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Influence of demographic variables on urban consumer preference for organic vegetables: Evidence from Pune City

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ABSTRACT

Consumer preference for organic vegetables is often assumed to vary systematically with socio-economic status, yet the direction and strength of this relationship remain empirically unsettled, particularly in fast-urbanising Indian cities. This study examines the influence of three demographic variables — age, monthly household income, and educational qualification — on urban consumer preference for organic versus inorganic vegetables in Pune City, Maharashtra. Primary data were collected from 100 respondents through a structured questionnaire administered online and offline across five vegetable markets, using convenience sampling. Pearson correlation and multiple linear regression (with consumer preference as the dependent variable) were used to test the relationships. Age showed a moderate negative correlation with preference for organic vegetables ($r = -0.461$), while income showed a weak positive correlation ($r = 0.203$) and qualification a weak negative correlation ($r = -0.117$). The regression model was statistically significant overall ($R^2 = 0.273$, adjusted $R^2 = 0.250$, $F = 12.006$, $p < 0.001$), with age ($\beta = -0.476$, $p < 0.001$) and monthly income ($\beta = 0.252$, $p = 0.006$) emerging as significant predictors, while educational qualification was not significant ($\beta = 0.050$, $p = 0.507$). The findings indicate that younger and higher-income urban consumers are significantly more inclined towards organic vegetables, whereas formal education level does not independently drive this preference. The results support age- and income-based segmentation as a more effective basis for organic vegetable marketing than education-based targeting, and suggest that non-demographic factors account for the larger share of variation in preference.

Keywords: Demographic variables, Consumer preference, Organic vegetables, Age, Income, Education, Regression analysis, Pune City

1. Introduction

Demographic characteristics have long been considered important correlates of food-purchase behaviour because they shape purchasing power, health awareness, exposure to information, and lifestyle orientation. As urban Indian consumers increasingly weigh health and food-safety considerations against price and convenience when choosing vegetables, understanding which demographic segments are most receptive to organic produce has direct implications for market segmentation and pricing strategy. Age, income and education are the three demographic variables most frequently examined in the organic-food literature, yet their reported effects are not uniform across studies or markets, making empirical verification in a specific urban context necessary.

Pune, a rapidly growing metropolitan centre in Maharashtra with a large and economically diverse consumer base, offers a suitable setting to examine these relationships. This study therefore focuses specifically on the third objective of a broader consumer-behaviour investigation: examining the influence of age, monthly household income, and educational qualification on urban consumer preference for organic versus inorganic vegetables in Pune City, using correlation and multiple regression analysis.

2. Review of literature

Demographic characteristics have consistently featured in studies of organic food behaviour, though findings on individual variables differ. Kumar *et al.* (2016) [1] found that family income, family size and gender significantly influenced consumers' willingness to pay for organic fruits and vegetables in Bangalore, indicating that economic capacity is an important enabler of premium purchase. Lakshmi *et al.* (2018) [2], using logistic regression, similarly identified income — alongside health, safety, environmental concern, price, trust and convenience — as a significant determinant of organic food purchase decisions, particularly relevant in urban markets where income differences determine consumers' ability to absorb an organic price premium.

The role of education is less consistent across the literature. While higher educational attainment is generally assumed to improve access to information about food safety, chemical residues, certification and environmental sustainability, several studies note that awareness alone does not guarantee purchase, since consumers may remain constrained by price and availability regardless of education level (Khare, 2019; Naresh *et al.*, 2022) [3, 4]. Balaji *et al.* (2017) [5] and Parwez *et al.* (2022) [6] both incorporated demographic profiles — including education — into their models of organic food perception and purchase intention, concluding that socio-economic characteristics matter but do not act uniformly across all consumers.

Age effects are similarly context-dependent. Younger, digitally comfortable consumers may be more receptive to health information and newer retail formats, while older consumers often rely on established shopping habits, personal familiarity with vendors and traditional markets. Nautiyal *et al.* (2024) [7], through cluster analysis of 608 Indian consumers, found significant heterogeneity in knowledge, trust, and purchase behaviour across demographic segments, reinforcing that age, income and education should be examined as an interacting set of variables rather than assumed to have uniform, independent effects. This body of work provides the empirical basis for testing the specific direction and significance of age, income and education effects in the Pune context.

3. Objective and hypotheses

Objective: To examine the influence of demographic variables — age, monthly household income, and educational qualification — on urban consumer preference for organic vegetables in Pune City.

The following hypotheses were formulated and tested:

H₀: There is no significant relationship between demographic variables (age, income, education) and consumer preference for organic versus inorganic vegetables.

H₁: There is a significant relationship between demographic variables and consumer preference for organic versus inorganic vegetables.

4. Research methodology

4.1 Research design and sampling

The study followed a descriptive-cum-analytical design. Primary data were collected from 100 respondents through a structured questionnaire administered online (Google Forms) and offline at five vegetable markets in Pune City — Mahatma Phule Mandai, Gultekdi Market Yard, Shivaji Bhaji Market, Karve Nagar Vegetable Market, and Bhaji Market, Hadapsar — with 20 respondents drawn from each market using convenience (non-probability) sampling.

4.2 Variables and analytical tools

Consumer preference for organic vegetables was treated as the dependent variable (Y), while age (X₁), monthly household income (X₂), and educational qualification (X₃) were treated as explanatory variables. Pearson correlation analysis was used to examine the direction and strength of the bivariate relationship between each demographic variable and consumer preference. Multiple linear regression was then used to estimate the joint and individual influence of the three variables, based on the model:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + U$$

where *a* is the intercept, *b*₁, *b*₂ and *b*₃ are regression coefficients, and *U* is the error term. The coefficient of determination (R²), adjusted R², *F*-statistic and individual *p*-values were used to assess model fit and the statistical significance of each predictor, at the 5 per cent level of significance.

5. Results and Discussion

5.1 Correlation between demographic variables and consumer preference

Table 1. Correlation matrix — demographic variables and consumer preference (*N* = 100)

Variable	Age	Income	Qualification	Preference
Age	1.000	0.079	0.315	-0.461
Income	0.079	1.000	-0.087	0.203
Qualification	0.315	-0.087	1.000	-0.117
Preference	-0.461	0.203	-0.117	1.000

Age recorded a moderate negative correlation with consumer preference for organic vegetables (*r* = -0.461), indicating that as respondent age increases, the likelihood of preferring organic vegetables decreases. Monthly income showed a weak positive correlation (*r* = 0.203), suggesting that consumers with higher income levels are somewhat more inclined towards organic vegetables, though the association is modest. Educational qualification showed a weak negative correlation with preference (*r* = -0.117), indicating only a marginal inverse relationship. Among the three variables, age exhibited by far the strongest association with consumer preference, followed by income, with qualification showing the weakest relationship.

5.2 Multiple regression analysis

The regression model returned a Multiple R of 0.522, indicating a moderate overall relationship between the three demographic variables and consumer preference. The model explained 27.3 per cent of the variance in consumer preference (R² = 0.273), or 25.0 per cent after adjusting for the number of predictors (adjusted R² = 0.250). The

model was statistically significant overall (*F* = 12.006, *p* < 0.001), confirming that age, income and education jointly have a significant influence on consumer preference for organic vegetables, even though roughly three-quarters of the variance remains unexplained by demographic factors alone.

Table 2. Regression model summary

Statistic	Value
Multiple R	0.522
R Square	0.273
Adjusted R Square	0.250
Standard Error	0.659
Observations	100
<i>F</i> -statistic	12.006
Significance <i>F</i>	< 0.001

Table 3. Regression coefficients and significance

Predictor	Coefficient (β)	<i>p</i> -value	Result
Age	-0.476	< 0.001	Significant

(continued on next page)

Predictor	Coefficient (β)	p-value	Result
Monthly income	0.252	0.006	Significant
Qualification	0.050	0.507	Not significant

Age emerged as a statistically significant negative predictor of organic vegetable preference ($\beta = -0.476$, $p < 0.001$), confirming that older respondents were significantly less likely to prefer organic vegetables than younger respondents in this sample. Monthly household income was a statistically significant positive predictor ($\beta = 0.252$, $p = 0.006$), indicating that higher-income consumers showed a significantly greater preference for organic vegetables, consistent with income acting as an enabler of premium-priced purchases (Kumar *et al.*, 2016; Lakshmi *et al.*, 2018) [1, 2]. Educational qualification, by contrast, was not a statistically significant predictor ($\beta = 0.050$, $p = 0.507$), suggesting that formal education level does not independently drive organic vegetable preference once age and income are accounted for — a finding consistent with the view that awareness alone does not guarantee purchase behaviour (Khare, 2019) [3].

5.3 Hypothesis testing

Table 4. Summary of hypothesis testing

Variable / Model	Analysis Result	Decision
Age	$r = -0.461$, $p < 0.001$	H_0 Rejected
Monthly income	$p = 0.006$	H_0 Rejected
Educational qualification	$p = 0.507$	H_0 Accepted
Overall model	Significance $F < 0.001$	H_0 Rejected / H_1 Supported

The null hypothesis of no relationship was rejected for age and income, both of which showed statistically significant associations with consumer preference, and accepted for educational qualification, which showed no significant effect. The overall regression model was significant, supporting the alternative hypothesis that demographic variables, taken together, significantly influence urban consumer preference for organic vegetables — driven specifically by age and income rather than education.

6. Conclusion

This study set out to examine the influence of age, income and educational qualification on urban consumer preference for organic vegetables in Pune City. The results demonstrate that age and monthly household income are statistically significant determinants of preference — younger and higher-income consumers show a significantly stronger orientation towards organic vegetables — while educational qualification does not exert an independent, statistically significant influence. The regression model, though significant overall, explains just over a quarter of the variation in preference, indicating that non-demographic factors such as perceived safety, health benefit, product quality and trust in labelling likely account for a larger share of the variation and merit joint consideration alongside demographic characteristics in future research and marketing strategy.

7. Practical implications

Age-based segmentation: Marketing communication and product positioning for organic vegetables should be weighted towards younger urban consumers, who show significantly stronger preference, while strategies to engage older consumers may need to address different barriers such as habit, trust and familiarity with traditional markets.

Income-based pricing and positioning: Since income positively and significantly predicts preference, tiered pricing, smaller pack sizes, or value-oriented organic ranges could help extend adoption to middle- and lower-income urban households who show favourable attitudes but limited purchasing capacity.

Education is not a sufficient targeting variable: Because qualification showed no significant effect, marketers should avoid assuming that more educated consumers are automatically more likely to buy organic vegetables, and should instead prioritise direct health and safety messaging over education-based targeting.

Complement demographic targeting with trust-building: As demographics explain only a modest share of variance, investment in certification, transparent labelling and quality assurance is likely to be at least as important as demographic segmentation in expanding the organic vegetable market.

8. Limitations and scope for future research

The study is based on a convenience sample of 100 respondents drawn from five markets in a single city, which limits generalisability to other urban contexts or to probability-sampled populations. Only three demographic variables were modelled; the modest explanatory power of the regression ($R^2 = 0.273$) indicates that other variables — such as household size, occupation, health status, and psychological factors including trust and environmental attitude — should be incorporated in future models. Larger, multi-city, randomly sampled studies would strengthen the external validity of these findings.

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