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Study on food safety awareness and its correlation with socioeconomic factors of consumers in Nagpur city, Maharashtra

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Abstract

A survey (sample size of 400) was conducted using a proportionate random sampling method. A bilingual (Marathi and English) questionnaire comprising questions related to consumer preferences, awareness of consumers regarding the type of meat and hygiene and expenses they incurred on meat and meat products was designed. This study aimed to investigate the actual level of food safety knowledge of consumers and its correlation with socioeconomic factors that are responsible for shaping the food safety mindset of consumers. The majority of the respondents (65.2%) were unaware of the Food Safety and Standards Act (FSSAI) in meat production. The majority of the consumers (80.8%) were unaware of the FSSAI registration or HACCP certification of meat shops from where they purchased meat. The results indicated that most of the respondents (75%) were unaware of animal welfare issues for the slaughter of animals by a humane method.

Keywords: Meat shops, food safety, awareness, foodborne illness, consumers

Introduction

Consumer decisions and purchasing power drive food systems; thus, consumers play a critical role in any effective food safety system. Consumer demand and preference for meat have increased in metro cities in Maharashtra. The major factors influencing such an increase are economic growth, urbanization, and improved income levels of a growing middle class. Food safety is of crucial importance to the consumer, food industry and economy. Food contamination creates an enormous social and economic burden on communities and their health systems. Food and Agriculture Organization (FAO) and World Health Organization (WHO) provide strict guidelines and regulations, for food processing, handling and consumption. In India Government has its own governing body the Food Safety and Standards Authority of India (FSSAI), which also supervises food safety and provides regulatory standards for food production. Despite many regulations and guidelines, the incidences of food-borne illness continue to prevail. The high prevalence of foodborne illness at home could be attributed to poor food hygiene and preparation due to poor awareness of proper practices.

Food safety assurance of meat requires a concerted effort throughout the value chain to ensure microbial contamination and proliferation are adequately restricted by implementing appropriate food control strategies. When food is unsafe, nutritional benefits are lost. More so, unsafe foods resulting in diarrhoeal diseases have additional consequences including nutrient loss, malabsorption, loss of appetite and reduced immunity to other diseases. That includes consumers, who are at the tail end of food value chains. Consumer perception of food safety, and food safety factors considered in choosing food products can either mitigate or increase the risk of foodborne illnesses. Information on consumer food safety behaviour and how these may influence consumer exposure to food safety hazards through meat consumption in Nagpur city is limited. An enhanced understanding of the social, scientific, and technological factors that influence meat safety is important to drive the development of appropriate interventions to support food safety efforts and reduce public health risks from meat consumption.

The present study is being conducted to assess the awareness, knowledge and practice of food safety among the urban population in Nagpur city of Maharashtra state.

Materials and Methods

The study was conducted in Nagpur, the sub-capital city of Maharashtra, India. The city lies on the Deccan Plateau of the Indian subcontinent and has a mean altitude of 310.5 meters above sea level. As of the 2011 census, Nagpur City had a population of 2,405,665. Nagpur is the third largest city and an important economic centre of the Vidarbha region of Maharashtra. The city has shown enhanced industrial development that was augmented by quick urbanization. This resulted in a rise in the number of people earning varied incomes living in these cities. A citizen living in Nagpur city has the combined advantage of having access to different consumer goods and fresh meat and meat products since ample meat and meat products are produced in areas adjoining the city. The survey's sample size of 400 respondents was taken by dividing Nagpur city into four zones, using a proportionate random sampling method. The pertinent data was gathered from the respondents to fulfil the research objectives. A bilingual (Marathi and English) questionnaire/interview schedule comprising questions related to socio-economic and educational particulars of the consumers, meat consumption patterns and factors influencing meat consumption. The researcher personally interviewed the respondents to gather the data by employing

a structured interview format. During the interview, the researchers also had an opportunity to evaluate the quality of opinions, knowledge and choices of the respondents about varied meat and meat products. Photography, interviews and questionnaires were the main data collection tools.

Statistical analysis: The data obtained through survey forms were recorded, tabulated, and analysed statistically using IBM Statistical Package for Social Science (SPSS) and Microsoft Excel. The responses were grouped and presented in the form of frequencies and percentages.

Results and Discussion

Socio-economic and educational background

The socioeconomic and educational background of the respondents has been presented in Table 1. The gender of the majority of respondents was male (86.2%), and female respondents were 13.8%. However, there was a highly significant ($p < 0.05$) variation in the gender population in Nagpur city. Similar findings were observed by Waghmare *et al.* (2021) [15], who reported that 89.12% of males were consumers in an online survey conducted in Maharashtra. Moreover, Gossard and York, (2003) [6] found that some factors associated with gender, age, place of residence (Urban or Rural), eating habits and social status of consumers affect meat consumption preference and amount of consumption.

Table 1: Socioeconomic and educational background of the respondents

Serial Nu.	Options	Total	P-Value
1	Gender		0.002**
	Male	345 (86.2%)	
	Female	55 (13.8%)	
2	Age group		0.145
	15-30	210 (52.5%)	
	31-45	124 (31.0%)	
	46-60	58 (14.5%)	
	61 & above	8 (2.0%)	
3	Head of Family		0.215
	Male	378 (94.5%)	
	Female	22 (5.5%)	
4	Type of Family		0.381
	Nuclear	307 (76.8%)	
	Joint	93 (23.2%)	
5	Frequency of meat consumption		0.171
	Once in week	201 (50.3%)	
	Twice in week	122 (30.5%)	
	Daily	8 (2.0%)	
	Occasionally	69 (17.2%)	
6	Mode of accommodation		0.536
	Own	182 (45.5%)	
	Rent	160 (40.0%)	
	Ancestral Property	58 (14.8%)	
7	Prefer meat from young or adult animal		0.056
	Up to Primary school	2 (0.5%)	
	Less than high school	3 (0.8%)	
	Equivalent to high school:	42 (10.5%)	
	Technical school:	23 (5.8%)	
	College dropout:	15 (3.8%)	
	College graduate:	143 (35.8%)	
Post graduate:	26 (6.5%)		

	Professional:	137 (34.3%)	
	Others specify	8 (2.0%)	
8	Family Income		0.000**
	< 2 lakhs	56 (14.0%)	
	2 - 4 lakhs	61 (15.2%)	
	4 - 6 lakhs	111 (27.8%)	
	> 6 lakhs	172 (43.0%)	

Value in the parenthesis indicates the percentage of the response (n=400)

* $p < 0.05$ - The mean difference is significant at a 5% level

** $p < 0.01$ - The mean difference is significant at a 1% level

The age group of the majority of respondents is from the age group 15-30 years (52.5%), followed by 31-45 years (31.0%) and 46-60 years (14.5%). The major advantage of the current study group is that most respondents were from the young (15-30 years) and middle age groups (31-45 years), respectively, which make up a significant group of the population having a huge impact on the consumption and purchase of meat and meat products. Among all respondents, 94.5% of men were heading the family showing male dominance, whereas only 5.5% of female respondents were head of the family. In Indian conditions, majority of females are involved in household work and restricted only to cooking, whereas meat purchasing activities are handled by males (Kiran *et al.* 2018)^[7].

Most respondents in Nagpur city were from the nuclear family (76.8%), while only 23.2% were from joint families. The results were well supported by Talukder *et al.* (2020)^[14], who reported the presence of nuclear families in most consumers in North Indian cities. Among the respondents, 45% of them own their homes, whereas 40% live in rented houses, and only 14.5% live in ancestral property.

Regarding the educational background of respondents, most were college graduates (35.8%), whereas 34.3% had professional education. In all, only 6.5% of respondents had a postgraduate degree. The findings were parallel with Reddy and Raju (2010)^[9], who reported that the majority of urban consumers (75%) in Hyderabad were either graduates or postgraduates.

About 43% of the respondents reported having a family income of more than 6 lakhs, followed by 4-6 lakhs (27.8%), 2-4 lakhs (15.2%) and less than 2 lakhs (14%). However, there was a significant variation ($p < 0.05$) in family income in Nagpur city.

Consumer awareness and hygiene considerations regarding meat

The analysed data on consumer awareness and hygiene considerations regarding meat in and around Nagpur city has been depicted in Table 2. Most respondents (66.3%)

reported that the meat (goat/sheep meat/poultry/pork) was purchased from the shop, as against 33.7% of consumers who think the meat was not processed hygienically. The finding was in line with earlier findings of Raju and Suryanarayana (2005)^[5], Singh *et al.* (2019)^[10] and Waghmare *et al.* (2021)^[15], who reported that nearly 42.78% of consumers were concerned about the meat retail shop's cleanliness and hygienic condition when they buy non-vegetarian products. This shows that consumers are concerned about food safety but unaware of the quality guidelines and standards. In contrast to the present finding, Bafanda *et al.* (2017)^[1] reported that fewer consumers are concerned about the hygienic processing, slaughtering, and dressing of healthy animals in Jammu.

Results show that most consumers (61.6%) marked frozen packed food as stale and unsafe. The present findings were in accordance with the findings of Singh *et al.* (2019)^[10], who reported that 60.0% of consumers thought frozen pack meat was stale/unsafe. Similarly, Chandirasekaran *et al.* (2021)^[4] reported that out of 120 respondents, no one prefers frozen meat in Madurai.

In the query regarding knowledge that poultry's age affects the meat taste, 61.2% of respondents were unaware of the age group of poultry affecting the taste of meat. However, there was a significant variation in consumers of different zones regarding the awareness effect of the age of poultry on meat taste. The finding agrees with Singh *et al.* (2019)^[10], who reported that most consumers (58.50-68.0%) were unaware that the age of poultry affects the taste of meat and cannot judge broiler or spent hen meat by tasting it.

The majority of the respondents (65.2%) were unaware of the Food Safety and Standards Act (FSSAI) in meat production. It might be due to the fact that most respondents lack knowledge about food safety and quality guidelines for food. The results agreed with the findings of Singh *et al.* (2019)^[10], who reported unawareness of 53.5-75% of respondents from the entire four zones in Ludhiana. Kiren *et al.* (2018)^[7] indicated that only 37.7% of respondents were aware of FSSAI and its role in Southern India.

Table 2: Consumer awareness and hygiene considerations regarding meat

Serial Nu.	Options	Total	P-Value
1	Do you think Chevron/Poultry/Pork you consume is hygienically processed?		
	Yes	264 (66.3%)	0.08
	No	134 (33.7%)	
2	Do you think frozen packed meat is stale/unsafe?		
	Yes	244 (61.6%)	0.218
	No	155 (38.4%)	
3	Do you have any knowledge about the age group of poultry affecting the taste of meat?		
	Yes	155 (38.8%)	0.012*
	No	245 (61.2%)	
4	Are you aware of Food Safety and Standards Act (FSSAI) in meat production?		
	Yes	139 (34.8%)	0.015*
	No	261 (65.2%)	

5	Do you think the shop/ retail outlet from where you purchase meat is FSSAI registered or HACCP Certified?		
	Yes	77 (19.2%)	0.39
	No	323 (80.8%)	
6	Do you think proper cooking at home kills all the pathogens in meat?		
	Yes	311 (77.7%)	0.809
	No	89 (22.3%)	
7	Are you aware of Animal Welfare issues for slaughter like humane slaughter?		
	Yes	100 (25.0%)	0.659
	No	300 (75.0%)	
8	Do you prefer to consume meat from road side vendors?		
	Yes	170 (42.5%)	0.001**
	No	230 (57.5%)	
9	Are you satisfied with the hygiene conditions adopted meat road side vendors?		
	Yes	91 (22.7%)	0.29
	No	309 (77.3%)	

Value in the parenthesis indicates the percentage of the response (n=400)

* $p < 0.05$ - The mean difference is significant at a 5% level

** $p < 0.01$ - The mean difference is significant at the 1% level

The majority of the consumers (80.8%) were unaware of the FSSAI registration or HACCP certification of meat shops from where they purchased meat. This unawareness was in consumers of the entire zone (75% to 84%), with non-significant variation among the zones. The findings were in parallel with Kiren *et al.* (2018)^[7] and Waghmare *et al.* (2021)^[15], who reported that about 85.4% and 85.49% of consumers in Southern India and Maharashtra, respectively, were unaware of whether the meat-selling shops where they buy non-veg were registered with FSSAI or not. Singh *et al.* (2019)^[10] found that 60-84.5% of shops/retail outlets where they purchase meat were not FASSI registered or HACCP certified in Ludhiana city. These findings corroborate with Suresh (2016)^[13], who reported that meat purchases from registered meat shops were relatively low at 22% and 20% in Delhi and Hyderabad, respectively. Bafanda *et al.* (2017)^[1] observed that very few respondents enquired about the license of the shop and meat inspection reports.

In the query regarding whether traditional cooking kills all the pathogens in meat, it was observed that 77.7% of participants opined that proper meat cooking at home kills all the pathogens. These findings might be due to mass campaigns and awareness programs conducted by the government and media during an avian flu outbreak. The findings were commensurate with the earlier findings of Kiran *et al.* (2018)^[7], who reported that traditional cooking practices in India destroy most meat-borne pathogens. Similarly, Singh *et al.* (2019)^[10] reported that 61.0-92.0% of consumers think proper home cooking kills all pathogens.

The results indicated that most of the respondents (75%) were unaware of animal welfare issues for the slaughter of animals by a humane method. This unawareness was recorded in the entire zone (73-79%) of Nagpur city with non-significantly ($p > 0.05$) variation. The results were well supported by the earlier finding of Waghmare *et al.* (2021)^[15], who reported that about 68.59% of consumers preferred chicken carcasses to be slaughtered by any ritual method.

Lower findings than the current study recorded by Singh *et al.* (2019)^[10], who reported that 46.50%-57.0% of respondents were unaware of the slaughter of animals by a humane method in all four zones of Ludhiana. Contrary to current findings, Suresh (2016)^[13] and Chandirasekaran *et al.* (2021)^[4] reported that most respondents (81.91% and 100%, respectively) prefer to buy fresh meat from roadside meat shops.

The results indicated that 42.5% of consumers in the city preferred roadside vendors for meat purchases. In all, 57.5% of consumers had a negative preference for meat from roadside vendors. Current findings align with Singh *et al.* (2019)^[10] found negative preference in 81.5-88.5% of consumers for people show for meat from roadside vendors in Ludhiana. In contrast, most respondents (77.3%) were dissatisfied with the hygienic conditions adopted by roadside vendors. These findings were in accordance with the earlier finding of Durmus *et al.* (2012)^[5], who reported dissatisfaction of 61% of participants since poultry meat production was not inspected adequately in Turkey. Singh *et al.* (2019)^[10] reported that the respondents (68.50-88.50%) from all four zones of Ludhiana were not satisfied with the hygienic conditions adopted by roadside vendors. However, Waghmare *et al.* (2021)^[15] reported that only 42.78 percent of consumers weren't satisfied with the hygienic conditions and cleaning practices adopted by meat shops in Maharashtra.

These results were well supported by the findings of Srinivas *et al.* (2018)^[11] and Babu *et al.* (2010)^[3], who reported the taste as a significant reason for meat consumption in Jagital and Chittoor. Ayman *et al.* (2021)^[2] reported that most consumers were habituated to chevon and mutton as the main reason for meat consumption in Srinagar. Sunitha (2019)^[12] also reported that the major reason for meat consumption was its habit (32%) and health benefits (28%) in Vilavancode, Tamil Nadu.

Table 3: Correlation analysis between socioeconomic and meat safety awareness variables

Serial Nu.	Food safety awareness variables	Socioeconomic variables (Pearson correlation 'r' value)	
		Education status	Net Income
1	Meat consume is hygienically processed	.202**	.122*
2	Frozen packed meat is unsafe	0.013	0.59
3	Age group of poultry affecting taste of meat	-0.052	0.069
4	Awareness about Food safety act and standards	.239**	-0.019
5	Shop is FSSAI registered/HACCP certified	0.064	-0.032
6	Proper cooking kills the pathogens in meat	.341**	.231**
7	Awareness about Animal Welfare issues	.341**	.231**
8	Prefer to consume meat from road side vendors	0.032	.149**
9	Satisfied with the hygiene conditions adopted by vendors	.103*	.261**

*p<0.05- The mean difference is significant at 5% level

**p<0.01- The mean difference is significant at 1% level

The analysed data on the correlation between socioeconomics and food safety awareness has been depicted in Table 3. The correlation between the net income, education status of respondents and the meat they consume hygienically processed is positive and statistically significant. It reveals that the education status of consumers impacts on the consumption of hygienically processed meat. The correlation between the education status of consumers and their awareness of the Food Safety Act and standards was found to be positive and statistically significant. It indicates that the education status of respondents increases awareness about various food safety acts.

Similarly, the correlation between the net income and education status of respondents and awareness about proper cooking kills the pathogens in meat is positive and statistically significant. It reveals that educated consumers were aware that proper cooking kills the pathogen and is important for safe meat consumption.

The correlation between respondents' net income, education status and awareness about animal welfare issues is positive and statistically significant. Similarly, respondents with higher incomes also prefer to consume meat from roadside vendors as their correlation was found to be positive and statistically significant. Similarly, the correlation between respondent's net income, education status and hygiene conditions adopted by vendors is positive and statistically significant. It reveals that higher education and net income were satisfied with the hygiene conditions adopted by vendors from where they buy meat.

Conclusion

The results of consumer studies concerning food safety knowledge and practices have shown that consumers are aware of and are thinking about food safety, although there are also many gaps in food safety knowledge and practices that may result in foodborne diseases. There is a great need to educate consumers regarding meat quality and hygiene issues through training and awareness programmes.

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