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CONSUMER VALUE PREFERENCES FOR FRESH TOMATOES IN MAJOR CITIES OF PAKISTAN

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The study determined value preferences of consumers for fresh tomatoes in Karachi, Lahore and Faisalabad – the three major cities of Pakistan. The purpose of the study was to identify tomato quality attributes consumers considered important in their purchase decisions. To this end, a survey of 275 consumers of fresh tomatoes was conducted in the selected cities. Using convenient sampling technique, consumers were approached when they had finished buying vegetables at retail shops in different localities of the selected cities. For conducting face to face interviews, a questionnaire was developed from reviewing related studies and holding brief discussions with consumers. Data were captured on consumption and purchase preferences and consumer importance ratings on various quality attributes of tomatoes. Collected data were analysed using descriptive statistics, analysis of variance and post-hoc tests. Results revealed both similarities and dissimilarities in consumption and purchase preferences for fresh tomatoes in three cities. The study did not find statistically significant differences among consumers in their preferences for most of the experience, safety and marketing attributes. Consumers largely differed in their preferences for search attributes. The study suggests that tomato value chain participants should deliver their produce according to the requirements of their target markets. For delivering fresh, undamaged and unblemished tomatoes, they need to upgrade their production, harvesting and marketing practices and improve collaboration among them. The study also urges related public-sector institutions to consider consumer requirements in designing their support activities because profitability of stakeholders in tomato value chains particularly growers cannot be enhanced without meeting these requirements.
Keywords: Consumer value, tomato value chains, quality attributes, value preferences, major cities, Pakistan.

INTRODUCTION

In Pakistan, tomato crop holds a significant position from the consumption and economic viewpoints. Tomatoes are enriched with vitamin A and C, minerals, sugar and other dietary fibres and hence consumed for both taste and health benefits (Tahir *et al.*, 2012; Adegbola *et al.*, 2018). Fresh tomatoes are widely used as an essential ingredient in the preparation of meals and salad in Pakistan (Mari *et al.*, 2007). The demand for processed tomato products such as ketchup, sauces, puree, dried and canned tomatoes is also gradually rising due to rapid expansion in fast food industry and resulting transformation in food consumption patterns (Tahir *et al.*, 2012).

Value chain profitability depends on how adequately consumer demands are met. Rising income levels and changes in lifestyles have changed choice parameters of consumers in Pakistan as well (Badar *et al.*, 2015).While buying fresh produce, consumers are increasingly paying more attention to food safety and marketing related attributes along with basic quality attributes such as size, shape, colour (Heuvel *et al.*, 2007; Bond *et al.*, 2008). Thus, greater emphasis is being laid on determining value preferences of consumers in terms of quality attributes they look for in fresh produce so that value chain activities can be upgraded accordingly (Adegbola *et al.*, 2018). It is now commonly held belief that businesses operating along the chains cannot increase their profits without adequately meeting requirements of their target consumer markets located in different areas (Heuvel *et al.*, 2007; Oltman *et al.*, 2014).

Value preferences of consumers living in different areas may have similarities as well as dissimilarities due to various socio-economic and cultural reasons (Kotler and Keller, 2016). Value chains actors need to understand these similarities and dissimilarities in preferences of consumers belonging to different areas for tailoring and delivering their produce accordingly. However, they are often constrained because of paucity of such information particularly in developing countries. Pakistan is a typical example where consumer research on vegetables including tomatoes is rare.

Historically, research on vegetables in Pakistan has largely focused on production and postharvest improvements. Value preferences which are the key determinants of consumer purchase decisions regarding vegetables have not been explored. Only Badar *et al.* (2020) assessed consumer preferences for fresh potatoes in Pakistan. Several studies have explored different aspects of value preferences of consumers for tomatoes in other countries (Lê and Ledauphin,

2006; Causse *et al.*, 2010; Martínez-Carrasco *et al.*, 2012; Alamanos *et al.*, 2013; Oltman *et al.*, 2014; Adegbola *et al.*, 2018). However, such consumer research on tomatoes is unavailable in Pakistan.

Without knowing what is valuable for consumers, as argued by O'Keeffe and Fearne (2005) and Taylor and Fearne (2009), the performance of value chains cannot be optimized. Resultantly, not only consumers are unable to get their desired value but also the profitability of value chain participants is lowered. Hence, this study was planned to determine the value preferences of consumers for fresh tomatoes in major cities of Pakistan so that appropriate upgrading measures can be suggested for bringing improvements in the performance of tomato value chains.

MATERIALS AND METHODS

The study is based on consumer survey conducted in Karachi, Lahore and Faisalabad. Being the most populated, these cities are the major consumers of vegetable supplies including tomatoes in Pakistan. For data collection, 100 consumers from each city were interviewed face to face. However, responses of 95 respondents from Karachi, 89 from Lahore and 91 from Faisalabad were found complete and adequate for data analysis. Thus, the study sample comprised 275 consumers of tomato which was large enough to draw valid conclusions because 100 observations are considered sufficient for segmentation purposes (Hair *et al.*, 2010; Adhikari *et al.*, 2012). Using convenient sampling technique, consumers were approached when they had finished buying vegetables at retail shops in different localities of the selected cities. For conducting interviews, a questionnaire was developed from reviewing related studies and holding brief discussions with consumers (Adhikari *et al.*, 2012; Macharia *et al.*, 2013; Badar *et al.*, 2015).

Among three sections of the questionnaire, the first and third captured consumption and purchase preferences and demographic characteristics of the respondents, respectively. The second section was designed for measuring the importance consumers attached to 24 quality attributes on a five-point scale (where 5 = highly important and 1 = not all important). The fresh produce quality attributes are identified as intrinsic and extrinsic. The intrinsic attributes include search and experience attributes and being internal to produce cannot be altered easily without genetic changes (Wirth *et al.*, 2011; Martínez-Carrasco *et al.*, 2012). While safety and marketing-related attributes are considered extrinsic, they can be improved with upgrading of various practices along the value chains (Moser *et al.*, 2011; Badar *et al.*, 2015).

The study included six search (shape, peel colour, large size, freshness, undamaged and unblemished), nine experience (firmness, aroma, ease of peeling, pulp colour, sweet taste, ripeness, shelf-life, juiciness and seed presence), three safety (cleanliness, pesticide and origin) and six market-related attributes (price, retailer cleanliness, packaging, grading, certification and information provision). These quality attributes were identified from related studies (Causse *et al.*, 2010; Oltman *et al.*, 2014; Adegbola *et al.*, 2018). Later, brief discussions with few consumers and experts were held to finalize these attributes in the local context.

Before conducting the survey, the questionnaire was pre-tested with twenty consumers in Faisalabad city and improved accordingly. Collected data were then coded and analysed using statistical software - IBM SPSS Statistics 25. Descriptive statistics such as frequency distribution and cross tabulation helped to explore consumption and purchase preferences and demographic composition of respondents. And, ANOVA, Post-hoc LSD tests revealed similarities and dissimilarities in value preferences of consumers in three cities.

RESULTS AND DISCUSSION

Demographic characteristics: The study sample included both male and female respondents. The percentage of female respondents was relatively higher in Karachi (63.2 percent) and Faisalabad (57.1 percent) compared to Lahore (36.0 percent). Mostly, respondents aged between 21 and 40 years in three cities.

Table 1. Demographic characteristics of respondents (percentage)

Characteristics	Categories	Karachi	Lahore	Faisalabad
Gender	Male	36.8	64.0	42.9
	Female	63.2	36.0	57.1
Age (Years)	Up to 20	12.6	16.9	4.4
	21-30	43.2	37.1	51.6
	31-40	28.4	15.7	18.7
	41-50	14.7	19.1	13.2
	51-60	1.1	11.2	9.9
	Above 60	-	-	2.2
Marital status	Single	60.0	39.3	47.3
	Married	37.9	57.3	52.7
	Other	2.1	3.4	-
Family size (No.)	1-2	13.7	5.6	6.6
	3-4	57.9	80.9	80.2
	>5	28.4	13.5	13.2
Education	No education	2.1	5.6	4.4
	Primary[1]	3.2	20.2	8.8
	Secondary[2]	-	22.5	7.7
	Intermediate[3]	5.3	11.2	18.7
	Graduate	45.3	30.3	31.9
	Post-graduate	44.2	10.1	28.6
Family income (PKR[4]/month)	< 25,000	5.3	31.5	17.6
	25,001-50,000	41.1	31.5	38.5
	50,001-75,000	40.0	13.5	15.4
	75,001-100,000	5.3	15.7	18.7
	> 100,000	8.4	7.9	9.9

Note: [1]Grade 5 equivalent, [2]Grade 10 equivalent, [3]Grade 12 equivalent, [4]Pakistani Rupee (1USD = 155 PKR)

More than half in Lahore and Faisalabad were married while in Karachi majority were single and mostly their families comprised of 3 to 4 family members. In Lahore, respondents had different levels of education. However, graduates and postgraduates in Karachi and Faisalabad were relatively more common. Regarding monthly family income, most of them in three cities belonged to lower- and middle-income levels and a smaller percentage reported their family income above 75 thousand (Table 1).

Consumption preferences: The data in Table 2 indicates the extent of consumer liking of tomatoes. In three cities, majority either somewhat or to a great extent liked to consume tomatoes. A few respondents in Karachi (2.1 percent), Lahore (6.7 percent) and Faisalabad (2.2 percent) did not indicate their liking for tomatoes. A vast majority in these cities liked tomatoes because of taste and associated health benefits. Oltman *et al.* (2014) in their study also found health benefits as a major reason for consumer liking of tomatoes. Few respondents also pointed out easy availability and use of tomatoes as an essential ingredient for cooking food as reasons for their liking.

Table 2. Consumers' liking of tomatoes (percentage)

Liking	Categories	Karachi	Lahore	Faisalabad
Extent	Not at all	2.1	6.7	2.2
	Very little	7.4	18.0	22.0
	Some what	63.2	29.2	41.8
	To a great extent	17.4	46.1	34.1
Reasons	Taste	43.2	48.3	49.5
	Health benefits	49.5	31.5	42.9
	Easy availability	2.1	14.6	4.4
	Essential ingredient of food	5.3	5.6	3.3

The study findings did not reveal significant differences in consumers of three cities in frequency and timing of their tomato consumption. Majority preferred to consume tomatoes daily at launch time. However, consumers differed in their preferred consumption form and quantity. In Lahore, more than 80 percent preferred fresh tomatoes whereas in Karachi and Faisalabad this percentage was 56.8 and 68.1, respectively. Majority in three cities reported their daily family consumption of tomatoes below 200 grams. In Lahore, the respondent percentage with daily family consumption more than 200 grams was comparatively high.

Purchase preferences: In purchase preferences, the study explored purchase frequency and quantity, weekly expenditure, preferred form and preferred retailers (Table 4). The study found same patterns in purchase frequency and daily purchase quantity. A vast majority preferred to purchase tomatoes daily, twice or thrice a week. Most of them preferred buying 1-2 kg tomatoes in one shopping. Nearly one-fourth in Karachi also reported buying more than 2 kg in one shopping. The study revealed statistically significant differences among consumers in three cities in their preferred purchase form, weekly expenditures and preferred retailer (Table 4). Comparatively, a greater percentage (86.5 percent) in Lahore preferred to buy fresh instead of processed tomatoes. Regarding weekly expenditure on tomatoes, more than 70 percent in Karachi and more than half in Faisalabad reported their spending greater than PKR 100. While in Lahore, more than half used to spend less than PKR 100 on buying tomatoes in a week.

In the last few years, presence of modern retailers such as supermarkets and superstores has significantly increased (Ghani, 2005). However, traditional retailers such as roadside shops and street vendors dominate retailing of fruits and vegetables in Pakistan (Badar *et al.*, 2019). The study also found the same. Nearly 98 percent consumers in Karachi, 87.6 percent in Lahore and 90.1 percent in Faisalabad resorted to modern retailers for buying tomatoes.

Table 3. Tomato consumption preferences in three cities

Consumption preferences	Categories	Karachi	Lahore	Faisalabad	Mean Rank	χ^2	*P*-value
Form	Fresh	56.8	80.9	68.1	153.84[a]	12.25	0.00***
	Processed	43.2	19.1	31.9	120.76[b]		
					138.32[c]		
Frequency	Daily	55.8	60.7	48.4	136.25[a]	2.28	0.32
	Twice a week	21.1	20.2	27.5	130.89[b]		
	Thrice a week	22.1	11.2	16.5	146.79[c]		
	Fortnightly	1.1	7.9	7.7			
Time	Breakfast	3.2	7.9	3.3	133.52[a]	3.55	0.17
	Lunch	76.8	69.7	64.8	132.31[b]		
	Evening	2.1	1.1	5.5	148.24[c]		
	Dinner	17.9	21.3	26.4			
Family consumption level (grams/day)	≤100	40.0	36.0	45.1	130.93[a]	4.50	0.10*
	101-200	49.5	33.7	36.3	151.65[b]		
	>200	10.5	30.3	18.7	132.03[c]		

Note: Superscripts [a, b, c] indicates mean ranks for Karachi, Lahore and Faisalabad respectively, ***highly significant ($\alpha \leq 0.01$), **moderately significant ($\alpha \leq 0.05$), *significant ($\alpha \leq 0.10$)

Table 4. Comparative tomato purchase preferences

Purchase preferences	Categories	Karachi	Lahore	Faisalabad	Mean Rank	χ^2	*P*-value
Frequency	Daily	36.8	28.1	14.3	134.46[a]	2.42	0.30
	Twice a week	18.9	23.6	31.9	131.66[b]		
	Thrice a week	25.3	48.3	51.6	147.90[c]		
	Weekly	10.5	-	1.1			
	Fortnightly	5.3	-	1.1			
	Monthly	3.2	-	-			
Quantity	<1	29.5	23.6	22.0	147.72[a]	3.25	0.20
(Kg/shopping)	1-2	47.4	76.4	76.9	131.27[b]		
	>2	23.2	-	1.1	134.44[c]		
Form	Fresh	71.6	86.5	76.9	146.94[a]	6.10	0.05**
	Processed	28.4	13.5	23.1	126.47[b]		
					139.95[c]		
Weekly expenditure on	<50	12.6	43.8	25.3	164.88[a]	20.41	0.00***
tomatoes (PKR)	51-100	15.8	15.7	20.9	114.44[b]		
	101-150	33.7	18.0	33.0	132.98[c]		
	>150	37.9	22.5	20.9			
Preferred retailer	Traditional	97.9	87.6	90.1	129.89[a]	7.20	0.03**
	Modern	2.1	12.4	9.9	143.99[b]		
					140.60[c]		

Note: Superscripts [a, b, c] indicates mean ranks for Karachi, Lahore and Faisalabad respectively, ***highly significant ($\alpha \leq 0.01$), **moderately significant ($\alpha \leq 0.05$), *significant ($\alpha \leq 0.10$)

Preferred tomato quality attributes: The study also captured the importance consumers attached to various tomato quality attributes (Table 5). The ANOVA and Post-Hoc LSD tests exhibited similarities and dissimilarities in consumer preferences for different quality attributes. Except peel colour in search attributes, consumers belonging to three cities differed in their preferences for shape, large size, freshness, undamaged and unblemished. Consumers in Lahore attached relatively more importance to shape and large size. In Faisalabad and Karachi, they accorded more importance to freshness. Jiménez-Guerrero *et al.* (2012) also describe freshness as a fundamental attribute in consumer evaluation of vegetables. Comparatively, consumers in Faisalabad liked to buy undamaged and unblemished tomatoes. On overall basis, consumers in Karachi indicated their greater preferences for fresh, in Lahore for undamaged and in Faisalabad fresh, undamaged and unblemished tomatoes.

Except sweet taste in experience attributes, the study did not find significant differences in consumer importance ratings for firmness, aroma, ease of peeling, pulp colour, ripeness, shelf-life, juiciness, seed presence across three cities. Brumfield *et al.* (1993) also found non-significant impact of colour on consumer purchase pattern of tomatoes in New Jersey. For sweet taste, consumers relatively had greater preference in Faisalabad and Lahore. On overall basis, consumers in Karachi preferred firm and ripe tomatoes. In Lahore, they attached more importance to good pulp colour, sweet taste, longer shelf-life and fewer seed presence. Consumers in Faisalabad considered sweet taste, longer shelf-life and juiciness of tomatoes more important.

In case of safety attributes, consumers in three cities significantly differed in their preferences for cleanliness. Compared to Karachi and Lahore, cleanliness received higher importance rating in Faisalabad. On overall basis, consumers belonging to Faisalabad accorded more importance to other two safety attributes. Regarding marketing attributes, significant differences were not found. Across three cities, the price factor received similar high importance ratings. In Karachi, packaging received relatively greater importance. For consumers, retailer cleanliness, grading, certifications and information provision had marginal importance.

***Conclusion and Recommendations*:** The study findings lead to conclude that tomatoes are widely consumed due to taste and health. The value preferences of consumers in three major cities i.e. Karachi, Lahore and Faisalabad are not the same. They vary in their consumption frequency and timing, preferred purchase form, weekly expenditures and preferred retailer. Except minor difference, consumers in three cities have largely similar preferences for experience, safety and marketing attributes. However, consumers in three cities significantly differ in their preferences for search attributes. In Karachi, they prefer fresh, in Lahore undamaged and in Faisalabad fresh, undamaged and unblemished tomatoes.

The findings highlight important implications for tomato value chain stakeholders. While preparing their produce, they need to consider the requirements of their target markets particularly the search attributes. Fresh, undamaged and unblemished tomatoes can be delivered by upgrading production, harvesting and marketing practices and improving collaboration among value chain participants.

Table 5. Comparative preferences for tomato quality attributes — ANOVA

Attribute type	Attribute	Karachi (*n*=95)	Lahore (*n*=89)	Faisalabad (*n*=91)	F-Value	*P*-Value
Search	Shape	3.84[a]	3.93[a]	3.60[b]	5.20	0.00[***]
	Peel colour	3.98[a]	3.87[a]	3.82[a]	1.37	0.25
	Large size	3.86[ab]	3.95[a]	3.72[b]	2.43	0.09[*]
	Freshness	4.25[a]	3.98[b]	4.34[a]	5.41	0.00[***]
	Undamaged	3.93[a]	4.14[b]	4.44[c]	12.65	0.00[***]
	Unblemished	3.95[a]	3.96[a]	4.27[b]	6.01	0.00[***]
Experience	Firmness	4.02[a]	3.95[a]	3.92[a]	0.47	0.62
	Aroma	3.80[a]	3.94[a]	3.84[a]	1.01	0.36
	Ease of peeling	3.82[a]	3.96[a]	3.80[a]	1.48	0.23
	Pulp colour	3.98[a]	4.05[a]	3.91[a]	0.97	0.38
	Sweet taste	3.82[a]	4.04[b]	4.07[b]	3.97	0.02[**]
	Ripeness	4.00[a]	3.97[a]	3.98[a]	0.02	0.98
	Shelf-life	3.98[a]	4.01[a]	4.07[a]	0.37	0.69
	Juiciness	3.94[a]	3.94[a]	4.04[a]	0.57	0.56
	Seed presence	3.80[a]	4.00[b]	3.96[b]	2.24	0.11
Safety	Cleanliness	4.12[a]	3.88[b]	4.24[a]	5.39	0.00[***]
	Pesticide free	3.92[a]	3.97[a]	4.08[a]	1.10	0.33
	Origin	4.03[a]	3.91[a]	4.00[a]	0.67	0.51
Marketing	Price	4.02[a]	4.02[a]	4.02[a]	0.00	1.00
	Retailer cleanliness	3.96[a]	3.88[a]	3.99[a]	0.53	0.59
	Packaging	4.04[a]	3.86[b]	3.93[a]	1.41	0.25
	Grading	3.86[a]	3.85[a]	3.92[a]	0.27	0.76
	Certifications	3.98[a]	3.78[b]	3.86[ab]	2.11	0.12
	Information provision	3.83[a]	3.84[a]	3.89[a]	0.20	0.81

Note: Alphabets in superscript indicate results of Post-Hoc Tests (Fisher's least significance difference LSD test). The same letters in each column in a row indicate that consumers in a particular city against that specific attribute are not significantly different at α=0.05, Cronbach's Alpha= 0.871, [***]highly significant (α ≤0.01), [**]moderately significant (α ≤0.05), [*]significant (α ≤0.10).

Efforts should be made to avoid those practices which can cause damages and blemishes. During postharvest handling, transportation, loading and unloading, extra care is needed to avoid any internal and external damages. Labour training can greatly contribute in avoiding damages and blemishes to tomatoes.

Freshness can be maintained either through better storage facilities or reducing the time between the production and consumption time. Findings also confirm that consumers' choice parameters have also broadened in Pakistan. Like other countries, they also consider several search, experience, safety and marketing attributes in their vegetable purchase decisions. Alongside growers, other value chain actors particularly retailers equally need to understand this change and align their practice accordingly.

The finding can be useful to public-sector institutions related to vegetables. While designing their support activities, they need to give due consideration to consumer value preferences because profitability of stakeholders in tomato value chains cannot be increased without meeting consumer requirements. The research institutes need to focus on improving quality attributes desired by consumers in their programs. Extension institutions should also help growers in aligning their produce with requirements of consumers in different markets.

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