



RESEARCH PAPER

Awareness regarding meat hygiene practices followed in Srinagar city of Jammu and Kashmir, India

Niha Ayman*, S.A. Hamdani, A.H. Akand, Abdul Hai, Namera Thahaby **and** Mudasir Ali Rather
Division of Veterinary and Animal Husbandry Extension, Faculty of Veterinary Sciences and Animal Husbandry
(SKUAST-K), Shuhama, Alasteng, Srinagar (Jammu and Kashmir) India
(Email: aymaniha95@gmail.com; shabeer.hamdani@gmail.com; AfzalHakand@gmail.com;
Abdulhaibhat@gmail.com; nimrazahbi@gmail.com; mudasiralir@gmail.com)

Abstract : The present study analyses the awareness regarding meat hygiene practices among consumers in the Srinagar district of Jammu and Kashmir. For this study, all administrative wards (35) were covered as an extensive sampling pattern and from each selected administrative ward, 7 meat-consuming households were randomly selected for the study. Finally, from each household, one member was selected and interviewed on various identified parameters based on the objectives of the study, making a total of 245 respondents. Data were collected through well-structured interview schedule after proper testing of the schedule and using appropriate scales. The data were coded, classified, tabulated, and analyzed using the appropriate tools to draw inferences. The major findings of the study reveal that all the respondents consumed at least one type of meat (mutton/carabeef/poultry). A satisfying feature with consumption of meat was that majority of people adopt hygienic meat handling practices especially personal hygiene while only half of the households were aware of the facts about licensing and inspection of meat sold by retailers in the markets of Srinagar. Chilling turned out to be the most followed scientific meat storage practice with a comparatively higher level of awareness among the households. Further, the majority revealed that they throw spoiled meat in public dustbins while scientific methods (Burial, compost etc.) turned out to be the least adopted practices. There was a significant relationship ($p < 0.05$) between awareness regarding meat hygiene practices with meat consuming households in Srinagar city. Moreover, it was seen that among the various socio-economic variables, family income, family size, and occupation were found to be influential on overall hygienic meat handling practices in Srinagar city, which in turn lays a strong emphasis on stakeholder dialogue for dissemination of relevant information on hygienic meat handling practices and abolishes the myths in its way for a healthier society at large.

Key Words : Animal welfare, Awareness, Disposal, Hygiene, Licensing, Preservation

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INTRODUCTION

India is the agricultural country where livestock and livestock products are considered as the backbone of

the rural economy in terms of income, employment, social/gender equity, agricultural sustainability, diversification, and foreign exchange earnings. The meat

*Author for correspondence:

sector contributes to the development of the livestock sector with sustainable production through a good demand with reasonable returns to its producers. In spite of the huge potential for meat production due to the large livestock population, the meat industry has not taken its due share on account of negative perceptions like the presence of high content of cholesterol and saturated fatty acids in meat having a deleterious effect on human health (Singh *et al.*, 2003). Besides meat production is largely an unorganized activity in India, with an acute shortage of slaughterhouses to produce quality meat under sanitary conditions (Thakur *et al.*, 2012) which in turn again has a direct and indirect effect on the sector. Concerning the consumption of meat and meat products, access to good quality, safe and nutritious food is considered a basic right of the people, and illness resulting from the consumption of foods has been a basic problem for consumers. As income rises in relation to the cost of living, consumers generally tend to spend more on protein products of animal origin than before, thus the quality of food of animal origin especially meat and meat products is nowadays a predominant key for everyone in society (Aumaitre, 1999 and Simeon *et al.*, 2006). Meat is a perishable commodity and therefore from production to consumption it needs to be beneficial and free from diseases. Meat acts as a vehicle for disease transmission mainly bacterial, protozoan, and helminthic. It is observed that many diseases (campylobacteriosis, amoebiasis, and ascariasis) can be transmitted to human beings if hygienic handling procedures are not followed (Bafanda *et al.*, 2017). There is a lack of empirical studies on consumers, butchers, meat handlers, and retailers regarding awareness towards consumption of hygienic meat and meat products in developing countries like India including Jammu and Kashmir. Thus, this study was undertaken in Srinagar city of J and K to assess the awareness regarding meat hygiene among consumers and to bring desirable change in the availability of good quality meat and its consumption.

MATERIAL AND METHODS

The present study was carried in the Srinagar district of Jammu and Kashmir Union territories (Erstwhile Jammu and Kashmir state), India. The district was chosen decisively because of having a human population of diverse socio-economic backgrounds and has maximum urbanization in the region. The specificity in the selection of the area is supported by the fact that

around the globe, the diets of relatively more urbanized populations are characterized by a higher content of meat, poultry, and other animal products with more awareness regarding the meat hygienic practices than the less diversified diets of rural communities (Xazela *et al.*, 2017). Accordingly, the data required for appropriate inferences demand different sources and types. Thus, the proposed study was restricted within the Srinagar district of Kashmir valley. As per Srinagar Municipal Corporation (SMC), the Srinagar city is divided into 2 divisions (right side and left side of river Jhelum), 4 zones (North, South, East, West), and 35 administrative wards. The data were collected through a pre-tested interview schedule during May 2019. For the present study, all administrative wards (35) were covered as an extensive sampling pattern and from each selected administrative ward, 7 meat-consuming households were randomly selected for the study. Finally, from each household, one member was selected and interviewed on various identified parameters based on the objectives of the study, making a total of 245 respondents. The data collected were analysed using appropriate tools to draw inferences. Finally, the chi-square test, Spearman's Rank correlation was accustomed to understanding the existing correlation pertinent socio-economic variables with important aspects of meat hygiene practices followed.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

A general profile of respondents :

A good majority of respondents (60.00%) who represented the households selected for the study (Table 1) were living in nuclear families with an average family member size of 5-7. More or less similar results have been reported by Rajgopal and Ajitkumar (2014) in their area of study where they observed an average family size of 5.9 as compared to 5.01 in the present study. Businesses turned out to be their main occupation for earning their livelihood, with an annual income of Rupees 360001-650000 and an overall average income of Rs. 409665.30±239548.69 per annum. More or less similar results have been reported by Rao *et al.* (2017) in their study. Statistical analysis of income data revealed no significant difference ($p < 0.05$) between 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	
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)
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 and 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
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)
Average annual income (Rs.)					
Less (upto 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 ±	396952.38±	391928.57±	433714.28±	409665.30±
	263164.82	221419.13	250350.72	229594.29	239548.69

(Figures in parenthesis indicate percentage)

Hygienic meat handling practices adopted by households in Srinagar :

Questions were put forward to the respondents to check the hygienic meat-handing practices adopted by households consuming the meat. Out of the various hygienic meat handling practices (Table 2 and Fig. 1), the adoption of good personal hygiene concerning meat cooking was followed by a majority of respondents with a net adoption level of 83.67 per cent. On contrary, the

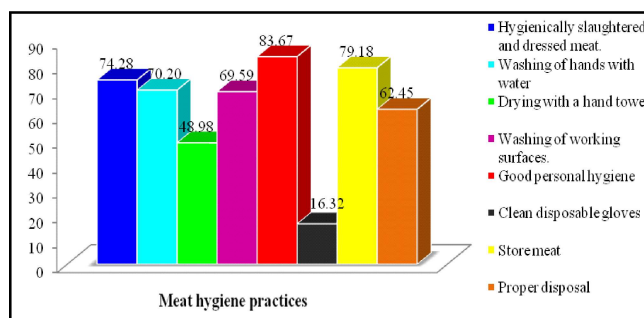


Fig 1: Hygienic meat handling practices adopted by households in Srinagar

Table 2: Distribution of households as per their hygienic meat handling practices adopted

Meat hygiene practices	Frequency			Net adoption percentage
	Always	Sometimes	Never	
Ensure meat bought is hygienically slaughtered and dressed.	148 (60.41)	68 (27.76)	29 (11.84)	74.28
Washing of hands with plain / soap water while handling meat.	139 (56.73)	66 (26.94)	40 (16.33)	70.20
After washing hands, drying with a hand towel.	82 (33.47)	76 (31.02)	87 (35.51)	48.98
Regular washing and disinfection of working surfaces.	129 (52.65)	83 (33.88)	33 (13.47)	69.59
Good personal hygiene with regard to meat to be cooked.	180 (73.47)	50 (20.41)	15 (6.12)	83.67
Handling raw meat with clean disposable gloves	0 (0.00)	36 (14.69)	209 (85.30)	7.34
Storing meat at safe temperatures	158 (64.49)	72 (29.39)	15 (6.12)	79.18
Proper disposal of spoiled by-products	108 (44.08)	90 (36.73)	47 (19.18)	62.45
Overall adoption (%)				61.96

(Figures in parenthesis indicate percentage)

use of disposable gloves while handling meat was adopted by the least number of households with a net adoption level of 7.34 per cent. The overall adoption level with regard to hygienic meat handling practices turns out to be 61.96 per cent suggesting that a greater majority of people realized the importance of meat hygiene as essential. It is a good sign that the meat-consuming households were giving importance to meat hygiene and were adopting these practices, which may be associated with better educational background and greater awareness among the masses in the region. It seems that the major and common hygiene practices are followed to a greater extent than the minor practices of containing the contaminants as is visible from the results. Statistical analysis revealed that there is a significant difference ($p < 0.05$) amongst hygienic meat handling practices adopted and meat-consuming households in Srinagar city of Jammu and Kashmir.

Correlation of hygienic meat handling practices adopted by households with socio-economic variables :

Under the relational study, we had put the data to statistical testing through the use of Spearman’s Rank correlation for understanding the existing correlation between the various pertinent socio-economic variables with the hygienic meat handling practices adopted by households. It was noted (Table 3) that the adoption of good personal hygiene with regard to meat cooking was highly and positively correlated with the family type (nuclear) and family occupation (primary source of income). The households that belonged to the government service class were adopting the practice of good personal hygiene with regard to meat cooking comparatively higher than those families who belonged to other occupation classes like business, agricultural farming etc. It apparently seems that occupational orientation has a great role to play in meat hygiene practices as the people

of better educational background more involved in Govt. service sector are more aware than their other counterparts in business and farming. On a similar basis, the family size was seen to be negatively correlated with good personnel hygiene maintained for healthy cooking as it becomes more and more difficult to hygienically handle the larger quantities of meat required in large size families. With regard to income, it was found to have a highly significant positive correlation with most of the hygienic meat handling practices adopted by households ranging from the practice of washing hands with water while handling meat to proper disposal of spoiled by-products. Thus, it seems that hygienic meat handling practices come at a cost as perceived by the respondents. This lays a strong emphasis on stakeholder dialogue for the dissemination of relevant information on hygienic meat handling practices and abolishes the myths in its way for a healthier society at large.

Household awareness about licensing and inspection of meat sold by retailers in markets of Srinagar :

Respondents were asked questions in order to check their awareness about licensing and inspection of meat sold by retailers in markets of Srinagar (Table 4 and Fig. 2) to which more than half of the households (51.93%) revealed that they were unaware of the facts. The awareness level was comparatively higher with regard to the knowledge about the officer involved in the issuance of license while the majority was least aware of place of slaughter. Similar findings were reported by Bafanda *et al.* (2017) in the Jammu region where he found that majority of respondents were not aware and did not enquire about the licensing while purchasing the meat. Thus, the concerned authorities were unable to aware the masses with regard to licensing and inspection of meat and a special drive needs to be done in this regard. Further, the retailers need to display their

Table 3: Distribution of households as per the correlation of hygienic meat handling practices adopted by households with their socio-economic profile

Socio-economic variable	Spearman’s rank correlation co-efficient of hygienic meat handling practices adopted by households							
	Hyg dressed	Washing hands	Hand towel	Clean work places	Good per hygiene	Gloves	Store meat	Proper disposal
Family type	.155*	.064	.032	-.007	.235**	.069	.055	.057
Family size	.048	.021	.028	.118	-.145*	-.072	-.038	.062
Occupation	.028	.050	.073	.100	.189**	.010	.062	-.008
Income	.121	.136*	.255**	.186**	.129*	.052	.198**	.263**

* and ** indicate significance of values at P=0.05 and 0.01, respectively

registration or other certificates of working to make people aware and conscious about the proper meat production under the guidelines set by the authorities. Moreover, this will help in checking diseases that spread through consuming inferior quality meat. Statistical analysis revealed that there is a significant difference ($p < 0.05$) amongst all variables for meat-consuming households in Srinagar city.

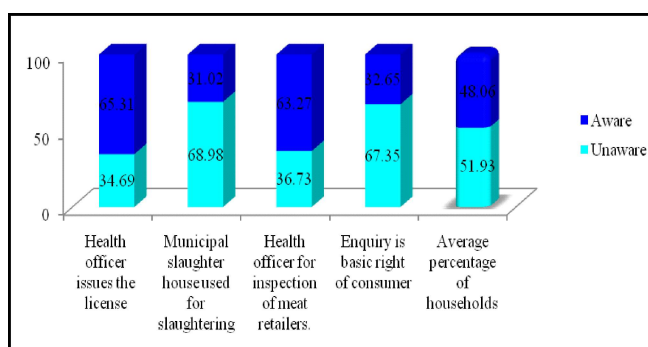


Fig 2: Household awareness about licensing and inspection of meat sold by retailers in markets of Srinagar

Household awareness about animal welfare and ethical considerations related to slaughter meat-producing animals/birds :

The household awareness about animal welfare and ethical considerations related to the slaughter of meat-

producing animals was studied on the basis of well-established 5F's principles of freedom pertaining to the cause. These include items ranging from freedom from hunger to freedom to express normal behaviour. It was seen (Table 5 and Fig. 3) that among the different welfare aspects, the respondents have a comparatively higher level of awareness with regard to animal ethics pertaining to freedom from pain, injury, and disease. However, the households seem to be comparatively less aware of animal rights pertaining to freedom to express normal behaviour patterns. The overall average percentage of respondents aware of all animal welfare practices turns

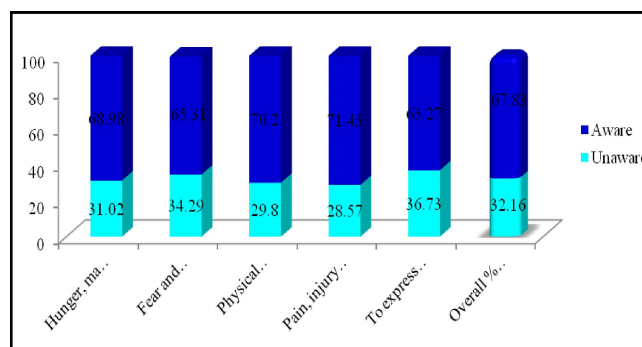


Fig 3: Household awareness about animal welfare and ethical considerations related to slaughter meat-producing animals/birds

Table 4: Distribution of households as per their awareness about licensing and inspection of meat sold by retailers in markets of Srinagar

Awareness about licensing and inspection of meat sold by retailers	(n=245)	
	Aware	Unaware
For the meat shop, the health officer SMC issues the license within the premises of Srinagar city.	160 (65.31)	85 (34.69)
No place other than a municipal slaughterhouse shall be used for the slaughter of meat animals	76 (31.02)	169 (68.98)
In Srinagar, the Commissioner of SMC has appointed a Health officer of the municipal corporation for inspection of meat retailers.	155 (63.27)	90 (36.73)
Inquiry from butcher about the license is a basic right of the consumer	80 (32.65)	165 (67.35)
Overall average percentage of respondents in all	48.06	51.93

(Figures in parenthesis indicate percentage)

Table 5: Distribution of households as per their awareness about animal welfare and ethical considerations related to slaughter meat-producing animals/birds

Awareness about animal welfare ethical considerations of animals	Aware	Unaware
Animal meant for slaughter should have		
Freedom from hunger, malnutrition, and thirst;	169 (68.98)	76 (31.02)
Freedom from fear and distress;	161 (65.31)	84 (34.29)
Freedom from physical and thermal discomfort;	172 (70.20)	73 (29.80)
Freedom from pain, injury, and disease;	175 (71.43)	70 (28.57)
Freedom to express normal patterns of behaviour.	155 (63.27)	90 (36.73)
Overall percentage of respondents in all	67.83	32.16

(Figures in parenthesis indicate percentage)

out to be 67.83 per cent. This could be attributed to the fact that the study area is pre dominated by people adopting ethical treatment of animals as has been the tradition of the area to treat its animal in a more humane way. Society at large has been in a healthier and close relationship with its animals including the food animals with due care and responsibility. Statistical analysis revealed that there is a significant difference ($p < 0.05$) amongst overall their awareness about animal welfare and ethical considerations related to slaughter meat-producing animals/birds for meat-consuming households in Srinagar city.

Household awareness and adoption about scientific storage practices in Srinagar :

The various findings as observed in Table 6 and Fig. 4 reveal that among the different scientific storage practices, the respondents have a comparatively higher

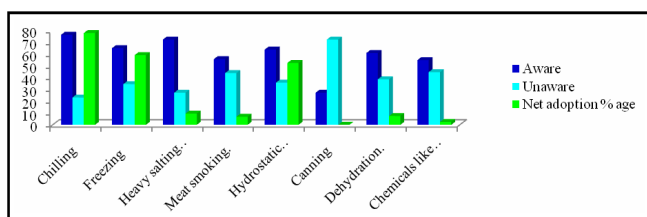


Fig 4: Household adoption and awareness about scientific storage practices in Srinagar

level of awareness with regard to Chilling (76.73%) as scientific storage practice and the same is reflected in the proportion of people adopting this practice with a net adoption level of 78.16 per cent. On contrary, canning which is mostly an industrial process of preservation was having a comparatively lesser awareness level and none of the households adopted it. Statistical analysis revealed that there is a significant difference ($p < 0.05$) amongst awareness about scientific storage practices and meat-consuming households in Srinagar city of Jammu and Kashmir.

Household awareness regarding scientific disposal of spoiled meat and meat products :

After interaction with the respondents, it was observed (Table 7 and Fig. 5) that out of the various

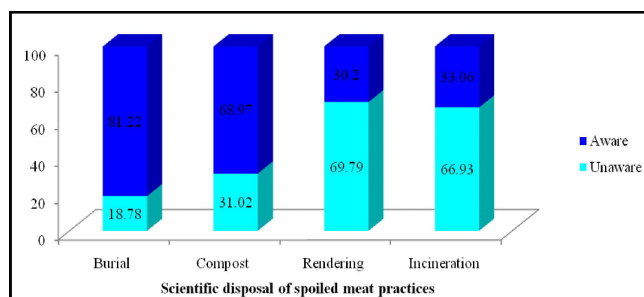


Fig 5: Household awareness regarding scientific disposal of spoiled meat and meat production

Scientific storage practices	Awareness		Adoption			Net adoption percentage
	Aware	Unaware	Always	Sometimes	Never	
Chilling	188 (76.73)	57 (23.27)	147 (60.00)	89 (36.32)	9 (3.67)	78.16
Freezing	160 (65.31)	85 (34.69)	62 (25.30)	167 (68.16)	16 (6.53)	59.38
Heavy salting (curing)	178 (72.65)	67 (27.35)	0 (0.00)	47 (19.18)	189 (77.14)	9.59
Meat smoking	137 (55.92)	108 (44.08)	0 (0.00)	34 (13.89)	211 (86.12)	6.93
Hydrostatic pressure cooking	157 (64.08)	88 (35.92)	36 (14.69)	186 (75.91)	23 (9.38)	52.65
Canning	67 (27.34)	178 (72.65)	0 (0.00)	0 (0.00)	245 (100)	0
Dehydration	150 (61.22)	95 (38.77)	0 (0.00)	37 (15.10)	208 (84.89)	7.55
Chemicals	135 (55.10)	110 (44.90)	0 (0.00)	12 (4.89)	233 (95.10)	2.44

(Figures in parenthesis indicate percentage)

Scientific disposal of spoiled meat practices	Aware	Unaware
Burial	199 (81.22)	46 (18.78)
Compost	169 (68.97)	76 (31.02)
Rendering	74 (30.20)	171 (69.79)
Incineration	81 (33.06)	164 (66.93)

(Figures in parenthesis indicate percentage)

Table 8: Distribution of households as per their adoption of practice for disposal of spoiled meat and meat products (n=245)

Disposal of spoiled meat practice followed	Always	Sometimes	Never	Net adoption percentage
Scientific methods (Burial, compost etc)	16 (6.53)	38 (15.51)	191 (77.95)	14.28
Thrown in public dustbins	113 (46.12)	94 (39.18)	38 (15.51)	65.30
Feeding of animals/birds	85 (34.69)	111 (45.30)	49 (20.00)	57.34
River/nearby stream	31 (12.65)	86 (35.10)	128 (52.24)	30.20

(Figures in parenthesis indicate percentage)

scientific disposal of spoiled meat and meat products, the households have a comparatively higher level of awareness with regard to burial as a scientific method of disposal of spoiled meat and meat products as revealed by the majority (81.22%) while the households seem to be comparatively less aware of rendering. Statistical analysis revealed that there is a significant difference ($p < 0.05$) amongst the awareness regarding scientific disposal of spoiled meat and meat-consuming households in Srinagar city of Jammu and Kashmir.

Disposal of spoiled meat and meat products practices adopted by households in Srinagar :

Questions were put forward in an open questionnaire to the respondents in order to check the disposal of spoiled meat and meat products practices adopted by households consuming the meat (Table 8 and Fig. 6), to which the majority revealed that they throw spoiled meat in public dustbins with its net adoption level of 65.30 per cent. Surprisingly scientific methods (Burial, compost etc.) turned out to be the least adopted practices. This has an impact on the large-scale stray dogs in Srinagar resulting in a greater number of dog bite cases reported each year (Thahaby *et al.*, 2020), thus, leading to large-scale public health in Srinagar city. This issue needs a thorough look of concerned authorities and other stakeholders to check the measures for scientific disposal of spoiled meat.

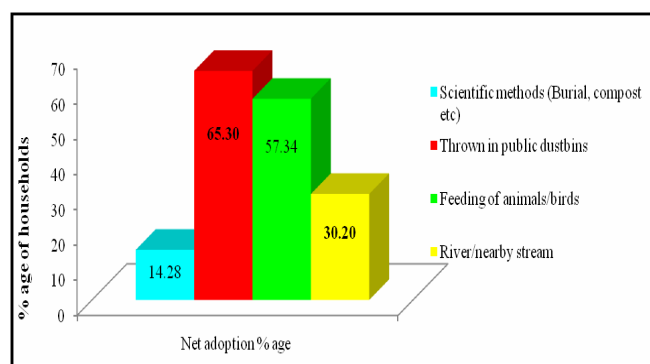


Fig 6: Disposal of spoiled meat and meat products practices adopted by households in Srinagar

Conclusion :

In summary, all the respondents selected from meat-consuming households were well aware of animal welfare and ethical considerations related to slaughter meat-producing animals/birds; scientific storage practices in Srinagar, and scientific disposal of spoiled meat and meat products. This shows that the consumers were concerned about cleanliness, hygienic and good quality meat production at a reasonable price. But on the other hand, it was seen that majority of households preferred public dustbins as the main practice for disposal of spoiled meat which is in turn a major public health obstacle in the Srinagar area and they commence to stray dog proliferation. There is a need for a thorough look of concerned authorities and other stakeholders to check the measures for scientific disposal of spoiled meat. Further, it was observed that a majority of people adopted overall meat hygienic practices in Srinagar city of Jammu and Kashmir showing a positive correlation with the family type (nuclear), family occupation and primary source of income. It seems that occupational orientation has a great role to play in meat hygiene practices while as difficult to hygienically handle the larger quantities of meat required in large size families. Moreover, it seems that hygienic meat handling practices come at a cost as perceived by the respondents. This lays a strong emphasis on stakeholder dialogue for the dissemination of relevant information on hygienic meat handling practices and abolishes the myths in its way for a healthier society at large.

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Conflict of interest and Ethics statement :

The authors have no conflict of interest associated with the material presented in this paper. Respondents had agreed on a voluntary basis and passed no objection on the particular survey and questionnaire.

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