

RESEARCH ARTICLE

Socio-economic determinants of fruits and vegetable consumption: insights from a survey in Delhi

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Received: 29.08.2022

Accepted: 12.10.2022

ABSTRACT

India has experienced a structural transformation in its food consumption with a drastic shift from staples to high value agricultural product food items like fruits, vegetables, milk, meat, fish and eggs. However consumption levels of these food items are far below the nutritional guideline which leads to an increasing burden of non-communicable diseases especially in the fast paced urban sector. This paper attempts to study the consumption pattern of fruits and vegetables in Delhi along with the enablers of their consumption. Data has been collected using a structured questionnaire on 304 urban samples from different districts of Delhi. Using descriptive statistics and non-parametric techniques like Kruskal Wallis test it has been found that gender, education and monthly income of a household among the socio demographic factors and health perception of the consumer, physical attributes of the food item along with the ease of availability of the quality food items are the main drivers of the FandV consumption. Identification of the main drivers involved in consumption, and the overall perception of the consumers towards these food items, may contribute to a better definition of health promotion initiatives aiming to improve nutritional intake across the different sections of the society.

Keywords: Consumer behavior, food consumption, urban, enablers, Kruskal Wallis

Citation: Gupta, N., Bhattacharjee, M., and Saha, A.R. 2022. Socio-Economic determinants of fruits and vegetable consumption: insights from a survey in Delhi. *Journal of Postharvest Technology*, 10(4): 202-212.

INTRODUCTION

Rising incomes, increasing urbanization, changing food preferences owing to diversified food choices, opportunity costs of time owing to women participating in work force have been extensively cited as reasons that have contributed to the diversification in the consumer's food basket. High-value agricultural goods include agricultural goods with a high economic value per kilogram, per hectare, or per calorie, including fruits, vegetables, meat, eggs, milk, and fish (Gulati, 2006). Yet, increasing food availability (i.e. productivity) and consumer accessibility (i.e. increasing consumer income) does not automatically translate into improved nutritional status (FAO et al., 2019), particularly in India (Samaddar et al., 2020).

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The GDP per capita of India experienced an increase of 8.6% from 1994 to 2012. During this period although the monthly per capita expenditure on overall consumption increased but there has been a decline in the share of expenditure on food consumption. Rural India has experienced a decline of 23% as compared to the urban areas where the decline is approximately 30%. This trend is in conformity with Engel's Law which states that with an increase in income the share of expenditure allocated to food tends to decline. The shift in the food consumption pattern in India is evident from the declining relevance of cereals and increasing importance of high value agricultural commodities as highlighted in several studies in the past (Pandey et al., 2020; Srivastava and Chand, 2017; Mittal, 2010). The consumption patterns have seen a major shift from food to non-food items with the share of food consumption declining from 59 percent to 48.6 percent in rural areas and from 48 percent to 38.5 percent in urban areas during the first 10 years of the millennium (NSSO, 2014). Within the food basket, the share of the high value agricultural products (HVAP) category in the monthly per capita expenditure (MPCE) has increased from 33 percent to 43.6 percent in rural areas and from 40 percent to 47.4 percent in urban areas during 2000-12.

The change in consumption pattern is also evident in the form of diversification of the consumption basket of the consumers. This can be calculated through the ratio of cereals to the non-cereals in the total food expenditure. Table 1 show that the ratio of cereal to non-cereal for a rural consumer has changed from 0.63 to 0.25 during the last two decades whereas the urban consumer has diversified the basket from 0.35 to 0.18 during the same period. On analysing the same diversification on the basis of income class, poor section of consumers tend to exhibit a greater change in the ratio of cereal to non-cereal consumption. The urban poor consumers exhibit a reversal of the ratios of cereal to non-cereal over these years, where cereals used to form 76% of their diet in 1993-94, in 2012, and the same proportion is taken over by the non-cereals. This clearly indicates that as the income for this section of society over the year's increases, they tend to shift their preferences towards food items other than staples.

Table 1: Diversity in Consumption of food

	Rural				Urban			
	1993	1999	2004	2011	1993	1999	2004	2011
Top 30%	0.37	0.35	0.3	0.17	0.32	0.2	0.19	0.11
Bottom 30%	1.2	1.14	0.88	0.43	0.76	0.69	0.58	0.33
Total	0.63	0.59	0.49	0.25	0.35	0.35	0.31	0.18

Source: Author's calculation from the various NSSO reports.

Literature supports that several socioeconomic, demographic, personal, and environmental factors, such as gender, age, economic status, place of residence, nutritional knowledge, attitudes, self-efficacy, perceived barriers, and family size and structure are associated with types and frequency of food consumption (Obayelu et al., 2018; Krølner et al., 2011). Fruit consumption increases with family's material wealth and higher parental occupational status, but this depends on socioeconomic position of the population among several other factors (Vereecken et al., 2005). Fruits, vegetables, and fish

consumption are associated with populations of lower socioeconomic status unlike consumption of fats and soft drinks, which is greater in population with higher socioeconomic status (Young, 2005). Consumption of fruits will continue to grow with population growth change in lifestyle and improvement in the standard of living along with emergence of the middle class and the youthful population (Kearney, 2010).

HVAP particularly fruits and vegetables (FandV) compose of 75% of the agricultural GDP value signalling that there is a market response of increased production to the increased demand for these products. Despite the increased availability, the levels of consumption remain far below the minimum intake guidelines recommended by the WHO and NIN-ICMR (Sharma et al. 2020; Pandey et al., 2016; Venkatesh et al., 2016). The insufficient consumption of HVAP has also been linked to increasing incidence of NCDs like obesity, diabetes and other lifestyle diseases. Studies both private and government based have also primarily focused on the consumption status of HVAP for rural and economically weaker sections of the society and particularly on the children and women sections, but in depth studies on the consumption of HVAP in the urban arena is limited.

While the available secondary information broadly gives the production and consumption situation in India, it does not provide information on the detailed consumption pattern, consumer perspective, factors determining the consumption pattern and awareness about regulations. The current study aims fill this gap by understanding the current consumption pattern of FandV of the urban consumers using the case study of Delhi. Delhi is one of the most urbanized cities of India with the third highest per capita income. The capital city is also plagued with one of the highest rates of non-communicable diseases in the country. Literature supports nutrition transition experienced lately in the urban cities to be one of the reasons for the same. Therefore a study based in Delhi will help in understanding the attributes that contribute towards explaining the consumption pattern in urban cities in India.

To assess the current consumption pattern of FandV w.r.t the monthly expenditure on these food items, frequency and quantity of consumption. To study the impact of the socio demographic factors on the consumption pattern by testing the following hypothesis:

H₀1 – there is no significant effect of age on the consumption pattern and behaviour of FandV

H₀2 – there is no significant effect of gender on the consumption pattern and behaviour of FandV

H₀3 – there is no significant effect of education on the consumption pattern and behaviour of FandV

H₀4 – there is no significant effect of occupation on the consumption pattern and behaviour of FandV

H₀5 – there is no significant effect of number of members in the family on the consumption pattern and behaviour of FandV

H₀6 – there is no significant effect of the monthly income on the consumption pattern and behaviour of FandV

H₀7 – there is no significant effect of area on the consumption pattern and behaviour of FandV

H₀8 – there is no significant effect of weekly expenditure on HVAP on the consumption pattern and behaviour of FandV.

MATERIALS AND METHODS

Data collection

A structures questionnaire consisting of three sections was used to collect data. The first section collected information on the various socio demographic factors like education, gender, age, monthly income etc. The second section aimed at understanding the consumption pattern of the consumers for FandV w.r.t the frequency, weekly expenditure on HVAP, source of purchase, willingness to consume organic version and willingness to pay more for the HVAP food items, most frequently consumed FandV. The final section of the questionnaire evaluated the attributes affecting the FandV consumption using a 5 point Likert scale with 5 being strongly agree and 1 being strongly disagree.

Literature supports that consumption patterns have been highly influenced by factors like health and nutrition, price, taste and freshness, natural content and safety, convenience of both purchase and preparation are some of the most important attributes that consumers consider while taking a decision to consume FandV. Out of the 400 surveys circulated, 304 (76%) fully completed responses were received and considered for the analysis. The data was collected using a stratified sampling technique. The 11 districts of Delhi were clubbed into 7 and numbers of respondents were selected using the percentage of population in each district. Within each district, samples were randomly selected from the supermarket, residential and office areas. The survey was conducted from the 1st December 2021 to the 28th Feb 2022.

Data analysis

In order to describe the overall consumption pattern and general attitude towards consumption of FandV, descriptive statistics were used. The statistical significant effect of independent variables (gender, age, level of education, occupation, number of members in the family, monthly income and location) on the dependent variables of the study were tested through the Kruskal-Wallis test. SPSS 23.0 was used to analyze the same. Significant differences were determined at $p \leq 0.05$ level. After testing for the normality of the data using the Shapiro-Wilk and Kolmogorov-Smirnov test it was verified that the current data is non-normal and therefore non-parametric statistics test was preferred over parametric test for this study. Several studies on consumer preferences have used non-parametric statistics mainly because of the underlying structure of the data at hand which is usually unknowable; thus one cannot be confident of the correctness of consumer preferences (Ndwandwe and Weng, 2017). Therefore owing to its no-specifications and distribution free nature, non-parametric was considered appropriate (Garmyn, 2020; Font i Furnols et al., 2011; Jin, 2008; Ngapo et al., 2004; Jin, 2003).

RESULTS

Socio demographic characteristics of the consumers

Table 2 gives an overview of the socio demographic characteristics of the total sample. The sample comprises of 60.5% of females and 39.5% of males. Consumers in the study were found to be relatively young (31.9% belonging to 18-30 years age bracket and only 13.9% being above the age of 50 years). Consumers demonstrated high education levels with 56.3% of them being postgraduates and 29.6% being graduates. 47.4% of the families had 3-4 family members. Most of the consumers were either employed in private companies (36.5%) or self-employed (23.7%). Maximum number of people covered in the study belonged to the lower middle income group (31.9%) followed by the highest income group of more than Rs.1, 50,000 (29%).

Table 2: Demographic Characteristics of the surveyed FandV consumers

Variable	Category	Frequency	Percentage
Age (in years)	18-30	97	31.9
	31-40	109	35.9
	41-50	56	18.4
	50 and above	42	13.9
Sex	Male	120	39.5
	Female	184	60.5
Education	Illiterate	6	2
	Up to secondary school	24	7.9
	Undergraduate	90	29.6
	Postgraduate	171	56.3
Family Size	Vocational Training	13	4.3
	Very small (1-2)	28	9.2
	Small (3-4)	144	47.4
	Medium (5-6)	100	32.9
Occupation	Large (7 or more)	32	10.5
	Dependent/ Unemployed/ Housewife	88	29
	Private Employee	111	36.5
	Government Employee	27	8.9
Monthly Income (Household)	Self Employed	72	23.7
	Retired	6	2
	<25000	57	18.8
	25000-75000	97	31.9
	75001-150000	62	20.4
	>150000	88	29

Source: Based on primary survey data

Consumption pattern analysis: frequency, purchase and preferences

The WHO panel on diet, nutrition and prevention of chronic diseases recommended a daily intake of at least 400 grams (gms) (with an average serving size being 100 gms for fruits and 300 gms for vegetables) of FandV, excluding potatoes; to prevent diet related chronic diseases and micronutrient deficiencies. The survey revealed that from the consumers surveyed, 87.1% consumed insufficient quantities of vegetables and for fruits this percentage stood at 59.2%. A majority of them as shown in Table 3, preferred to buy the FandV from street hawkers and local markets (46% and 22.7% respectively for fruits and 44.7% and 23.6% for vegetables). The consumers buying FandV from supermarkets are the one who are graduates and postgraduates indicating that consumers with higher education do consider an option of purchasing FandV from supermarkets. The study also reveals that although 94% of the consumers are consuming vegetables on a daily basis, only 54.9% of the consumers are consuming fruits at this frequency. 31.5% of the consumers prefer to consume fruits only 2-3- times a week whereas there were 5% of the consumers who did not like to consume fruits at all. The main reasons mentioned during the interviews for this trend were paucity of suitable time during the day, affordability and non-liking for the fruits in general. Amongst the fruits, apple, banana and papaya were the most widely consumed fruits owing to the reasons like all season availability, comparatively cheaper (banana and papaya) than other fruits and ease of consumption unlike fruits like pomegranate and pineapple.

Table 3: Consumption Pattern and Preferences

Variable	Fruits	Vegetables
Average Consumption (Qty. in gms)/ day		
Less than recommended	180 (59.2%)	265 (87.1%)
Recommended or more	124 (40.8%)	39 (12.9%)
-		
Consumption (Frequency)		
Daily	167 (54.9%)	286 (94%)
2-3 times a week	96 (31.5%)	14 (4.6%)
Once a week	23 (7.5%)	3 (0.01%)
Once a month	3 (0.01%)	1 (0%)
Rarely	15 (4.9%)	0 (0%)
Source of Purchase		
Street hawker/ milkman	140 (46%)	136 (44.7%)
Local Vendors/ shops	69 (22.7%)	72 (23.6%)
Supermarket	39 (12.8%)	32 (10.5%)
Online	18 (5.9%)	18 (5.9%)
Others (self-farm/gardens, weekly markets)	37 (12.1%)	45 (14.8%)
Preferred form of FandV		
Fresh/ Conventional	143 (47%)	154 (50.6%)
Organic	157 (51.6%)	148 (48.7%)
Use of online for purchase of FandV		
Yes	166 (54.6%)	
No	138 (45.4%)	
Willingness to pay for Organic FandV		
Yes	204 (67%)	
No	100 (32.8%)	
Most consumed FandV*		
(for vegetables onion, potato and tomato were excluded)	Apple (70%)	Bottle gourd (45%)
	Banana (85%)	Cauliflower (30%)
	Papaya (40%)	Spinach (55%)

*Multiple responses received

Source: Primary survey

The results from the survey also found that 67% of the consumers are willing to switch to organic FandV and pay 10% more towards the same. Some of the main reasons identified for currently not consuming organic products were difficulty in availability, expensive, lack of proper knowledge and awareness about the existing brands and qualities to look for in an organic product etc. Owing to the technology disruption, 54.6% of the consumers have started to explore online portals for purchasing FandV. Easy availability and delivery, discounts and good quality have been highlighted as some reasons for the same.

Factors Influencing the FandV consumption

Past literature indicates that consumption of food especially perishable items like FandV is not just affected by price but also by non-price factors like health and nutrition, availability of time for purchase and preparation, product quality and environmental impact (Chikkamath, et al., 2012). The current study therefore incorporated five factors based on the literature reviewed for understanding the consumer behaviour towards FandV consumption – health and nutrition, price and affordability, convenience in terms of availability and preparation, weight control, physical quality in terms of taste and freshness, natural content i.e. free from pesticides, additives etc., and recommendations of friends, family, doctors and media. The responses of the consumers are shown in Table 4, in terms of the mean and standard deviation against each of the attribute. Findings showed that health and nutrition (Mean - 4.2987) is the most important aspect for the respondents. Almost all the respondents gave high importance to taste and freshness (3.8355) indicating that consumers prefer FandV which are good in appearance, firm and free from any physical damage. This was followed by the natural content (M – 3.698) of FandV i.e. consumers are aware and demand FandV that are low in pesticide usage and free from any additives. Convenience was also an important consideration both in terms of availability and time for preparation (M – 3.6834). Price with a low mean of 3.581 was not a major consideration for most of the middle and high income group consumers belonging to more than Rs. 25000 per month category.

Table 4: Factors affecting FandV Consumption

Attributes of FandV	Mean (M)	Standard Deviation (S.D.)
Health and Nutrition	4.2987	.77263
Price	3.5811	1.09738
Taste and Freshness	3.8355	1.04582
Natural Content	3.6980	1.18405
Convenience in terms of availability and preparation	3.6834	1.03780
Recommendations by family, friends, doctor and media	3.1401	1.05866
Familiarity in terms of habit and tradition	3.5241	1.05103
Weight Control	3.5932	1.21990

Impact of Socio Demographic Characteristics

This section tests the hypothesis mentioned to study the effects of the socio - demographic factors (independent variables) on the consumption frequency and preferences of the consumers (dependent variables). The results shown in Table 5 indicate a significant statistical difference ($p \leq 0.05$) between gender and frequency of consumption and source of purchase. Health, convenience and natural content as attributes also were significantly impacted by the gender. Significant differences were found between the different levels of education and frequency of FandV consumption, source of purchase, willingness to pay for organic FandV as well as for all the attributes other than the price ($p \leq 0.01$). Higher the income group, higher was the frequency of consumption, willingness to pay for organic and demand for pesticide-free FandV ($p \leq 0.01$). The composition of the family in terms of the number of members was also found to be significantly impacting the health and natural content attribute. The different kinds of occupation only had a significant impact on the willingness of the consumers to pay more for

the organic FandV (p value – 0.025) and were found insignificant for all the other attributes. Frequency of consumption and willingness to pay for organic also varied significantly on the basis of the weekly budgeted expenditure on this food category (p value = 0.16 and 0.011 respectively). Finally, area of residence of the consumers had statistical significant differences on the price, willingness to pay for the organic FandV and natural content.

Table 5: Kruskal-Wallis test results on effect of socio-demographic factors

Factor	Gender	Age	Education	Occupation	Weekly Expenditure on FandV	Monthly per capita income	Area	Members in the family
Frequency of consumption	.001 ^a	.198	.000 ^a	.693	.016 ^b	.000 ^a	.655	.307
Willingness to pay for organic	.067	.027 ^b	.000 ^a	.025 ^b	.011 ^b	.001 ^a	.015 ^b	.167
Source of Purchase	.032 ^b	.548	.853	.081	.616	.811	.051	.523
Attributes								
Health	.001 ^a	.042 ^b	.000 ^a	.669	.148	.074	.564	.030 ^b
Convenience	.000 ^a	.043 ^b	.001 ^a	.440	.012 ^b	.210	.963	.161
Price	.151	.008 ^a	.286	.500	.304	.310	.026 ^b	.571
Free from additives and pesticides	.005 ^a	.001 ^a	.000 ^a	.139	.001 ^a	.000 ^a	.025 ^b	.035 ^b
Freshness and taste	.040 ^b	.082	.000 ^a	.504	.026 ^b	.249	.055	.062

^{a, b} indicate p – value significant at 0.01 and 0.05 levels respectively

DISCUSSION

From the present study it was found out that although the FandV are consumed on an average on a daily basis by the consumers, the intake in terms of quantity is much less than the recommendations by WHO as well as ICMR. This is more so for vegetables, with 87.2% consuming quantities below the recommended level (300 gms) as compared to 52.9% of consumers consuming less than 100 gms of fruits per day. The analysis of the results indicated that health and nutrition was the most important benefit sought when consuming FandV followed by freshness and taste and convenience in terms of time required for buying and purchasing. This finding is reiterated by other studies based in Nigeria, Bangladesh etc. where health and taste have been found to be most important factors affecting the consumption choices w.r.t FandV (Massaglia et al., 2019; Raaijmakers et al., 2018; Masoom et al., 2015). Local vendors, street hawkers were found to be prominent source of purchase for FandV as compared to supermarkets and online stores. Major reasons shared for this trend are sufficient availability of FandV in local markets, fresh and seasonal variety being available and prices being more reasonable. Other studies have also found similar results in their analysis (Khokhar et al., 2021; Mukherjee et al., 2015; Raaijmakers et al., 2018; Shokrvash et al., 2013). Customers who buy other food items from the supermarket are usually the one who purchase FandV also from the supermarkets and have a preference for frozen food items (Finzer et al., 2013). Another result reported in the study was willingness of consumers to buy organic FandV. Although not currently consuming the organic FandV, 67% of consumers are willing to pay 5-10% more for switching to organic. However lack of affordability, availability and awareness of good organic brands are some of the reasons mentioned during the survey for not shifting towards organic products. Therefore there is an urgent need to explore the organic market for promoting FandV consumption.

Consumer choices were examined to determine the effect of gender, age, level of education, weekly expenditure on food, monthly income and location on consumer choice. The results shares similar findings from studies where they found that a wide variety of independent socio-demographics characteristics including gender, age, level of education and geographic location to greatly influence consumer choices on FandV (Chikkamath, et al. ,2012; Akpinar et al., 2009). Gender and education had a statistically significant effect on several consumer preferences including frequency of FandV consumption, preferred source of purchase, consumer willingness to pay more organic FandV, and as well as health, freshness and additive free as attributes to determine FandV quality. Landais et al., (2014) found that women with higher income levels tend to consume higher amounts of FandV. The research results also indicate that preference for taste and smell, natural content of FandV, seasonality and organic consumption differ among the consumers according to their education and income levels. This is in concurrence with other studies that found that sensitivity to price; nutritional content, organic growing, in-season growing, product display and the shopping environment vary among income and educational groups (Akpinar et al., 2009). Izzah et al., (2012) in their study on the medical students in Delhi found that age and semester of study participants were major significant factors impacting the FandV consumption. This is contrary to the results of the current study found that age had no significant impact on the FandV consumption for the current sample covered. At the same time it was found that women appreciate the sensory attributes along with the pesticide free FandV more than their men counterparts in the survey.

CONCLUSION

The above study aimed at determining the consumption pattern of the urban consumers in Delhi towards FandV along with understanding the effects of the socio demographic factors like age, education etc., on this pattern. This paper focused on measurement the consumption pattern in terms of the frequency of consumption, quantity consumed, source of purchase of FandV and willingness to consume and pay for organic FandV. From the study, it is evident that FandV consumption vary significantly across the different groups of the socio demographic factors especially education, gender and age along with consumer behavior towards attributes like health, physical quality and convenience and naturalness of FandV amongst the urban consumers in Delhi. In order to promote the FandV consumption, apart from emphasis on quantitative intakes, focus needs to shift towards availability of fresh, pesticide free FandV at reasonable prices. Organic FandV market is also an untapped potential area in the Delhi urban markets and a best practice sharing with southern cities of India like Bangalore will help in exploring the same. Our primary data serves as a baseline from which researchers can track how changes in the food environment affect FandV purchasing and consumption over time. Government could partner with private companies to develop mobile phone technology based solutions to help farmers sell their produce directly to customers, cutting out middlemen. Policymakers can use these data to help ensure that FandV are healthy and safe, affordable, and easily accessible, especially compared to unhealthy foods. Fresh food start-ups should be encouraged to promote door to door deliveries of fresh FandV by directly sourcing from farmers thereby removing the middlemen. Technological innovations in the space of production like use of hydroponics, kitchen gardening, community gardening should be encouraged.

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