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RESEARCH PAPER

Study on apple consumption pattern and constraints in the Dharwad district of Karnataka

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Abstract: Apples, though primarily produced in the Himalayan states of India, have emerged as an important fruit in non-producing regions due to rising health awareness and changing dietary preferences. This study was conducted in the Dharwad district of Karnataka, a non-apple-producing region, to examine the consumption patterns of fresh apples and awareness of apple-based processed products among urban and rural consumers. Data were collected from 100 respondents (50 urban, 50 rural) through personal interviews using a structured schedule.Garrett's ranking technique was applied to identify key constraints. Results revealed that while all respondents consumed apples, frequency and quantity were higher in urban areas, where quality considerations dominated purchase decisions. Rural consumers showed greater price sensitivity and limited market access. Awareness and usage of value-added products such as apple juice, vinegar, jam and apple-based flour were modest in urban areas and very low in rural areas, with limited awareness and availability emerging as the most critical barriers. The study highlights that expanding market outreach, improving product availability and enhancing consumer awareness could significantly increase the acceptance of apples and their processed forms in non-producing regions.

Key words: Apple, Consumption pattern, Rural, Urban, Value-added products

Introduction

Apples are one of the most popular and widely consumed fruits around the world, valued not only for their taste and nutritional benefits but also for their adaptability in being processed into products like juices, jams, cider and dried form. India ranks among the top five apple-producing countries, contributing nearly threeper cent of global output (2.55 million metric tonnes), following China, the United States, Turkey and Poland (United States Department of Agriculture, 2024-25). Within the country, apples occupy the sixth position among fruit crops, with production concentrated in the Himalayan states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand, which together contribute about 99 per cent of the national output, along with limited production in Arunachal Pradesh, Sikkim and Nagaland (MoAFW, 2021).Despite this strong production base, India remains the world's third-largest importer of fresh apples, which reflects rising domestic demandand the increasing role of apples in the national fruit economy. Apples are consumed predominantly in fresh form. However, a portion of the produce is processed into value-added products such as juice, concentrate, jam, vinegar, dried apples and flour, with apple juice and concentrate being the most widely marketed and consumed (Indusfood, 2024).The demand for these processed products has been increasing steadily, particularly in urban markets, driven by shifting dietary patterns, health awareness and the rapid expansion of organized food retail (IMARC, 2024).It is required to develop an efficient global value chainto benefit all the stakeholders (Priyanka *et al*, 2024).Most existing studies have examined consumption behaviour in apple-producing states, however, consumer patterns in non-producing regions remain less understood. The present study was conducted in Dharwad district of Karnataka, a non-apple-producing region, to assess the consumption of fresh apples and awareness of processed apple products in both rural and urban areas. Studying such regions provides critical insights into consumer demand, market reach and supply chain efficiency beyond production zones, offering valuable implications for producers, processors and policymakers seeking to expand apple consumption and improve access to fruit-based products across the country.

Material and methods

The study was conducted in the Dharwad district of Karnataka during 2024 with the objective of examining the consumption patterns of apples and apple-based processed products, along with the constraints influencing their utilization. A total of 100 consumers were selected using a stratified random sampling technique, with equal representation from urban and rural areas (50 respondents each). The sampling frame consisted of households from residential areas and marketplaces in the case of urban consumers and households from farming and non-farming backgrounds in the case of rural consumers. Within each stratum, respondents were chosen randomly to represent a mix of socio-economic categories, thereby improving the representativeness of the sample.Primary data were collected through personal interviews using a well-structured schedule. The study examined the consumption pattern of fresh apples, irrespective of variety and processed apple products,available in local markets, retail outlets and food marts. The processed products considered were apple juice, apple drink, apple vinegar, apple jam and apple-based flour/cereal, representing both beverage and food categories.For analysis of the data, descriptive statistics such as frequency and percentage distributions were used to summarize consumption patterns. To identify constraints associated with apple and apple-based product consumption, Garrett's ranking technique was

employed, whereby respondents' rankings of constraints were converted into scores and the factor with the highest mean score was identified as the most critical.The following formula was used to calculate the percent position of each rank:

$$\text{Per cent position} = 100 \times \frac{(Rij - 0.5)}{Nj}$$

where,

R_{ij} = Rank given for i^{th} factor by j^{th} individual

N_j = Number of factors ranked by j^{th} individual

The percent positions thus obtained were converted into Garrett scores using a standard conversion table developed by Garrett and Woodworth (1969). For each factor, the mean score was computed by averaging the scores across all respondents. The factor with the highest mean Garrett score was considered the most critical constraint, while factors with lower mean scores were ranked accordingly in descending order of importance.

Results and discussion

Socio-economic characteristics of consumer respondents

A higher proportion of females participated in both urban and rural areas (Table 1). The majority of urban respondents were in the 46-55 age group, while in rural areas, the largest share was 36-45 years. 84 per cent of urban respondents had a degree and above, compared to rural areas, where most had schooling up to secondary or below. Family size tended to be larger in rural areas compared to urban households. Income distribution highlighted higher earnings in urban areas, (above ₹ 60,000 per month), while rural households were concentrated in the lower brackets, with 60 per cent earning below ₹ 30,000.

Table 1. Socio-economic characteristics of consumer respondents

S.No	Particulars	Urban (n=50)	Rural(n=50)
1.	Gender		
A.	Male	14 (28.00)	18 (36.00)
B.	Female	36 (72.00)	32 (64.00)
2.	Age of the sample respondents in years		
A.	<25	6 (12.00)	1 (2.00)
B.	25-35	13 (26.00)	9 (18.00)
C.	36-45	11 (22.00)	17 (34.00)
D.	46-55	19 (38.00)	15 (30.00)
E.	>55	7 (14.00)	8 (16.00)
3.	Education		
A.	Primary School (upto 5)	-	12 (24.00)
B.	Middle School (6-8)	3 (6.00)	15 (30.00)
C.	Secondary School (9-12)	5 (10.00)	14 (28.00)
D.	Degree and above	42 (84.00)	9 (18.00)
4.	Occupation		
A.	Student	3 (6.00)	-
B.	Govt employee	15 (30.00)	9 (18.00)
C.	Labour/Worker	3 (6.00)	11 (22.00)
D.	Housewife	11 (22.00)	9 (18.00)
E.	Farmer	3 (6.00)	13 (26.00)
F.	Private sector employee	12 (24.00)	2 (4.00)
G.	Own business	3 (6.00)	6 (12.00)
5.	Family size in numbers		
A.	< 3	11 (22.00)	11 (22.00)
B.	3 to 5	36 (72.00)	24 (48.00)
C.	6 and above	3 (6.00)	15 (30.00)
6.	Monthly income (₹)		
A.	<10,000	2 (4.00)	8 (16.00)
B.	10000- 30,000	10 (20.00)	22 (44.00)
C.	31,000- 60,000	14 (28.00)	10 (20.00)
D.	60,000-90,000	12 (24.00)	7 (14.00)
E.	>90,000	12 (24.00)	3 (6.00)

Note: Figures in parentheses indicate the percentage of the respective values

Apple consumption pattern

The apples were part of the diet of all respondents (Table 2), but apple-based products were far more common in urban areas than in rural areas. Purchase and consumption were also more frequent in urban households, with 20 per cent buying twice weekly and 28 per cent consuming daily, compared to rural consumers who mostly bought once a month (30%) or occasionally (12%), with only 12 per cent consuming daily. Both groups generally purchased small quantities (0.5-1 kg), though health remained the primary motive for consumption. Quality dominated purchase decisions in both urban (82%) and rural (58%) areas, while 12 per cent of rural respondents prioritized price determinant. In terms of market channels, rural

Table 2. Apple consumption among consumer respondents

S.No.	Particulars	Urban (n=50)	Rural (n=50)
1.	Apples are part of the diet		
A.	Yes	50 (100.00)	50 (100.00)
2.	Apple products are part of the consumption		
A.	Yes	9 (18.00)	2 (4.00)
B.	No	27 (54.00)	36 (72.00)
C.	Few products	14 (28.00)	12 (24.00)
3.	Apple purchase frequency		
A.	Weekly once	26 (52.00)	26 (52.00)
B.	Weekly twice	10 (20.00)	-
C.	Once a fortnight	9 (18.00)	3 (6.00)
D.	Once a month	4 (8.00)	15 (30.00)
E.	On occasion	1 (2.00)	6 (12.00)
4.	Frequency of apple consumption		
A.	Weekly once	7 (14.00)	7 (14.00)
B.	Two to three times a week	26 (52.00)	24 (48.00)
C.	Daily	14 (28.00)	6 (12.00)
D.	Once in a while	3 (6.00)	13 (26.00)
5.	Purchase Volume per Visit		
A.	0.5-1Kg	43 (86.00)	42 (84.00)
B.	Upto 2 Kg	7 (14.00)	8 (16.00)
6.	Primary Consumption Motive		
A.	Health	40 (80.00)	33 (66.00)
B.	Taste	1 (2.00)	5 (10.00)
C.	Both health and taste	9 (18.00)	12 (24.00)
7.	Purchase Determinants		
A.	Quality (size, color& texture)	41 (82.00)	29 (58.00)
B.	Price	-	6 (12.00)
C.	Both quality and price	9 (18.00)	15 (30.00)
8.	Place of purchase		
A.	Local market	19 (38.00)	47 (94.00)
B.	Street fruit vendor	18 (36.00)	3 (6.00)
C.	Superstore	9 (18.00)	-
D.	Both local market and street vendor	4 (8.00)	-

Note: Figures in parentheses indicate the percentage of the respective values

Table 3. Awareness of different value-added products of apples

	Urban (n=50)			Rural (n=50)		
	Aware and consuming	Aware but not consuming	Not aware	Aware and consuming	Aware but not consuming	Not aware
Apple Juice	17 (34.00)	29 (58.00)	4 (8.00)	5 (10.00)	18 (36.00)	27 (54.00)
Apple Drink	9 (18.00)	21 (42.00)	20 (40.00)	6 (12.00)	12 (24.00)	32 (64.00)
Apple Vinegar	7 (14.00)	23 (46.00)	20 (40.00)	-	6 (12.00)	44 (88.00)
Apple Jam	6 (12.00)	19 (38.00)	25 (50.00)	-	9 (18.00)	41 (82.00)
Apple-based Flour/Cereal	5 (10.00)	10 (20.00)	35 (70.00)	3 (6.00)	8 (16.00)	39 (78.00)

Note: Figures in parentheses indicate the percentage of the respective values

consumers relied almost entirely on local markets (94%), while urban buyers used more diverse outlets, including vendors and superstores.

Awareness of different value-added products of apple

The findings highlight that the urban consumers were generally more exposed to such products, though actual consumption remained modest, whereas rural consumers showed very low awareness and minimal usage across all categories (Table 3). Among the different products, apple juice was the most recognized and widely consumed, with 34 per cent of urban respondents reporting both awareness and consumption. In rural areas, more than half (54%) of the rural consumers reported having no awareness of packaged apple juice. Similarly, apple drink was relatively less popular than juice, indicating limited outreach of such products beyond towns. The awareness of apple vinegar was limited overall with 40 per cent in urban areas and 88 per cent in rural completely unaware and none reporting consumption in rural areas. A similar trend was observed for apple jam. Awareness of apple-based flour or cereal was lowest among all products. A large majority (70% urban and 78% rural) were not aware. This shows that such products are at a very nascent stage of consumer acceptance.

Constraints faced by consumers for fresh apples

The urban consumers in Dharwad district faced the major constraint of poor grade apples (Table 4), which indicates substandard grades discourage consumption, likely due to perceptions about freshness, taste and value for money. In contrast, rural consumers ranked the high cost of apple varieties as their top constraint, suggesting that price sensitivity is a more dominant barrier in rural markets. Although expensive apple varieties were also a concern in urban areas (ranked second), especially during the off-season, the issue was more pressing for rural consumers, possibly because higher prices restrict their ability to purchase even moderate quantities of apples. Another important constraint in urban areas was scepticism regarding wax-coated apples. Seasonal gaps in domestic apple supply emerged as another constraint, ranking fourth among urban and fifth among rural consumers. Economic constraints, though least concerning for urban consumers (ranked sixth), were ranked third in rural areas, indicating financial limitations in rural consumers.

Constraints faced by consumers for value-added products

In Dharwad district, the most prominent constraint for both urban and rural consumers regarding apple value-added products was limited awareness, ranked first (Table 5), which might directly impact their willingness or ability to purchase them. In urban areas, the second most important issue was an unwillingness to buy, suggesting a lack of interest, possibly due to unfamiliarity. Lack of product availability emerged as a more critical concern in rural areas (ranked second) compared to urban areas (ranked third), likely reflecting weaker supply chains or market access in village areas. High prices were a more prominent concern for rural buyers (ranked fourth) than urban buyers (ranked sixth).

The study revealed greater female participation in fruit consumption decisions, consistent with the findings of Ionela *et al.* (2022). Urban consumers were generally better educated and had higher incomes, which encouraged dietary diversification, as also noted by Joshi *et al.* (2016), whereas larger family size and lower income levels constrained purchases in rural households. Apple consumption was found to be universal in both the groups. Pawel *et al.* (2025) similarly

Table 4. Consumption constraints on apple consumption among urban and rural consumers

Constraints	Urban		Rural	
	Garrett Score	Rank	Garrett Score	Rank
Poor grade apples	62.11	I	61.35	II
Costly apple varieties	61.07	II	70.04	I
Scepticism over the wax-coated apple	60.59	III	53.00	IV
Seasonal gaps in domesticapple supply	59.56	IV	51.24	V
Limited availability of preferable variety	47.42	V	44.47	VI
Economic constraints affecting purchase	41.04	VI	57.04	III

Table 5. Consumer perceived constraints in apple value-added products

Constraints	Urban		Rural	
	Garrett Score	Rank	Garrett Score	Rank
Limited product awareness	63.71	I	73.70	I
Unwilling to buy	59.53	II	49.67	V
Lack of product availability	58.00	III	62.73	II
Limited product variety	55.06	IV	57.57	III
Taste preferences not met	50.74	V	45.40	VI
Products are expensive	48.76	VI	55.68	IV
Avoidance due to preservatives	36.00	VII	35.57	VII
Low-quality standards	31.47	VIII	33.11	VIII

reported apples as the most preferred fruit among students. Shashank and Hanumantha (2025) reported in the case of chironjiwasconsumed mostly in fruit form by all respondents. However, frequency of consumption differed, with urban households consuming more regularly and emphasizing health and quality, while rural consumers prioritized price, reflecting affordability constraints, in line with Masoumeh and Jennifer (2025) who identified price as a key determinant in apple purchases. Market access also showed variation, as rural buyers relied predominantly on local markets, whereas urban consumers used a wider range of outlets, a pattern similar to Riyanti and Hani (2021), who observed that traditional markets and local merchants were the most preferred sources for apple purchases in Indonesia.

Awareness of value-added products was relatively higher in urban areas, particularly for apple juice, whereas rural awareness remained very limited. Apple flour or cereal was the least recognized product, highlighting adoption barriers that restrict acceptance at the consumer level. Urban consumers reported poor-grade apples and concerns over wax coating as major issues, similar to Umali (2019), who identified high price, unavailability, pesticide residues and health concerns as key barriers to fruit consumption in Sri Lanka. Conversely, rural respondents ranked high prices as their most critical constraint, indicating greater price sensitivity. Seasonal gaps in supply were a common issue for both groups. In the case of processed products, limited awareness emerged as the most significant barrier. Urban consumers additionally expressed unwillingness and taste mismatch, while rural buyers highlighted high cost and lack of availability. Comparable constraints,such as lack of awareness, limited availability, low preference and unacceptable tastewere also reported by Sunil *et al.* (2008) in the context of value-added fish products.

Conclusion

The study highlighted that the apples were part of the diet of all respondents but urban households consumed them more frequently and purchased them through diverse outlets, while rural consumers showed greater price sensitivity and limited access to processed products. Awareness and consumption of apple-based value-added products were higher in urban areas, though modest overall, while rural areas showed minimal awareness and usage, reflecting poor market penetration. Urban consumers were more concerned about quality issues such as poor grading and wax-coating, whereas rural consumers faced affordability challenges and economic limitations, which restricted both fresh apple and value-added product consumption. Across both groups, limited awareness, inadequate availability and lack of product range emerged as major barriers to the acceptance of value-added products. Better consumer awareness, improved supply chains and diversified product offerings could significantly enhance the reach and acceptance of apples and their value-added products in Dharwad district.

References

IMAARC Group, 2024, Indian food processing market. Retrieved from www.imarcgroup.com/indian-food-processing-market.

Indus food, 2024, India apple industry. Retrieved from www.https://indusfood.co.in/article/india-apple-industry.

Ionela M V, Ana C B, Gina F, Liliana B, Florin S, and Elena T, 2022, Mapping the preferences of apple consumption in Romania. *Horticulturae*, 9, 35.

Joshi P K, Shinoj P and Praduman K, 2016, Dynamics of food consumption and nutrient insecurity in India. *Proceedings of the Indian National Science Academy*, 82(5): 1587-1599.

Masoumeh B and Jennifer A, 2025, Exploring the effects of fruit brand names on consumer preferences: A case study of Apple Consumer Behavior. *Journal of Sensory Studies,* 2025; 40:e70035: 1-13.

Ministry of Agriculture and Farmers Welfare (MoAFW), 2021, Retrieved from www.https://agriwelfare.gov.in/en/Annual.

Pawel K, Paulina S, Weronika C and Bozena N, 2025, Fruit consumption habits and apple preferences of University Students in Poland. *Foods*, 14(12): 2073: 1-19.

Priyanka T, Kerur N M, Balachandra K N, Rajshekhar A Y and Venugopal C K, 2024, Export of fruits, vegetables and their products from India- A study on growth rate and instability Index. *Journal of Farm Sciences*, 37(1): 59-63.

Riyanti I and Hani P, 2021, Consumer preference for local apples Malang and imported apples during the Pandemic. *E3S Web of Conferences.*

Shashank H R and Hanumantha M, 2025, Study on utilization pattern and value addition of Buchanania Lanzan Spreng in Banavasi forest range, Uttara Kannada, Karnataka. *Journal of Farm Sciences*, 38(1): 86-89.

SunilS, Arpita S and Shyam S S, 2008, Consumption pattern and consumer preference for value-added fish and fish products in North Zone of India. *Journal of Indian Fish Association*, 35: 19-27.

Umali S H, 2019, Fruit consumption, its determinants and attitudes among undergraduates. *International Journal of Agriculture, Environment and Food Sciences*, 3(1): 50-53.

United States Department of Agriculture, 2024-25, Production: Commodity. Retrieved from www.fas.usda.gov/data/production/commodity.