing pattern. In this study, information was gathered from household surveys. Data was analyzed using multinomial logistic regression and descriptive analysis. The majority (76.6%) of the respondents had up to seven family members. one-third of the sampled population falls in the service sector of the economy (43%). most of the sample households were from rural backgrounds (55.9%). Around (87.8%) of the sample population consumed less than 3 servings of vegetables in a day. The quantity of vegetable consumption as a dependent variable has three categories less than, greater than, and equal to three serving sizes. While taking greater than three serving sizes as a reference category and less than three serving sizes as the dependent variable. It was found that as the family size increases from three members to more than that there is a likelihood increase in taking vegetables more on a per capita basis per day with an odds ratio of 0.21(0.4-0.9), similarly there is a likelihood increase in the vegetable consumption with the increase in monthly income 0.5(0.12-0.95), as the frequency of buying vegetables increases there is an increase in vegetable consumption, accessibility has also significant bearing on its intake. Due to less access to the marketplaces, rural residents have low trips to grocery shops and rely mostly on homegrown vegetables. Respondents from urban residents have frequent trips to the grocery shops mostly due to the availability of vegetables. The results show that implementing an appropriate pricing strategy and promoting market infrastructure will augment the dietary diversity in the population which will lead to the holistic development of the vegetable industry as well as the required nutritional needs efficiently.

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Keywords:

Vegetable purchase; determinants; dietary diversity; household level; Kashmir valley.

1. Introduction

Vegetables are gaining attention for their health benefits and balanced diet, reducing chronic diseases risk such as cardiovascular disease and type 2 diabetes through increased consumption Pem and Jeewon, 2015. The Northwestern Himalayan region is a microcosm of the relationships between humans and the environment because of its unique topography and intricate ecological systems. Vegetable consumption patterns in this region change as a result of human and environmental factors causing changes in society dynamics, which calls for a thorough examination. Within the regional fabric of culture, there is increasing worry regarding changes to customary vegetable consumption practices. The difficulties posed by globalization, climate change, and socio-economic upheavals exacerbate this, casting doubt on the

sustainability of regional eating customs. It is critical to recognize these shifts to address any effects on biodiversity, cultural continuity, and nutritional well-being.

This study uses a multidisciplinary approach to give a thorough analysis of the patterns of vegetable consumption. The study has wider implications in the fields of cultural anthropology, agricultural sustainability, and ecosystem resilience, in addition to its immediate impact on local nutrition. It is expected that the results would shed light on how communities adjust to changing socio-environmental circumstances, making a significant contribution to the body of knowledge on sustainable development in mountainous areas. This work essentially aims to provide a connection between empirical research and theoretical framework, promoting a more sophisticated comprehension of the intricate interactions between environmental dynamics, human cultures, and activities. Literary sources have identified a multitude of factors influencing the consumption of the vegetables. A brief description of the studies done has been reported.

Vegetable consumption patterns vary across regions and populations, influenced by cultural, economic, and environmental factors (Miller et al., 2016). A study of European adults revealed that Mediterranean regions had the highest vegetable consumption, while Eastern Europe had the lowest Stefler and Bobak, 2015. Another study conducted in the United States found that non-Hispanic black and Hispanic populations had lower vegetable intake compared to the non-Hispanic white population (Wang, 2016). Demographic factors like age, gender, education, and income significantly influence vegetable consumption, emphasizing the need to tackle barriers, especially among low-income and older adults (Dong et al., 2022). Also education level, and access to supermarkets were significant predictors of vegetable among Indonesia adults (Octaria et al., 2022). The study emphasized the importance of improving access to healthy food options and promoting health education to increase vegetable consumption in Indonesia. According to Bertail and Caillavet (2008), the lowest income cluster with the lowest consumption remains insensitive to economic variables. Although they know the benefits of vegetable consumption some social taboos are attached to it Kamga et al. (2013). Metoyer et al. (2023) reported that there is a positive association between fruit and vegetable intake and shopping for that at the grocery stores. The purchase of analyzed produce is primarily influenced by its availability in retail outlets, fooled by consumer income, health, and product visual appeal (Kuhar and Juvancic, 2008).

The average consumption was higher in neighborhoods with higher income and concentration of food stores, and better index of access to healthy foods (Carvalho et al., 2017). In a study of Asian countries, it was found that vegetable consumption was positively associated with higher socio-economic status (Cheung et al., 2021). This study also finds that the main barriers are financial concerns, exacerbated by food businesses with unavailability and urbanization-induced price inflation. Most of the rural population in India is taking pulses and vegetables below the RDI (recommended dietary intake) (Arlappa et al., 2010). Similarly, Ernest Liu et al. (2011) observed that there is a significant decrease in vegetable consumption across regions in urban China. A study by Choudhury et al. (2020) reported that in Bangladesh 75% of urban and 92% of rural populations consume less than five servings of fruits and vegetables. This is mainly attributed to the informal market infrastructure Sadia et al. (2021). All South Asian countries appear to consume extremely low quantities of fruits and vegetables (Jayawardena et al., 2020).

Vegetable consumption in India varies across states and regions due to socioeconomic status, migration, and cultural practices. Income, price, and density of wholesale markets significantly influence household consumption of fruits and vegetables in India, hence the need to address socio-economic disparities (Choudhury et al., 2020). Khokhar et al. (2021) analyzed the patterns in the consumption of fruits and vegetables among medical students in Delhi, poor handling, poor quality, and unsafe use of pesticides were the common barriers to the consumption of

fruits and vegetables. Ganpule et al. (2023) conducted a study on dietary diversity in India and found that there were interstate and intrastate differences in vegetable consumption patterns. The study reports that the place of residence, gender, and wealth index were important determinants of the food insecurity experience scale. The study also highlighted that those residing in South India, women, and those belonging to the poorest wealth index report higher food insecurity. The study reveals significant variations in vegetable consumption, influenced by socioeconomic status and cultural practices, and calls for interventions and policies to promote vegetable consumption and address disparities in dietary patterns in the Valley of Kashmir.

This research study aims to:

- i. Describe the socio-economic characteristics of the respondents
- ii. Analyze their vegetable purchase patterns, and
- iii. Identify the underlying factors.

2. Materials and Methods

This study analyzed the data on vegetable consumption and predictors of vegetable consumption from the population comprising 2375 individuals both children and adults in the study area (Figure 1).

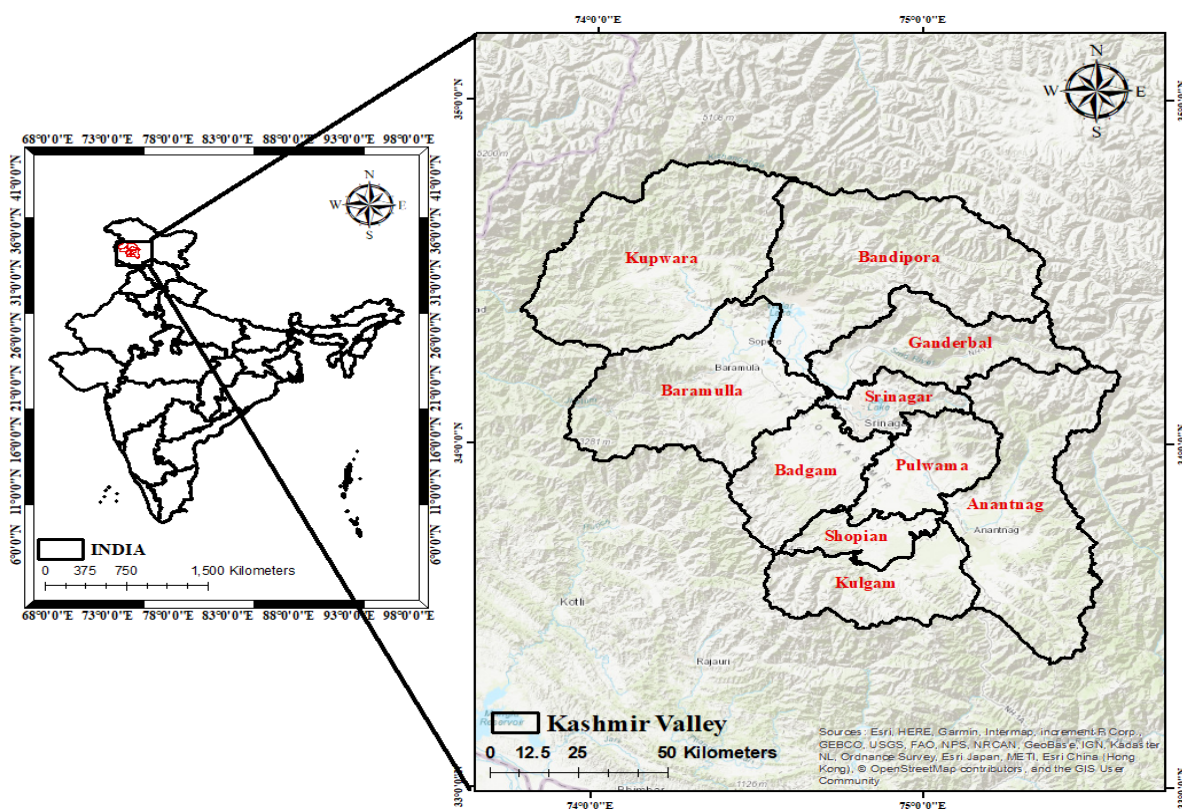


Figure 1. Location map of the study area

From the purposive random sampling method, a sample size of (444) households have been identified (rural households 244 and urban households 200) through the application of Yamane's (1967) formula.

$$n=N/1+N(e)^2$$

where 'n' is the sample size, N is the population size, and e is the level of precision.

Taking 'N' as the whole population of the study area, which is 9,316,974 procured from government officials. The precision level is (0.05). the sample size becomes 400 households. After checking the questionnaire responses, it was found that some responses were incomplete. To make the sample size proportionate this was increased to 444 households. Tourists, those living in military bases or quarters, and institutionalized people, such as those residing in jails, hospitals, nursing homes, or other facilities of the same nature, are not included in the sample. To identify the patterns in vegetable consumption, a structured questionnaire was used which was divided into two sections with a household as a sampling unit. The first section covered respondents' demographic characteristics (age, gender, family size, economic status, location, occupation, monthly income), availability of groceries from the household, buying frequency of vegetables, and education level of the household head details enquired from a family. Along with the essential elements, the second part covered data on vegetable consumption with the name of each vegetable, its quantity, source (whether purchased or homegrown), frequency of buying, etc.

As per the Indian Council of Medical Research (ICMR), an individual is recommended to take 300 g of vegetables per day comprising 2.5 to 3 servings with each serving size as 100 g. A meal should include at least 50 g of roots & tubers, 50 g of green leafy vegetables, and 200 g of another vegetable (including cauliflower, brinjal, tomato, cucurbits, peas, beans, and onions) daily. A family consuming less than 3 servings was considered a low intake of vegetables, a family consuming daily as per recommendations was considered as on equilibrium, and a family consuming more than the threshold was considered a high-level intake of vegetables.

Multilevel logistic regression modeling was employed to analyze these patterns, utilizing IBM SPSS version 21 for statistical analysis.

3. Results and Discussion

3.1 Socio-Demographic Profile of the Respondents

The majority (76.6%) of the respondents had up to seven family members with a significant bearing on the consumption of vegetable-led diets ($p<0.05$). This composition has a maximum share of families living in a nuclear setup (75.5%). Moreover, occupational status reveals that more than one-third of the sampled population fell in the service sector of the economy (43%) most of the sample households were with rural backgrounds (55.9%). Availability of vegetables for consumption purposes was to be fulfilled from less than 3 km distance from the main household with the frequency of buying vegetables highly significant factor ($p<0.001$). Most of the households had low educational backgrounds (Table 1).

Table 1. Socio-demographic characteristics of sample households

Variables	Frequency	Marginal percentage
Family size of the HH		
up to 3	47	10.6%
4 to 7	340	76.6%
Above 7	57	12.8%
Total income of the household		
<20000	139	31.3%
20000-50000	289	65.1%
>50000	16	3.6%
Status of Household		
APL (Above the poverty line)	319	71.8%
BPL (Below the poverty line)	125	28.2%
Family type		
Nuclear	335	75.5%
Joint	109	24.5%
occupation of the Heas		
primary sector	123	27.7%
secondary sector	130	29.3%
tertiary sector	191	43%
Location of the household		
Rural	248	55.9%
Urban	196	44.1%
education level		
Primary ^a	217	48.9%
High	82	18.5%
Higher	71	16%
PG & above	74	16.7%
at what distance vegetable is purchased?		
less than 3km	382	86%
3 to 5km	62	14%
< 3 serving size of vegetables	390	87.8%

b

^a includes illiterates and with no formal education,

^b includes Green leafy vegetables (50 g), roots and tubers (50 g), and other vegetables (100 g) on a per capita basis per day. This was estimated through the total quantity purchased or homegrown in a month by the family size.

3.2 Frequency of vegetable consumption

Around (87.8%) of the sample population consumed < 3 servings of vegetables. The mean consumption of vegetables on a per capita basis was 5.6 kg per month comprising almost 2 servings in a day. Green leafy vegetables are consumed by the recommendations with a serving size of 50 g per person in a day. Root and tubers are consumed well below the recommendations of less than 50 g per person in a day. In the case of 'other' vegetables consumption is very high way above the recommendations comprising three serving sizes in a day. Consumption patterns across location, family size, income level, and occupational status were evaluated.

There is an increasing trend in buying vegetables for consumption with an increase in family size ($p < 0.05$). there is an increasing trend in the purchase of vegetables as there is an increase in monthly income ($p < 0.001$). people from rural backgrounds rely more on home-grown vegetables than to purchase them (Table 2).

Table 2. Consumption of vegetables across family size and Monthly Income

Variables	Serving Size/day		Test statistics
	< 3 servings	>= 3 servings	
Family size			
Up to 3 members	53(11.9)	14(3.1)	χ^2 (10.8), p (0.04)
4 to 7 members	280(63)	72(16.2)	
Above 7 members	20(4.5)	5(1.1)	
Monthly income			
<20000	50(11.2)	26(5.8)	χ^2 (3.5), p (0.001)
20000-50000	250(56.3)	64(14.4)	
>50000	30(6.7)	24(5.4)	

Table 3. Predictors of the likelihood of taking less than three serving sizes and equal to 3 serving sizes of vegetables

Predictors	< 3 servings	Equal to 3 servings	Significance	Significance
	OR ^h (95% CI)	OR ⁱ (95% CI)	p (<0.05)	P (<0.05)
Family size (up to 3 members)	0.21(0.4-0.9)	1.1(0.08-15.5)	0.04	0.92
Family size (4 to 7 members)^a	0.80(0.20-3.1)	0.91(0.07-10.6)	0.75	0.94
Income (<20000)	0.5(0.12-0.95)	0.98(0.35-0.84)	0.0001	0.0001
Income (20000-50000)^b	0.44(0.07-0.43)	0.84(0.84-0.84)	0.0001	0.001
Education (primary)	1.4(0.45-4.6)	1.1(0.15-9.0)	0.52	0.86
Education (High)	0.65(0.17-2.4)	1.3(0.14-12.4)	0.53	0.78
Education (higher)^c	0.70(0.17-2.7)	1.5(0.16-13.5)	0.61	0.71
Occupation (primary sector)	3.7 (0.75-13.3)	0.65(0.05-8.)	0.11	0.73
Occupation (secondary sector)^d	1.5(0.64-3.8)	2.6(0.54-13.0)	0.31	0.22
Economic status (APL)^e	2.1(0.78-5.6)	1.5(0.27-8.2)	0.14	0.63
Residence(rural)^f	5.9(2.2-15.6)	2.3(0.44-12.7)	0.0001	0.30
Availability(<3KMs)^g	1.6(0.55-4.6)	1.6(0.55-4.6)	0.38	0.99
Frequency of buying (grocery)	0.81(0.74-0.88)	1.0(0.92-1.2)	0.0001	0.37

^h: OR= odds ratio-dependent variable (< 3 serving size), ⁱ: dependent variable (= 3 serving size)

^a: reference group family size above 7 members ^b: reference group income level above 50000 ^c: reference group educational level PG (postgraduate) and above ^d: reference group service sector ^e: reference group economic status (BPL) ^f: reference group urban resident ^g: reference group from 3 to 5. dd

Distribution of consumption of vegetables across the households, accessibility, occupational status of the household, frequency of buying, affordability, and availability of the vegetables as a diet component were looked at. Entries in Table 3 indicate that as the family size increases from more than three family members there is less likely increase in buying vegetables comprising of < 3 serving size on a per capita basis per family. Family size above three members (OR=0.80,95%CI=0.20-3.1) in comparison to a household with family size up to three (OR= 0.21 95%CI=0.4-0.9). As more and more people live in rural areas, there is a likely increase in consuming home-

grown vegetables mainly due to the absence of market centers (OR=5.9,95%CI= (2.2-15.6).

As the frequency of buying groceries increases, there is a decrease to have the number of vegetables available per person per day for consumption purposes (OR=0.81,95%CI= (0.74-0.88). This is supported by an increase in the monthly disposal income of the household, as the income of the household increases from less than 20000 monthly income (OR=0.35,95%CI=0.12-0.95) to more than that (OR=0.44, 95%CI=0.07-0.43), there is a decrease in taking vegetables less than three serving size per person per day. The educational attainment of the respondents, occupational background, and economic status of the household did not show an association with the purchasing of vegetables ($p > 0.05$) when the dependent variable was less than three serving sizes of the vegetables for consumption. None of the above-mentioned predictors except income level were found associated with a serving size equal to three as a dependent variable with more than three serving sizes as a reference category.

The study has identified that half of the respondents surveyed were with low educational background (48%). The majority of the households had an income of less than 50 thousand Indian currency (rupees) per month. The study revealed that the majority (76%) were living in a nuclear family setup. The family size of four to seven members was dominating. The study also identified that most of the households were falling in the tertiary sector of the economy (43%) with only (28%) of the respondents in the primary sector. Most of the households were from rural backgrounds (56%). Family size, income level of the household, educational attainment, economic status of the household, location of the respondent, frequency of vegetable buying in a month, and availability of the vegetable were the factors that were analyzed to find the major determinants of vegetable consumption. Around (87.8%) of the sampled population consumed <3 servings of vegetables. The mean consumption of vegetables on a per capita basis was 5.6 kg per month comprising almost 2 servings in a day. Green leafy vegetables were consumed by the recommendations with a serving size of 50 g per person in a day. In the case of 'other' vegetables consumption is very high way above the recommendations comprising three serving sizes in a day. Among the factors mentioned, we find that household size, income level, location frequency of buying are the factors that are majorly determining the consumption patterns of vegetables in the area. In a study at a global level, Hall et al. (2009) reported that the prevalence of low fruit and vegetable consumption tends to increase with age and decreases with an increase in income. The study also reported that urbanicity was not associated with low consumption but there were significant rural and urban differences in eleven countries. A study by Selvaraj et al. (2021), found that poor harvest infrastructure, price volatility, unorganized supply chains, long-standing government policies favoring cereals, and increasing consumer preference for convenience foods are identified as major reasons for the low intake of nutrient-dense perishable foods. A study by Singh (2018) reports that freshness and price are the main factors affecting the consumer's decision to buy vegetables. Similarly, Akpinar et al. (2009) report that the correlation between the gender, education, and income variables and the sensitivity to the particularities of some of the products is significant. Socioeconomic status is a significant determinant of vegetable consumption. Low socioeconomic status is associated with lower vegetable intake due to affordability and availability issues. According to Hart et al. (2005), besides season and culture, other factors like prices, taste, and nutritional knowledge also influence the consumption of vegetables. Bezbaruah & Brunt (2016), report that family dislikes and likes were the most

influential factors in purchasing decisions. A study by Liese et al. (2013), found that grocery shopping frequency directly impacts fruit and vegetable consumption, with access to farmers markets or community gardens influencing consumption. Haynes-Maslow et al. (2020), also reported that perception-based barriers to vegetable access were not significantly associated with intake, but supercenter density within 1.6 km was significantly associated with decreased vegetable purchase.

Urban residents may consume purchased vegetables, while rural households have more opportunities for home gardening and agriculture Herart,2019. A study by Michaela et al. (2018), has proved a dependence between the purchase of vegetables and respondents' place of residence. Besides this Nurul Izzah et al. (2012), have reported that ethnic background has a role in the consumption of vegetables. Apart from this Tennant et al. (2014), reported that across Europe, nine out of fourteen countries consumed vegetables and fruits <400g/d recommended by WHO. A study by Dong and Kim (2022), has confirmed that the effects of food accessibility and affordability on vegetable acquisitions and healthy eating behaviors were different between urban and rural areas. Similarly, Pandey et al. (2020), found that urban households in India had higher vegetable consumption compared to rural households. According to this study, the average consumption is higher in urban than rural areas for fewer than 10% of all commodities. The findings of this study were supported by the mentioned studies.

4. Conclusion

An intricate interaction of factors influencing dietary behaviors has been shown by the empirical examination of vegetable intake patterns in the study area. Given the cultural and socioeconomic variables underlying the observed consumption patterns, a nuanced approach is necessary for a thorough understanding and successful intervention. The scientific conversion on sustainable development in hilly areas is strengthened by the substantial contribution made by this work. The complex relationship between dietary practices and traditional knowledge offers crucial information for developing context-specific interventions. It is essential to close the gap between theoretical frameworks and real data. The amalgamation of scientific discoveries presented here enhances our comprehension of local dynamics and provides a guide for cultivating resilient and sustainable communities within a wider framework A first step toward more research and policy development, this study recognizes the connections between human cultures, food habits, and environmental sustainability.

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