Association Between Sociodemographic Factors and the Health Orientation of Urban Consumers Toward the Consumption of High-Value Agricultural Products in India

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Abstract

Purpose : Due to the great nutritional and economic significance of high-value agricultural products (HVAPs), these goods have taken center stage in the Indian economy, both in terms of production and consumption. Nevertheless, even with higher production levels, India's population consumed far less milk and fruit than what the WHO suggested.

Methodology : Using the health orientation framework, a study was conducted in Delhi with 385 urban consumers to investigate how health orientation (HO) varies across different sociodemographic factors and what effect this has on HVAP consumption. Factor analysis, analysis of variance (ANOVA), and ordinal logistic regression techniques were used for the analysis. The analysis has been conducted using SPSS software.

Findings : Three main factors affecting HVAP consumption, namely healthy eating, healthy lifestyle, and conscious eating, were identified. Income, education, and gender were identified to be the most important sociodemographic factors affecting the health orientation of the consumers. All three HO factors significantly and positively impacted the frequency of HVAP consumption.

Practical Implications : This research paves the way for policymakers and marketing experts to design consumer segment-based interventions to promote the consumption of HVAPs. The insights from the study would aid in designing outreach messages that resonate effectively within each demographic subgroup.

Originality : In India, ample research has been undertaken by both researchers and government organizations toward improving nutrition security for economically weaker consumers, with focal points being women and children. However, studies covering the phenomena of low HVAP consumption in urban areas are negligible, especially about their health orientation.

Keywords : **health orientation (HO), high-value agricultural products (HVAP), urban consumers**

JEL Classification Codes : D11, D91, I12

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India has experienced immense economic and demographic transformations coupled with urbanization in the past two decades. The share of urban population in India has increased from 27.6% in 2000 to 35.39% in 2021. During the same period, the per capita rose (World Bank, 2020). Rapid economic growth and

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urbanization have resulted in dietary shifts in India away from staples and more toward livestock, dairy products, along fruits and vegetables (F&V) (Gaiha et al., 2012). These food items have been extensively referred to as high-valued agricultural products (HVAP) (Birthal et al., 2005; Consultative Group on International Agricultural Research Science Council, 2004).

On the other hand, factors like the expansion of the middle class, higher female participation, the emergence of nuclear two-income families on the demand side and integration of global economies, and foreign direct investments on the supply side have encouraged the culture of eating out, accessing the convenience and processed food, etc. (Deaton & Drèze, 2009; Popkin et al., 2012). The traditional healthy diet consisting of cereals, milk, F&V, meat, fish, and egg (MFE) has been replaced by processed and calorie-dense food with a high intake of fat and sugar. The introduction of the super-mart and hyper-mart culture has made unhealthy and packaged foods easily accessible (Pingali, 2007). These dietary shifts have often been found to be associated with a high occurrence of lifestyle diseases like obesity, diabetes and diseases like hypertension and cancer as well (Menon et al., 2021; Singh et al., 2019; World Cancer Research Fund International & The NCD Alliance, 2014). According to a 2020 study, everyone in India consumes less than the 2503 calories per day suggested by the LANCET, with the exception of the richest 5% of the population. In contrast to the recommended intake of 29% of calories, only 6–8% of calories come from animal protein, and the number of fruits and vegetables that all segments of society consume is woefully inadequate (Sharma et al., 2020).

The proportion of deaths due to non-communicable diseases (NCDs) in India has increased from 37.9% in 1990 to 61.8% in 2016. The NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes (Ministry of Health and Family Welfare, 2022). This report accounted for four major factors responsible for this increase: unhealthy diet, lack of physical activity, use of tobacco and alcohol, and accelerated nutrition transition. According to the National Family Health Survey (NFHS) 2019–2021, the prevalence of obesity among Indians has increased as compared to 2015–2016. Against one in every four, now one in every five is overweight (Ministry of Health and Family Welfare, Government of India, 2021). In contrast to rural areas, where the increase in obesity incidence is from 15.1% to 19.7%, this trend was more noticeable in urban areas, where it increased from 31.4% to 33.3% (Aggarwal, 2022). Studies in the past have suggested an association between following a healthy dietary pattern comprising of animal products, at recommended amounts, fruit, vegetables, whole grains, nuts, seeds, and legumes, and the one that does not exceed recommendations for added sugar, sodium, and saturated fat and lower risk of CVDs (Petersen et al., 2017; World Cancer Research Fund International & The NCD Alliance, 2014).

Endogenous economic growth models and Grossman's model of health suggest that investments in nutrition and health are good economic investments to boost overall economic productivity. Several studies have defined the concept of health orientation (HO) as the individual motivation to engage in healthy attitudes, beliefs, and behaviors (Cavaliere et al., 2016; Moorman & Matulich, 1993). Several studies identified that the concept of HO explained the extent to which individuals are concerned about health-related issues and gave a measure of their willingness to take responsibility for their health (Cavaliere et al., 2016; Moorman & Matulich, 1993). In other words, it represents the individual motivation for pursuing the goal of being healthy (Cavaliere et al., 2016). Nutrition knowledge and health awareness are multifaceted aspects that have been studied about food intake and have been positively associated as well (Boustani & Guiné, 2020).

Delhi, one of the most urbanized cities in India and the nation's diabetes capital ("Delhi to Become the Diabetes," 2020), was chosen for this study in order to assess the reasons why Delhi's urban population chooses to follow a healthy diet and how sociodemographic variations may affect this perception. Moreover, the consumption of HVAP foods in Delhi lags far behind the recommended quantities. On average, an urban consumer in Delhi only consumes 296 grams of fruits and vegetables and 144 grams of milk per person per day, which is notably lower than the recommended daily intake of 400 grams and 300 grams, respectively, and also falls below the levels observed in other states.

For this study, the HVAP food items have been categorized into six categories: fruits, vegetables, milk, and MFE. This study articulates individual health behaviors (such as the consumption of five servings of fruits and vegetables, the importance of enough sleep and regular exercise, intake of cholesterol-rich food, sugar, and salt, etc.) concerning healthy food intake and lifestyle patterns. This paper is structured as follows: section two explains the methodology and empirical analysis applied to attain the objectives of the study; Section three reports the results of the analysis conducted along with discussing the results in the vocabulary of the existing literature; and finally, section four concludes the study with main findings and future course of action/ studies.

The current study has, therefore, identified the following three objectives:

(1) To identify the factors incorporating Health orientation.

(2) To understand if health orientation differs among the various sociodemographic factors.

(3) To analyze the impact of health orientation on the six HVAP food items.

Materials and Methods

Data Collection

This study is qualitative. Data for the analysis were collected in Delhi (India) through a primary survey of a sample of 385 urban consumers. A geographically stratified systematic sampling was used, covering all the districts of Delhi. Consumers were then randomly approached outside the grocery stores covering different time bands to reach different shoppers categories. The criterion outlined by Mazzocchi (2008) for determining the relative accuracy of a mean estimator in relation to sample and population sizes was used to determine the sample size. A sample size of 385 respondents is allowed to ensure an error lower than 6.27% (Ljubičić et al., 2022).

To put it another way, this sample size is sufficient to ensure an excess or deficit of the mean estimate of about 6% for a population that exceeds 1.6 million, as that of Delhi (based on the most recent statistics available, Population Census 2011). A questionnaire that had been verified on a small sample of forty customers was used to collect the data. The study's time frame was December 2022 to September 2023.

Variable Description

According to the purpose of the paper, the first part of the analysis was meant to identify the major factors impacting the HO of the consumers. An exploratory principal axis factor analysis (PFA) was performed with varimax rotation on the scores for the 19 statements used in the diverse literature (Choi et al., 2012 ; Dutta & Youn, 1999; Dutta-Bergman, 2005; Hong, 2009; Michaelidou & Hassan, 2008; Mohammad Bawazeer et al., 2021) to understand the HO of the consumers across the world. The Appendix Table gives the details of the source of each of the statement. Each of these statements was measured using the 5-5-point Likert scale (rating 1 to 5, with 1 indicating *strongly disagree* and 5 indicating *strongly agree*), and consumer ratings were collected. Items with loadings above 0.50 are ranked very significantly (Hair et al., 2010) and included as part of the analysis. Cronbach's α was calculated for each subscale and for the whole scale to check the reliability of the instrument and the internal consistency of the principal components. Discriminant validity analysis was conducted using Pearson's correlation coefficient between independent variables to check for the extent to which a construct was truly distinct from other constructs (Deshpande et al., 2009). The unweighted ratings for each item in each factor were averaged to calculate the factor scores. These scores were then used as a variation factor to calculate the analysis of variance (Ares & Gámbaro, 2007). The assessment of statistically significant differences of HO factors across the various sociodemographic factors was conducted by analysis of variance (ANOVA) and an

independent sample *t*-test at a confidence interval of 95%. The sociodemographic factors included for this purpose were age, gender, education, occupation, income, and family size. In order to determine the impact of each of the identified factors of HO on the consumption of HVAP (objective 3), ordinal regression analysis was conducted using the frequency of HVAP consumption as the dependent variable. The frequency of consumption was measured in six levels: 1: *being never*, 2: *rarely*, 3: *monthly*, 4: *weekly*, 5: *twice a week*, 6: *daily*. All the analysis is done using SPSS version 26 software.

The following hypotheses will be tested in the study:

- **H01 :** The health orientation does not differ significantly across the sociodemographic factors.
- **Ha1 :** The health orientation differs significantly across the various sociodemographic factors.
- **H02 :** Health orientation has no significant impact on the consumption of six HVAPs.
- **Ha2 :** Health orientation has a significant impact on the consumption of six HVAPs.

Analysis and Results

Consumers' Profile

A glimpse of the sociodemographic profiling of the respondents is presented in Table 1. The sample comprised 57.1% of women and 42.9% of men. A maximum percentage of respondents belonged to the service group (49%), followed by those engaged in self-employment and business activities (23%). The middle-income group (₹25,000–1,00,000 per month) was the most prominent income category, with 46% of respondents belonging to this group, followed by the top income category of more than ₹1,50,000 per month (22%). 39% percentage of consumers fall in the age bracket of 31–40 years followed by those in the age group of 18–30 years (30%). As the area studied belongs to the urban parts of Delhi; therefore more than 90% of the respondents were graduates and above. The sample contained maximum consumers belonging to nuclear families with 3–4 members (47%), followed by a joint family set up of 5–6 members (34%).

Table 1. ***Socioeconomic Profile of the Consumers***

Sociodemographic Factor	Categories	Frequency	Percent
Gender	Male	114	42.9
	Female	152	57.1
Age	18–30	80	30
	31–40	104	39
	41–50	49	18
	51–60	27	10
	Above 60	6	2
Education	Illiterate	5	2
	Upto 12th	22	8
	Graduate	70	26
	Postgraduate	145	55
	Vocational	24	9
Occupation	Student/dependent/unemployed	39	15

	Housewife	29	11
	Service	131	49
	Self-employed	63	23
	Retired	4	2
Monthly Income	less than 25,000	46	17
	25,000–50,000	57	21
	50,001–1,00,000	66	25
	1,00,001–1,50,000	38	14
	more than 1,50,000	59	22
Family Size	1–2 members	26	10
	3–4 members	124	47
	5–6 members	89	34
	7 or more members	27	10

Exploratory Factor Analysis (EFA)

The overall correlation matrix indicated a substantial number of significant correlations above 0.30, which makes the data appropriate for factor analysis. Bartlett's test of sphericity was found to be significant ($\chi^2 = 4760.69$, degrees of freedom = 171, $p < .001$). The Kaiser–Meyer–Olkin measure of sampling adequacy (MSA) was also found to be at an acceptable level of 0.933. Depending on the Eigen value > 1 and factor loadings greater than 0.5, the 19 were grouped into three main factors, namely healthy lifestyle (HL), healthy eating (HE), and conscious eating (CE), which together explained 66.27% of the variance. According to Cronbach's α values, this instrument was found to have a good internal reliability with all the factors exhibiting a reliability >0.8. Table 2 displays the factor's specifics as well as the factor loadings, factor score, mean, standard deviation (*SD*), and ensuing Cronbach's α values for each variable.

Table 2. ***Factor Loadings and Reliability Estimates for Health Orientation***

Factor	Statement	Factor Loading	Mean (*SD*)	Cronbach's α
Healthy Lifestyle *(HL)*	I am very aware of how healthy my body feels.	0.723	3.89	0.895
			(1.041)	
Mean: 3.851,	I am aware of the nutrition guidelines of a healthy diet.	0.753	3.72	
			(1.071)	
S.D.: 0.818	Get regular and enough sleep.	0.757	3.80	
			(.997)	
	Maintaining a healthy lifestyle is important to me.	0.793	4.03	
			(.921)	
	I try to exercise at least 30 min. a day, for three days each week.	0.750	3.70	
			(1.068)	
	I can access the health care I need easily.	0.768	3.97	
			(.952)	
Healthy Eating *(HE)*	Eating calcium-rich foods reduces the risks of broken bones.	0.767	3.83	0.922
Mean: 3.594,			(1.019)	
S.D.: 0.882	I am concerned about getting enough calcium in my diet.	0.709	3.61	

			(1.056)	
	I eat more than four different varieties of fruits each week.	0.752	3.53	
			(1.169)	
	I eat more than four different varieties of vegetables each week.	0.750	3.85	
			(1.156)	
	I opt for lean cuts of meat or remove visible fats.	0.628	3.33	
			(.999)	
	I make a special effort to get enough fiber in my diet.	0.772	3.55	
			(1.078)	
	I try to select foods that are fortified with vitamins and minerals.	0.781	3.45	
			(1.112)	
	I try to avoid foods that have additives in them.	0.792	3.59	
			(1.168)	
Conscious Eating *(CE)*	I try to avoid foods that are high in fat.	0.817	3.50	0.886
Mean: 3.516,			(1.154)	
S.D.: 0.964	I try to avoid foods that are high in cholesterol.	0.800	3.56	
			(1.117)	
	I try to avoid foods with a high salt content.	0.799	3.62	
			(1.143)	
	I am concerned about how much sugar I eat.	0.793	3.75	
			(1.169)	
	I use a lot of low-calorie or calorie-reduced products.	0.661	3.15	
			(1.184)	

HL appeared to be one of the most important factors impacting the HO of the consumers (*M*: 3.851), followed by HE (*M*: 3.54) and CE (*M*: 3.516). Within a healthy lifestyle, access to healthcare, maintaining a healthy lifestyle, and sleep patterns were the attributes that were given greater importance over other components. Similar results have been observed in a study based in Hong Kong that identified that self-health awareness, health motivation, and personal responsibility were the three components of health consciousness of a consumer that actually direct actual consumption (Hong, 2009). In terms of HE, respondents agreed that they do take sufficient fruits and vegetable servings of calcium-rich food as part of their diet. Avoidance of sugar, cholesterol, and salt-rich foods was the most agreed aspect of the CE factor.

HO and Sociodemographic Variables : ANOVA

ANOVA was conducted to study how the three factors of HO differ among the various sociodemographic variables. With respect to age, a significant difference was identified between the age group of 18–30 (*M*: 3.295) years and 51–60 years (*M*: 3.763) on the CE parameter, indicating that as consumers move to higher age groups, they become more conscious of their HVAP intakes (Siekierski et al., 2013). Females were found to be more health conscious than men, with a significant difference found for both HE (mean diff: .614, *p*-value: 0.000) and CE (mean diff: .251, *p*-value: 0.12). Gender differences were found to be attributable to women's stronger belief in psychological factors like weight management (39% females against only 23% males) and healthy eating (77% women "agreed or strongly agreed" as compared to only 37% men). This finding has been supported by several studies where women are more likely to use their skills to eat healthily, avoid high-fat food, and eat more

fiber and fruits (Estaquio et al., 2008; Ferrão et al., 2019; Lee et al., 2022; Wardle et al., 2004). A significant difference for all three parameters of HO was found between illiterate and graduate and above levels of education, as well as up to 12th category and graduate and above (mean diff. of 0.83 for CE, 1.129 for HE and 1.2 for HL) (*p*-value –0.001, 0.021, and 0.003). This suggests health-conscious dietary habits among those with higher education. This can be owing to the capability of reading and understanding food labels and higher eating self-efficacy (Estaquio et al., 2008). A significant difference was identified for HL between the students and those in service (mean difference of 0.4776, *p*-value –0.003). Consumers in service are found to be leading less healthy lifestyles; individual health behaviors have been found to be affected by working hours and stressful work environments (Lee et al., 2022; Portero de la Cruz & Cebrino, 2021). The HO with respect to HL varied substantially across households with 3–5 members and those with 5–6 members (mean difference:.437; *p*-value: 0.022).

In comparison to families with seven or more members, those with three to four individuals were found to be more inclined toward an HL (mean diff: 0.417, *p*-value: 0.016). All three HO variables showed substantial differences in income between the lower and middle-income groups. Regarding the three HO components, the HE attribute (0.7751) showed the largest mean difference between the highest and lowest income groups, followed by HL (0.5888). A study in Rome and Sao Paulo reiterates the same where people with higher income are found to be more health and taste-oriented (Siekierski et al., 2013). These findings of ANOVA analysis are also in sync with the findings from a study of the relationship between dietary patterns and socio-demographic and lifestyle characteristics in Saudi Arabia. It found that adherence to a healthy pattern was associated with male gender, higher education with high income, older adults, breakfast consumption behavior, and high levels of physical activity (Mohammad Bawazeer et al., 2021). Similar to the findings in the current study, the higher income groups, better educated consume HVAPs more frequently; several studies previously have also associated lower quality diets in terms of intake of lower nutritional value food by the groups belonging to lower socio-economic situations (Darmon & Drewnowski, 2015; Harrington et al., 2011; Malon et al., 2010; Mullie et al., 2010). A study in Bangladesh found that people with higher incomes, higher education, and those who are older are less likely to have problems with low intake of fruits and vegetables. This is so because all these factors assist in attaining positive beliefs and behavioral practices regarding food (Mustafa et al., 2021).

Given the findings (refer to Table 3), we reject the null hypothesis H01 that there is no significant difference in the scores of the factors of HO among the different income categories. This is because a significant difference was found among all the categories of income for all the factors of HO. For all the other sociodemographic variables, the study partially accepts the null hypothesis H01.

Ordinal Regression Analysis

To study the impact of HO on the frequency of consumption of HVAP, ordinal logistic regression was carried out separately for each of the HVAP. The independent variables incorporated in the analysis were sociodemographic variables like age, gender, income, education, occupation, and family size. The three factors identified using the factor analysis (HL, HE, and CE) were also considered in the analysis. The frequency of consumption was taken separately for each of the six HVAP items. The results of the regression analysis are shown in Table 4 and Table 5

Table 3. ***Analysis of Variance: Health Orientation and Sociodemographic Variables***

Sociodemographic Factor	*HE*	*HL*	*CE*
Age (years)	**n.s.**	**n.s.**	**<0.05**
18–30	3.4947	3.8053	3.295**
31–40	3.7153	3.9027	3.6088

41–50	3.4757	3.7245	3.5528
51–60	3.7122	3.9612	3.7628**
60 and above	3.5083	4.0333	3.533
Gender	**<0.05**	**n.s.**	**<0.05**
Male	3.3892***	3.7814	3.3737**
Female	3.7506***	3.9014	3.624**
Education	**<0.001**	**<0.001**	**<0.001**
Illiterate	2.7083***	3.0000***	2.9667***
Up to 12th	2.8226***	3.3871***	2.8065***
Vocational	3.1836	3.6563	3.2688
Graduate	3.5310***	3.8097***	3.4903***
Postgraduate	3.8370***	4.0000***	3.6931***
Occupation	**n.s.**	**=.005**	**n.s.**
Student/dependent/unemployed	3.8115	4.1366**	3.3869
Housewife	3.6790	3.8561**	3.8091
Service	3.4737	3.6959**	3.4363
Self-employed	3.6325	3.9233	3.5840
Retired	3.5750	4.0167	3.7000
Monthly Income	**<0.05**	**<0.01**	**<0.01**
Lowest (Less than 25,000)	3.1708***	3.4765***	3.3014**
Upper Lower (25,000–50,000)	3.4278***	3.8667***	3.3711**
Lower Middle (50,001–100,000)	3.6010***	3.8603***	3.5212**
Upper Middle (100,001–150,000)	3.9471***	4.0128***	3.6538**
Upper (More than 150,000)	3.9459***	4.0653***	3.7946**
Family Size	**n.s.**	**<0.10**	**<0.05**
1–2 members	3.4628	3.7162	3.4162
3–4 members	3.7165	4.0091**	3.4855
5–6 members	3.4761	3.7443**	3.5143
7 or more members	3.5357	3.5667**	3.5585

Note. n.s. denotes non-significant, **: significant at 5% level, ***: significant at 1% level.

Table 4. ***Ordered Logistic Regression Analysis : Frequency of Consumption of HVAP (F&V and Milk) and Health Orientation***

Parameter		Fruits			Vegetables			Milk		
		Coefficients	Sig.	Odds Ratio	Coefficients	Sig.	Odds Ratio	Coefficients	Sig.	Odds Ratio
Threshold	Never	2.233	0.044	9.323	–1.789	0.212	0.167	–2.297	0.034	0.101
	Rarely	3.739	0.00	42.068	–0.069	0.957	0.933	–1.165	0.277	0.312
	Monthly	4.700	0.000	109.99	0.768	0.549	2.155	–0.835	0.436	0.434
	Once a week	5.996	0.000	401.87	1.723	0.179	5.604	–0.362	0.736	0.696
	2–3 times a week	8.029	0.000	3069.55	2.776	0.032	16.047	0.435	0.686	1.545
Gender		**0.754*** **	0.001	2.215	0.166	0.596	1.181	0.002	0.994	1.002

Age (in years)	0.096	0.445	1.100	–0.028	0.863	0.973	–0.002	0.985	0.998
Education	**0.522*** **	0.000	1.686	–0.091	0.601	0.913	0.079	0.577	1.082
Occupation	–0.134	0.272	0.875	**–0.436*** **	0.013	0.646	**–0.580*** **	0.000	0.560
Monthly Income	**0.156***	0.080	1.168	0.181	0.182	1.199	0.147	0.158	1.159
Family Size	–0.018	0.898	0.982	–0.015	0.933	0.985	–0.144	0.334	0.866
HL	**0.869*** **	0.000	2.384	**0.504*** **	0.015	1.656	**0.120*** **	0.001	1.143
HE	**0.411*** **	0.010	1.509	**0.946*** **	0.000	2.576	**0.519*** **	0.003	1.681
CE	**0.332*** **	0.013	1.394	**0.391*** **	0.029	1.479	0.451	0.444	1.586

Note. **: significant at 5% level, ***: significant at 1% level.

for F&V and milk and MFE, respectively. For F&V and milk, the chi-square values are 178.15, 121.89, and 97.091, respectively. The model seems to be a reasonably good fit with a chi-square value of 55.402, 52.62, and 73.12 for MFE, respectively.

All HVAPs are significant at 1% (p-value <0.01). The estimated models for each of the food items were able to predict more than 70% of the respondents' perspectives accurately. The regression results for fruits indicated that among the socio-demographic factors, gender (p-value ≤ 0.01), education (p-value ≤ 0.01), and monthly income (p-value ≤ 0.10) positively and significantly impacted the frequency of fruit consumption. Females had higher odds of consuming fruits more frequently by 2.215 times than males. Similarly, higher-educated consumers had 1.686 times more odds of consuming fruits more frequently as compared to less educated or uneducated respondents. As far as vegetables and milk are concerned, occupation (p-value ≤ 0.005 and 0.001, respectively) was the only sociodemographic factor that had a significant but negative impact on their consumption. The odds of frequency of consumption of vegetables and milk decreased by 0.646 times and 0.560 times, as the consumers surveyed moved from unemployed and housewife to service employed or self-employed categories. With respect to the HO, all three factors are positively significant for both fruits and vegetables. This demonstrates that the more the consumer is motivated towards leading a healthier lifestyle and monitors the eating patterns in sync with the nutrition guidelines, the greater are the chances of them increasing the consumption of F&V. The odds of leading to increased probability of F&V consumption with higher HL are 2.384 times and 1.656 times.

Similarly higher the HE habits, the higher the odds of consuming F&V more frequently (1.509 times and 2.576 times, respectively). Milk is positively and significantly impacted by both HL (p-value ≤ 0.001) and HE (p-value ≤ 0.001) but not CE. The odds of consuming milk more frequently increase by 1.143 and 1.681 times with improvement in orientation towards HL and HE, respectively.

Therefore, we reject the null hypothesis H02 that there is no significant impact of HO on the consumption of fruits and vegetables because all three aspects of HO are found to be significant. In the case of milk, we partially accept the hypothesis H02 as CE is found to have no significant impact on milk consumption.

According to MFE's logistic regression results (Table 5), age is a major sociodemographic factor that negatively affects how frequently these three food items are consumed. It implies that with growing age, the MFE food items are consumed less frequently by consumers. The odds of MFE consumption frequency reducing with increasing age are 0.695 times for meat, 0.708 times for fish, and 0.788 times for eggs. Gender was found to be significantly and negatively impacting the meat and fish frequency of consumption indicating that the odds of consuming these food items decreased among females by 0.599 times for meat and 0.637 for fish. The HE and HL variables of HO positively and significantly impact the frequency of MFE consumption. With an increase in the likelihood of consumers following an HL, eggs had the highest odds of increasing consumption frequency by 2.034 times, followed by meat (1.931 times). Fish has the highest probability of being ingested more frequently (1.494 times) according to the respondents' HE perspective, followed by meat (1.397).

Table 5. ***Ordered Logistic Regression Analysis : Frequency of Consumption of HVAP (MFE) and Health Orientation***

Parameter		Meat			Fish			Eggs		
		Coefficients	Sig.	Odds Ratio	Coefficients	Sig.	Odds Ratio	Coefficients	Sig.	Odds Ratio
Threshold	Never	1.154	0.144	3.171	1.913	0.018	6.774	2.887	0.000	17.938
	Rarely	1.393	0.078	4.029	2.400	0.003	11.02	3.169	0.000	23.791
	Monthly	1.950	0.014	7.028	3.253	0.000	25.68	3.582	0.000	35.933
	Once a week	3.303	0.000	27.203	4.803	0.000	121.92	4.226	0.000	68.423
	2–3 times a week	5.738	0.000	310.32	7.060	0.000	1164.25	5.939	0.000	379.52
Gender		**–0.513*** **	0.014	0.599	**–0.451*** **	0.031	0.637	–0.271	0.184	0.763
Age (in years)		**–0.363*** **	0.001	0.695	**–0.345*** **	0.001	0.708	**–0.238*** **	0.018	0.788
Education		–0.144	0.248	0.866	–0.164	0.207	0.848	–0.043	0.729	0.958
Occupation		0.079	0.482	1.082	0.114	0.307	1.121	0.128	0.230	1.137
Monthly Income		–0.027	0.736	0.974	–0.012	0.878	0.988	0.112	0.146	1.118
Family Size		0.052	0.678	1.054	0.089	0.478	1.093	0.067	0.577	1.069
HL		**0.658*** **	0.000	1.931	**0.592*** **	0.00	0.897	**0.710*** **	0.000	2.034
HE		**0.331*** **	0.029	1.393	**0.401*** **	0.013	1.494	**0.313*** **	0.034	1.367
CE		–0.195	0.122	0.823	–0.108	0.385	1.807	0.021	0.860	1.022

Note. **: significant at 5% level, ***: significant at 1% level.

Concerning MFE, we reject the null hypothesis H02 for all three food items. Both HL and HE have a significant impact on MFE. CE as a factor of HO has no significant effect on the consumption of MFE, and thus, we accept the null hypothesis H02 w.r.t MFE.

A study in Portugal reiterates the results found above that nutrition knowledge and health awareness have a significant positive influence on dietary patterns (Ferrão et al., 2019; Hong, 2009). Additionally, a US university study found that self-reported behavior regarding the consumption of fruits and vegetables, behavioral intention, and attitude were all strongly positively correlated with health orientation (Dutta-Bergman, 2005). According to findings from another Italian study, customers are more likely to take activities and adopt behaviors that improve their health if they have a strong health motivation (Cavaliere et al., 2014).

Conclusion

Increasing occurrences of NCDs like overweight and obesity pose a serious situation to the future quality of public health, health care, aggregate productivity, and quality of life among Indians. This study helps in identifying that HO individuals do tend to have a greater frequency of HVAP consumption. Therefore, health education and outreach programs can be designed to manage healthy diets and the foods they eat. The current study also illuminates how certain socio-demographic factors like age, gender, and occupation may relate to an individual's consumption of a healthful diet and understanding the links among diet, exercise, and good health. Also, variables of particular interest to economists—such as household structure, income, and formal education—may help explain variation in these behaviors and attitudes. These findings will aid in designing nutrition outreach messages for specific target groups.

Implications

Theoretical Implications

The current study is one of the first to evaluate the linkages between HO and consumption of HVAP. Several researches have covered the consumer's perception of product attributes of healthy food items but very few have been linked with the health understanding of the consumer. This study has added to the current literature, which is limited to European and American countries and is not so extensive in third-world countries. Given the escalating burden of NCDs, especially in urban areas of developing nations, the study explored crucial connections between health awareness, dietary habits, and the consumption of HVAPs. To promote HVAP consumption and bring it in line with the recommended intake of HVAP consumption, the study aids in better understanding of the health-related motives of the consumer. Most importantly, it has been able to identify three aspects of HO, namely HE, HL, and CE, that can have an impact on the HVAP consumption. The relationship of these with different socio-demographic factors will aid the private players on the one hand and the government on the other to plan the interventions accordingly.

Managerial Implications

The current study empirically validates that HO has a significant impact on HVAP consumption. It helps marketers, producers, and government agencies to identify the areas of intervention in terms of designing nutrition education programs, developing and marketing healthier versions of existing HVAPs, etc. As consumer health awareness continues to rise, private players should pay attention to various aspects: providing clear and comprehensive nutrition labels on HVAP food items to help consumers make informed choices, emphasizing factors such as organic practices to appeal to the health-conscious consumers, developing and offering processed versions of HVAPs that maintain their nutritional value while enhancing convenience can cater to the needs of consumers seeking healthier options and marketing and advertising campaigns focusing on the health aspect of HVAPs.

Limitations of the Study and Scope for Future Research

The current study could cover Delhi as one of the urbanized cities of India owing to time and financial constraints. As the scope for further study, it is recommended that other metropolitan and urban cities are also studied regarding the health linkages of consumption of urban consumers to facilitate best practice sharing. A wider definition of HVAP food items has been dealt with in the current study with broader categories of overall fruits, vegetables, milk and meat, fish, and eggs. A detailed study of each category with its different variants and subcategories can be done to provide consumer preferences for each one separately.

Authors' Contribution

Dr. Nisha Gupta was responsible for the project's inception, data gathering, and analysis. Dr. Nisha Gupta assessed the literature, while the other two authors contributed more recommendations and studies. Prof. (Dr.) Mahua Bhattacharjee approved and oversaw the analytical procedures. Using SPSS version 26, Dr. Nisha Gupta conducted data analysis. All of the authors worked together to draft the manuscript. Prof. (Dr.) Anindita Roy Saha provided a critical evaluation and revisions to the text. Prof. (Dr.) Mahua Bhattacharjee and Prof. (Dr.) Anindita Roy Saha approved the article's final draft.

Conflict of Interest

The authors have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Appendix

Table A1. ***Reference to the 19 Statements for Health Orientation***

Statement	References
I am very aware of how healthy my body feels.	Gould (1990) ; Michaelidou & Hassan (2008) ;
I am aware of the nutrition guidelines of a healthy diet.	Moorman & Matulich (1993)
Get regular and enough sleep.	
Maintaining a healthy lifestyle is important to me.	
I try to exercise at least 30 min. a day, 3 days each week.	Kraft & Goodell (1993)
I can access the health care I need easily.	
Eating calcium-rich foods reduces the risks of broken bones.	Dutta-Bergman (2005); Food and Agricultural
I am concerned about getting enough calcium in my diet.	Organization (FAO) (2007)
I eat more than four different varieties of fruits each week.	
I eat more than four different varieties of vegetables each week.	
I opt for lean cuts of meat or remove visible fats.	
I make a special effort to get enough fiber in my diet.	Dutta-Bergman (2005)
I try to select foods that are fortified with vitamins and minerals.	Dutta & Youn (1999) ; Dutta-Bergman (2005) ;
I try to avoid foods that have additives in them.	Hong (2009)
I try to avoid foods that are high in fat.	
I try to avoid foods that are high in cholesterol.	
I try to avoid foods with a high salt content.	
I am concerned about how much sugar I eat.	
I use a lot of low-calorie or calorie-reduced products.	

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