Determinants of Tomato Demand in Delhi NCR *During 2023 Price Spikes*

An Analysis of Price Elasticity, Income Elasticity, and the Role of Substitutes

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Introduction

The study explores the culinary significance of tomatoes in Indian cuisine, while considering the factors of supply and demand volatility caused by climate, transportation, and other inefficiencies.

- Overview of volatile tomato prices
- Research objectives: consumer demand, price elasticity, and substitutes like tomato puree
- Survey of 98 households
- Key findings: price inelasticity and negative income elasticity
- Importance for policymakers and marketers

Research Problem

Tomatoes are a very important ingredient in Indian Cuisine, specially north India and second largest consumer globally. The objective of the study is to understand:

- Price Fluctuations
- Factors affecting tomato prices: supply, seasonality, climate
- Determinants of tomato demand
- How price spikes affected demand

Methodology

- Sample: 98 households across 3 income groups
- Method: Quantitative survey (Google Forms)
- Demographic: Mix of rural and urban households in Delhi NCR
- Key questions about price, income, and consumption habits
- References: Key references from prior studies (Gupta, 2021; IARI, 2020; Birthal et al., 2019)

Research Questions

Main Questions

- What is the price elasticity of tomato demand in Delhi NCR?
- How does income affect tomato demand?
- What role do substitutes (like tomato puree) play?

Literature Review

- Demand inelasticity for staple vegetables like onions (Birthal et al., 2019)
- Factors influencing fruit and vegetable consumption (Gupta, 2021)
- Importance of convenience in purchasing decisions

Research Design and Ethics

Research Process

- Quantitative study through a Google Forms survey
- Participants - 98 households from Delhi NCR, covering three income groups
- Data from survey on tomato consumption, personal preferences, substitutes and costs

Ethical Considerations

- Ensured data privacy and confidentiality
- Participants were informed about the study's purpose
- Voluntary participation emphasized

Results

Consumer Behaviour Analysis

Substitutes

Price Elasticity of Demand

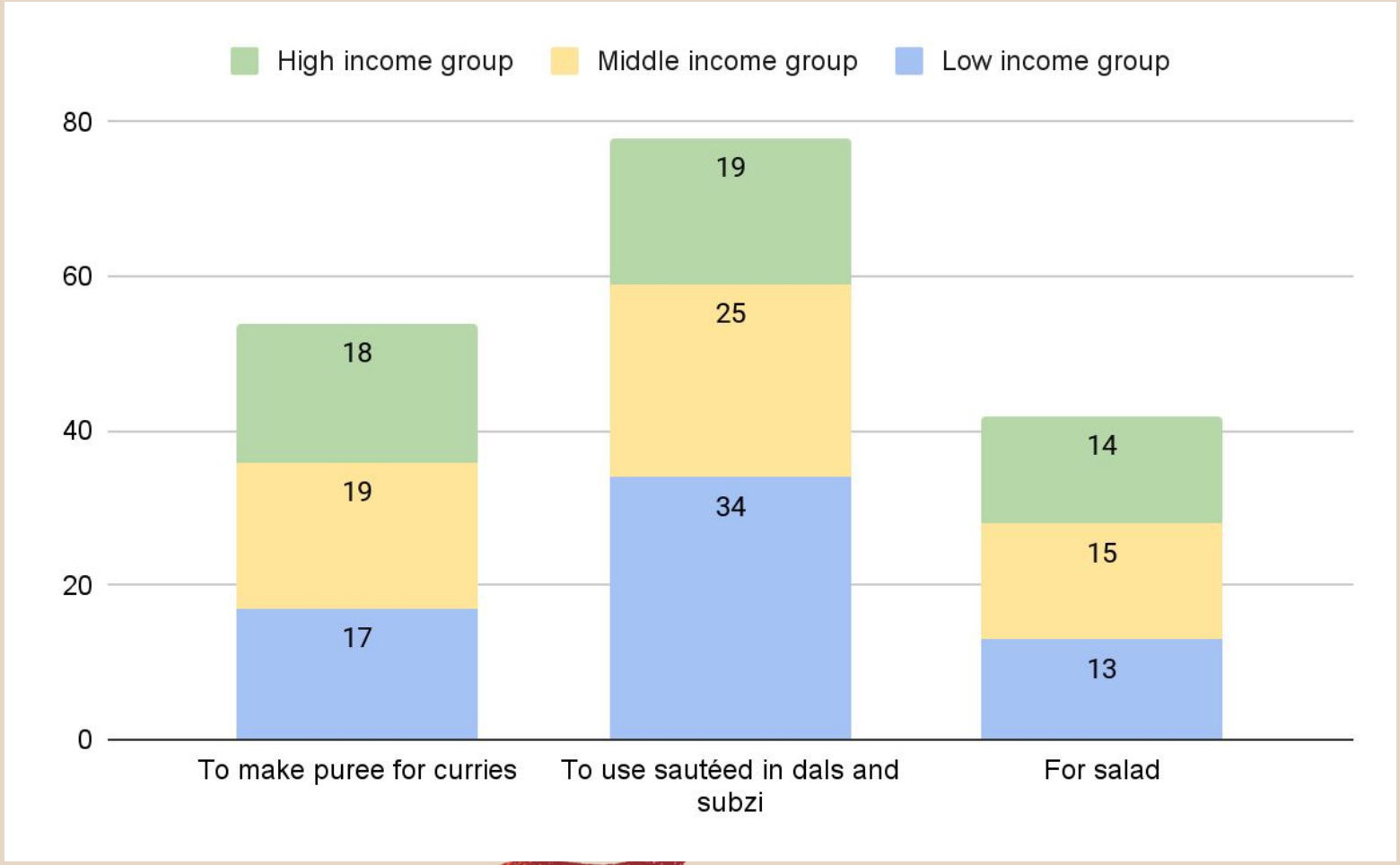
Income Elasticity of Demand

Consumer Behaviour Analysis

Tomato usage patterns differ across income levels

- Low-Income Households: Prefer sautéing tomatoes in dals and subzi.
- Middle-Income Households: Higher preference for making puree.
- High-Income Households: Diverse usage across sautéing, purees, and salads.

Figure 1: Reason for Buying Tomato Puree (N=88)



Substitutes

Significant preference for homemade tomato puree across all income groups

- Low-Income Group: 66% prefer homemade puree
- Middle-Income Group: 57% prefer homemade puree
- Convenience is the main driver for choosing readymade puree, especially in low- and middle-income groups

Figure 2: Reason for buying readymade tomato puree

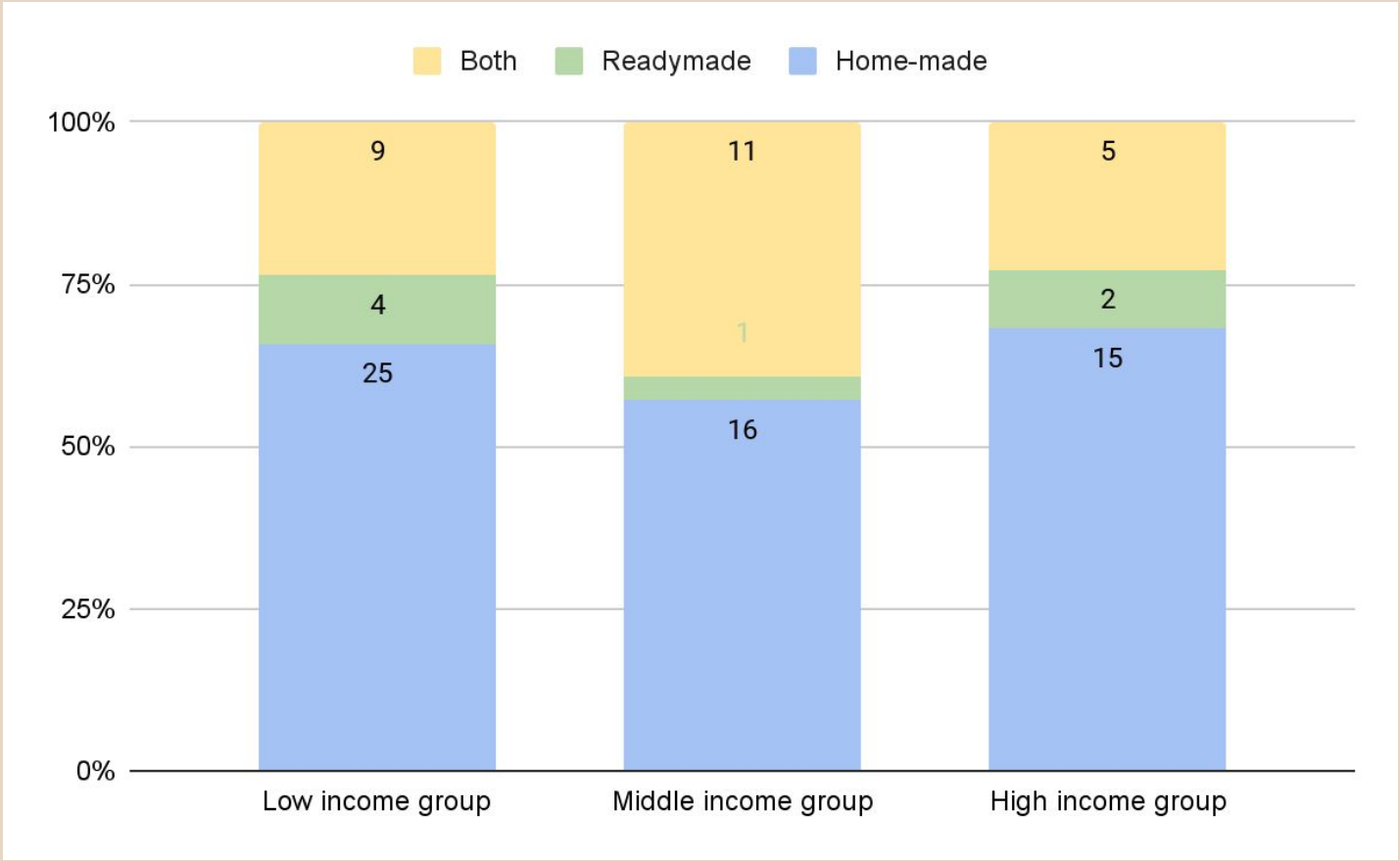


Figure 3: Q_D of Homemade and Readymade Tomato Puree

Price Elasticity of Demand

Price elasticity is negative, reflecting the inverse relationship between price and demand

- Low-Income Group: More sensitive to price changes (elasticity = -0.096)
- Middle- and High-Income Groups: Show less sensitivity to price changes (elasticity = -0.084 and -0.083)

Table 1: Price Elasticity of Demand for Tomatoes on the Basis of Household Income

Household Income	Calculation of Price Elasticity (ε)	ε
Low Income	$\frac{\frac{1.658-1.368}{1.658}\times 100}{\frac{44.737-126.5}{44.737}\times 100} = \frac{17.491\%}{-182.764\%}$	-0.096
Middle Income	$\frac{\frac{2.214-1.893}{2.214}\times 100}{\frac{46.429-126.5}{46.429}\times 100} = \frac{14.499\%}{-172.459\%}$	-0.084
High Income	$\frac{\frac{2.591-2.25}{2.591}\times 100}{\frac{49.091-126.5}{49.091}\times 100} \Rightarrow \frac{13.161\%}{-157.685\%}$	-0.083

Source: Author's Calculation

Income Elasticity of Demand

Income elasticity is negative, indicating that as income increases, the demand for tomatoes decreases

- Low-Income Group: Elasticity = -0.709, showing tomatoes as a relatively necessary good
- High-Income Group: Elasticity = -0.826, reflecting that tomatoes are viewed more as an inferior good

Table 2: Income Elasticity of Demand for Tomatoes on the Basis of Household Income

Household Income	Calculation of Income Elasticity (η)	η
Low Income	$\frac{\frac{-0.026kgs}{1.658kgs} \times 100}{2.211\%} = \frac{-1.568\%}{2.211\%}$	-0.709
Middle Income	$\frac{\frac{-0.054kgs}{2.214kgs} \times 100}{3.179\%} \Rightarrow \frac{-2.439\%}{3.179\%}$	-0.767
High Income	$\frac{\frac{-0.068kgs}{2.591kgs} \times 100}{4.364\%} \Rightarrow \frac{-2.624\%}{3.179\%}$	-0.826

Source: Author's Calculation

Discussion

Price Inelastic Demand

- Tomatoes are a necessity with low price sensitivity across income groups.
- Higher-income households are less affected by price changes, focusing on health and convenience.

Negative Income Elasticity:

- As income rises, tomato consumption decreases, especially among higher-income groups, who opt for premium food choices.

Non-Price Factors:

- Convenience and cultural preferences outweigh price in driving tomato puree demand.

Conclusion and Implications

Tomato demand is price inelastic across all income groups. Convenience drives demand for ready-made puree, with a strong preference for homemade options

Implications:

- Policymakers: Use findings for better subsidy and price control policies
- Marketers: Focus on convenience products and fresh tomato services
- Producers: Improve supply chain efficiency to ensure a steady supply

Limitations:

- Convenience sampling may not fully represent the population
- Potential recall bias in survey responses

Future Research:

- Larger, more diverse sample and longitudinal data needed to capture long-term consumer behaviour trends.

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