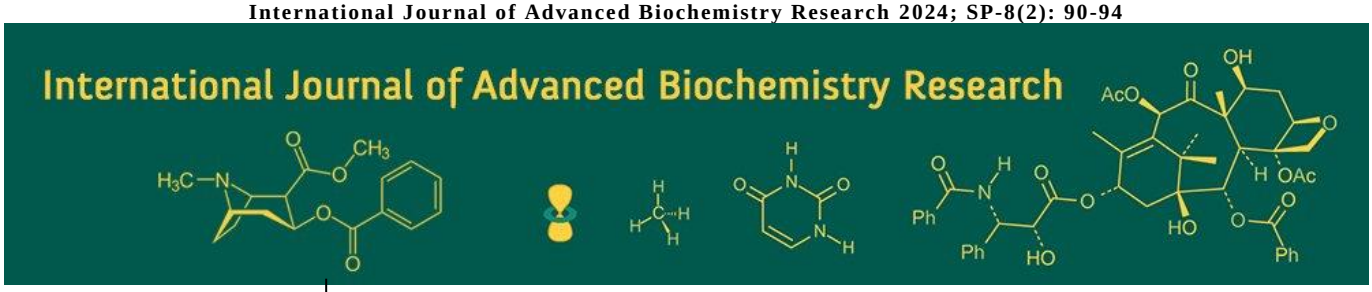

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Consumer perception and attitude towards meat quality and safety in Srinagar city of Jammu and Kashmir, India

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Abstract
In 2019, a survey was conducted in Srinagar, Jammu and Kashmir, to understand people's awareness, buying habits, and perceptions about meat quality, safety, regulations, and contamination. The study covered all 35 administrative wards of Srinagar city, with 245 respondent families randomly selected. The major findings of the study reveal that all the respondents consumed at least one type of meat (mutton/carabeef/poultry). Colour and taste turned out to be the most preferred sensory qualities with respect to consumption of meat and meat products respectively while aversion was found highest for fat marbling. It was found that among the various socio-economic variables only income of meat-consuming households was found to be highly and positively correlated with the sensory attributes like colour and smell. A good percentage of households preferred butcher's home (sheep and buffalo) and retail shops (poultry) as a place of slaughter while slaughterhouses were preferred by a very little number of people. Besides this, it was noted that people could always assess the spoilage in meat/meat products by use of senses while for adulteration they could never assess the same. There was reduced consumption of meat during disease outbreaks in affected species. Further, it was seen that there was a significant relationship ($p<0.05$) between the quality consciousness towards consumption of meat and meat products with meat consuming households in Srinagar city. The result of the current study necessitates stringent food safety and quality measures to cater to the increased consumer demand for meat and meat products that can ensure the well-being of people at a reasonable price.

Keywords: Households, meat, meat products, quality consciousness, sensory qualities, Srinagar city

Introduction
Meat refers to the edible flesh of animals, obtained through systematic slaughtering methods. Comprising mainly muscle tissue and varying amounts of connective, epithelial, and nervous tissues, meat is a significant source of proteins, vitamins, minerals, micronutrients, and fats (Sharma, 2011) [12]. In many Indian households, meat and its derivatives are integral to the daily diet, and consumer preferences for food, particularly meat, are evolving (Waghamare *et al*., 2021) [14]. Several factors influence meat consumption, such as increased disposable income, urbanization, demographic shifts, improved transportation, and consumer perceptions related to quality and safety (Kiran *et al*., 2017) [5]. Consumers consider aspects like nutritional value, convenience, and health impact when accepting meat, alongside factors such as safety assurance, quality, trustworthiness, animal welfare, and convenience (Wu and Xiao, 2013; Liang *et al*., 2014; Zhang *et al*., 2014) [15, 6, 17]. Presently, global changes in lifestyle and consumer attitudes towards food quality are becoming more uniform. In both developed and developing countries, consumers prefer high-quality, reasonably priced meat and meat products that contribute to their well-being (Dacinia *et al*., 2020) [2]. Health-conscious individuals in urban areas are willing to pay a premium for quality meat (Slorach, 2006) [13].

Srinagar, the summer capital of the Jammu and Kashmir region, boasts a diverse population with varying socio-economic backgrounds and significant urbanization. This setting offers an excellent opportunity to examine trends in meat consumption behavior and quality awareness among consumers in this region. Despite the considerable interest from scholars, market analysts, and economists in understanding consumers' new eating habits, there have been limited efforts to study these habits among the population of Srinagar.

Against this backdrop, the study aimed to explore the preferred quality parameters of meat among households in Srinagar city. The survey's findings are expected to guide policymakers in the meat sector to implement programs addressing food safety concerns and conduct research and development to meet consumer demands and preferences, ensuring access to high-quality meat for the public.

Materials and Methods

The research took place in the Srinagar district of Jammu and Kashmir, using an ex-post-facto and exploratory research design. According to the Srinagar Municipal Corporation (SMC), Srinagar city is divided into 4 zones and 35 administrative wards. The study was purposefully conducted in all administrative wards of the city. Seven households were randomly selected from each ward, totaling 245 households. One member from each household was interviewed. The data collection occurred in May 2019 using a pre-tested interview schedule. The collected data underwent statistical analysis, and the results were presented accordingly. Before the study, a pre-interview revealed that 99.5% preferred mutton, 39.59% preferred carabeef, and 100% preferred poultry out of the 245 households. A well-structured interview schedule, developed with expert consultation, was used for data collection. The gathered data were coded, tabulated, and statistically analyzed using Spearman's Rank correlation to understand the correlation between socio-economic variables and meat quality preferences.

Results and Discussion

A general profile of respondents

A significant portion of the participants (60.00%), representing the households chosen for the study (Table 1), resided in nuclear families with an average family size ranging from 5 to 7 members. Comparable findings were observed by Rajgopal and Ajitkumar (2010) [14] in their research area, where they noted an average family size of 5.9, slightly higher than the 5.01 observed in the current study. The primary source of livelihood for most respondents was business, with an annual income falling in the range of Rupees 360001-650000, and an overall average income of Rs 409,665.30±239,548.69 per annum. Rao *et al.* (2017) [9] reported similar results in their study. When analyzing income data, statistical analysis indicated no significant difference ($p<0.05$) among the different zones of the city.

Table 1: Distribution of respondents as per their socio-economic characteristics

Socio economic variable	Zones				Total=245
	Zone I	Zone II	Zone III	Zone IV	
i. Family type					
Joint	24 (42.86)	26 (41.27)	24 (42.86)	24 (34.29)	98 (40.00)
Nuclear	32 (57.14)	37 (58.73)	32 (57.14)	46 (65.71)	147 (60.00)
ii. Family size (in no's)					
Small (2-4)	21 (37.50)	27 (42.86)	25 (44.64)	23 (32.86)	96 (39.18)
Medium (5-7)	32 (57.14)	31(49.21)	27 (48.21)	43 (61.43)	133 (54.29)
Large (8 & above)	3 (5.36)	5 (7.94)	4 (7.14)	4 (5.71)	16 (6.53)
Mean± SD	4.94±1.60	5.06±2.01	4.94±1.66	5.07±1.03	5.01±1.64
iii. Primary family occupation					
Agricultural farming	2 (3.57)	3 (4.76)	0 (0.00)	4 (5.71)	9 (3.67)
Business	29 (51.79)	31 (49.20)	28 (50.00)	21(30.00)	109 (44.49)
Govt. service	18 (32.14)	22 (34.92)	20 (35.71)	39 (55.71)	99 (40.41)
Caste occupation	4 (7.14)	4 (6.35)	5 (8.93)	2 (2.86)	15 (6.12)
Others	3 (5.36)	3 (4.76)	3 (5.36)	4 (5.71)	13 (5.31)
iv. Average annual income (Rs)					
Less (up to 360000)	25 (44.64)	24 (38.10)	24 (42.86)	21 (30.00)	94 (38.37)
Moderate (360001-660000)	17 (30.36)	31 (49.21)	23 (41.07)	35 (50.00)	106 (43.27)
High (> 660000)	14 (25.00)	8 (12.70)	9 (16.07)	14 (20.00)	45 (18.38)
Mean± SD	411642.85 ± 263164.82	396952.38± 221419.13	391928.57± 250350.72	433714.28± 229594.29	409665.30± 239548.69

(Figures in parenthesis indicate percentage)

Sensory qualities of meat and meat products preferred by households: The survey asked participants about their preferred sensory qualities when it comes to meat and meat products, and the responses are summarized in Table 2. The results showed that when purchasing meat, the majority of households (80.81%) considered color as the most important sensory quality. Color is often the first aspect consumers use to judge the freshness and overall quality of meat. These findings align with Xazela *et al.* (2017) [16], who also observed that consumers prioritize the color of meat when making purchase decisions. In terms of specific preferences, consumers in meat-consuming households expressed a preference for bright-cherry red color in carabeef, brick red color in lamb, and pink color in chicken, although there was noticeable variation in preferences. On the other hand, when it comes to cooked meat products, taste emerged as the top priority for a significant percentage (86.53%) of households, followed by consideration of color. This suggests that the population places a higher reliance on their taste preferences when it comes to cooked meat products. Interestingly, there was a notable aversion (anti-preference) for fat marbling, which is the visible fat within the muscle structure, influencing flavor, juiciness, and tenderness. The majority (24.08%) of households expressed an anti-preference for fat marbling, possibly due to concerns about its association with health issues. While some individuals still appreciate fat marbling for its taste, the overall trend seems to be shifting towards leaner meat in response to health concerns. Statistical analysis indicated a significant difference ($p<0.05$) in the preferred sensory qualities among meat-consuming households in Srinagar city, Jammu & Kashmir.

Table 2: Distribution of households as per their preferred sensory qualities of meat and meat products (n=245)

Item	Sensory quality	Preferred	Not preferred	Aversion (Anti)
Meat	Colour	198 (80.81)	47 (19.18)	0 (0.00)
	Smell	111 (45.30)	134 (54.69)	0 (0.00)
	Fat marbling	48 (19.59)	138 (56.32)	59 (24.08)
	Leanness	126 (51.42)	88 (35.91)	31 (12.65)
Meat products	Colour	198 (80.81)	47 (19.18)	0 (0.00)
	Smell	111 (45.30)	134 (54.69)	0 (0.00)
	Taste	212 (86.53)	33 (13.46)	0 (0.00)
	Tenderness	144 (58.77)	78 (31.84)	23 (9.39)
	Juiciness	152 (62.02)	93 (37.95)	0 (0.00)

(Figures in parenthesis indicate percentage)

Correlation of preferred sensory qualities for meat and meat products among households with socio-economic variables

In our study that examined relationships, we used statistical testing, specifically Spearman's Rank correlation, to analyze the data. The goal was to understand the correlation between various socio-economic factors and the preferences for sensory qualities in meat and meat products. The results (Table 3) showed a significant and positive correlation only between the income of households that consume meat and sensory attributes like color and smell. This indicates that families with higher incomes tend to prefer meat with specific color and smell, as their better economic status allows them to choose among different varieties. However, when it comes to the other socio-economic factors, there was no notable impact on the preferred sensory qualities of meat and meat products among households. It appears that these variables do not significantly influence the sensory attributes of meat. Once again, the broader society seems to act as a cohesive unit, with shared sensory preferences, when deciding on the consumption of meat and meat products, showing minimal diversity.

Table 3: Distribution of households as per the correlation of preferred sensory qualities with their socio-economic profile

Socio economic variable	Spearman's rank correlation coefficient of preferred sensory qualities for meat and meat products among the households						
	Meat				Meat products		
	Colour	Smell	Fat marbling	Leanness	Taste	Tenderness	Juiciness
Family type	.035	.009	.050	-.034	.115	.027	.072
Family size	-.013	.136	-.032	.047	-.098	-.026	-.063
Occupation	-.016	.034	.015	.000	-.013	-.026	-.028
Income	.381**	.182**	.113	.018	.027	.048	.048

*significant at 5% level of significance, **significant at 1% level of significance

Preference for place of slaughter, dressing, and packaging of meat of different species among the consuming households: The findings from Table 4 indicate that the majority (93.03%) of households prefer to have sheep, goat, and buffalo slaughtered at the butcher's home, while about 97.55% opt for retail shops for poultry slaughter. This preference is primarily due to customer convenience, making the process hassle-free. Poultry, being smaller, is easier to handle for slaughter at retail shops compared to larger animals. Additionally, the limited availability of slaughterhouses in Srinagar contributes to these preference patterns. People are also health-conscious and prefer the slaughter to occur in their presence to ensure the meat comes from a healthy bird. In terms of meat dressing preferences, all households consuming mutton, chevon, and carabeef prefer dressed meat. For poultry, the majority (71.84%) prefer dressed chicken, while the remaining (28.10%) do not favor it, likely because dressing animals requires significant effort on the part of the consumer, making it cumbersome. The results further show that a majority (49.59%) prefer paper bags for packaging mutton and chevon, polythene bags for carabeef, and laminated foil packaging for poultry. The choice of packaging material seems to be based on convenience and availability in the markets.

Statistical analysis demonstrated a significant difference ($p<0.05$) among all variables for households that consume meat in Srinagar city.

Table 4: Distribution of consuming households as per their preference for place of slaughter, dressing and packaging of meat

Preference for	Sheep (Consumed=N=244)	Buffalo (Consumed=N=97)	Poultry (Consumed=N=245)
Place of slaughter			
At retail shops	12 (4.91)	0 (0.00)	239 (97.55)
At slaughter houses	5 (2.04)	0 (0.00)	0 (0.00)
At butcher's home	227 (93.03)	97 (100)	6 (2.44)
Preference of dressing			
Yes	244 (100)	97 (100)	176 (71.84)
No	0 (0.00)	0 (0.00)	69 (28.16)
Preferred packaging material for meat bought			
Polythene bags	95 (38.78)	71 (73.19)	78 (31.84)
Paper bags	121 (49.59)	24 (24.74)	59 (24.08)
Wrapped in laminated foils	26 (10.61)	0 (0.00)	108 (44.08)
Overwrap in own basket	2 (0.82)	2 (2.06)	0 (0.00)

(Figures in parenthesis indicate percentage)

Assessment of spoilage and adulteration in meat and meat products at the household level

After talking to the participants, it was evident (Table 5) that people were well-informed about the impact of spoiled meat and meat products on health. A strong inclination towards fresh meat was expressed, with approximately 81.63% being able to identify spoilage using their senses, primarily through smell, followed by touch, color, taste, and rarely through laboratory testing. These results align with Rao *et al*.'s (2017) [9] findings in Andhra Pradesh, where people could detect spoilage through similar sensory methods. This highlights the considerable experience and awareness of quality among households. When it comes to assessing the adulteration of meat/meat products, an overwhelming majority could not detect it using smell (93.06%), color (60.81%), taste (62.85%), touch (97.55%), and even laboratory testing (100%). These findings differ from those reported by Reddy and Raju (2010) [11] but are consistent with the opinions of consumers in developed nations like Germany (Becker *et al*., 1997) [1], who considered themselves incapable of identifying adulteration solely through senses or other methods.

Statistical analysis showed a significant difference ($p<0.05$) in the assessment of spoilage and adulteration in meat and meat products among the selected households.

Table 5: Distribution of households as per their assessment of spoilage and adulteration in meat and meat products. (n=245)

Assessment by use of		Always	Sometimes	Never
Smell	Spoilage	200 (81.63)	36 (14.69)	9 (3.67)
	Adulteration	0 (0.00)	17 (6.93)	228 (93.06)
Touch	Spoilage	105 (42.86)	88 (35.92)	52 (21.22)
	Adulteration	0 (0.00)	6 (2.45)	239 (97.55)
Colour	Spoilage	167 (68.16)	58 (23.67)	20 (8.16)
	Adulteration	14 (5.71)	82 (33.46)	149 (60.81)
Taste	Spoilage	199 (81.22)	42 (17.14)	4 (1.63)
	Adulteration	38 (15.51)	53 (21.63)	154 (62.85)
Laboratory testing	Spoilage	0 (0.00)	3 (1.22)	242 (98.77)
	Adulteration	0 (0.00)	0 (0.00)	245 (100)

(Figures in parenthesis indicate percentage)

Meat consumption behavior during disease outbreak among the meat animals/birds

Participants were inquired about their meat consumption habits during disease outbreaks in animals (as shown in Table 6). The majority mentioned that they avoided consuming only the meat from the affected species, while a significant portion of households abstained from all animal/bird-origin products during such events. These findings are somewhat consistent with the observations of Huang *et al*. (2014) [3] and Ramdurg *et al*. (2007) [8], who noted a decline in the consumption of chicken and eggs by individuals and bulk consumers due to concerns about bird flu. However, Rathod *et al*. (2011) [10] reported different observations, stating that most consumers did not hesitate to consume meat during a bird flu outbreak. The behavior observed in this study may be attributed to the local awareness of the adverse health effects associated with consuming meat from diseased animals/birds. Statistical analysis indicated a significant difference ($p<0.05$) in meat consumption behavior during disease outbreaks among the selected households in Srinagar city

Table 6: Distribution of households as per their meat consumption behavior during disease outbreak among meat-producing animals/birds

Species	Meat consumption behavior during a disease outbreak		
	No change in consumption pattern	Avoid everything of animal origin	Avoid consumption of meat only
Sheep (N=244)	32(13.06)	34 (13.87)	178 (72.65)
Buffalo (N=97)	17 (6.93)	24 (9.79)	56 (22.85)
Poultry (N=245)	12 (4.89)	47 (19.18)	186 (75.92)

(Figures in parenthesis indicate percentage)

Conclusion

The overall findings provide insights into future strategies for meat scientists in Jammu and Kashmir to address consumer needs and enhance food safety measures. It was observed that the majority of households prefer butcher's homes for sheep and buffalo slaughter and retail shops for poultry, with only a small number opting for slaughterhouses. This emphasizes the need to enhance the role of slaughterhouses in a more scientific manner for hygienic meat production with improved control and surveillance. Furthermore, a significant portion of respondents relies on their senses to detect spoilage in meat/meat products, while the majority cannot assess adulteration. These observations indicate a lack of knowledge among households in Srinagar when it comes to evaluating the quality of meat using various methods at the household level. This highlights the importance of comprehensive efforts from relevant agencies and stakeholders to address this knowledge gap.

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