



Effect of Level of Education of Consumers on Consumption and Processing Pattern, Awareness and Hygienic Considerations for Meat in Ludhiana City of Punjab, India

Sandeep Singh, Nitin Mehta*, Manish Kumar Chatli and Om Prakash Malav

Department of Livestock Products Technology, College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, INDIA

*Corresponding author: N Mehta; E-mail: nitinmehta@gadvasu.in

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ABSTRACT

The present study was conducted to study effect of level of education of consumers on consumption pattern, awareness and hygienic practices adopted for meat and its products in Four zones of Ludhiana city through contact survey method. A bilingual (Punjabi and English) questionnaire/interview schedule comprising questions related to meat consumption, processing pattern, awareness of consumers regarding type of meat and hygiene was designed. For survey, the Ludhiana city was divided into four hypothetical zones, namely; Zone I, II, III and IV and a total sample size of 800 respondents (256 females + 544 males) was taken for study. Respondents were further sub-grouped into 4 educational Groups, namely; Secondary, Senior Secondary, Graduation and post-Graduation. Respondents from all the education groups (secondary, senior secondary, graduation and post-graduation) had a higher preference for poultry meat than other categories of meat. A significant effect of education on preference of carcass part was observed. However, irrespective of educational level, a higher preference for poultry leg for consumption was observed. An increase in level of education amongst respondents made them aware of different classes of processed products whereas people with lower educational backgrounds generally preferred the commonest product. The respondents in all education groups (secondary, senior secondary, graduation and post-graduation) were aware regarding the potent environmental hazards by disposal of the untreated slaughter byproducts.

HIGHLIGHTS

- It was observed that as the level of education increased, the preference and inclination towards branded outlets increased amongst consumers.
- The level of education bears direct positive correlation with awareness of consumers regarding meat safety and processing.

Keywords: Meat consumption pattern, consumer behavior, survey, questionnaire, education level

Meat and its products are always considered as significant source of protein in humans' food basket (Mehta *et al.*, 2013). Indian civilization has a variety of eating customs that vary depending on factors including geography, socioeconomic status, religion, culture, and tradition (Singh *et al.*, 2019). With the impact of dietary changes, lifestyle advancements, and rising purchasing power, meat consumption has significantly changed in India (Mehta *et al.*, 2015). The metropolitan areas have seen a surge in the demand and desire for meat amongst customers. Education, awareness, economic expansion, urbanization, and rising

middle class income levels are the main elements driving this trend (Mundhe *et al.*, 2024). Apart from that, consumers are demanding the food which is safe, thus public health and well-being are greatly impacted by food safety, particularly in animal-based foods (Sharan *et al.*, 2024). It

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encompasses practices and regulations aimed at ensuring that food is safe to consume by preventing contamination and lowering the risks of food borne illnesses. Proper food handling, storage, and preparation are essential to minimize hazards such as bacterial, chemical, or physical contaminants. Governments, regulatory bodies, and industry standards play crucial roles in establishing and enforcing food safety protocols throughout the food supply chain. Vigilance, education, and adherence to strict hygiene standards are vital to safeguarding consumers from the potentially severe consequences of consuming unsafe food, promoting healthier communities worldwide. Consumption is the last step in the production line, and having consumer's expectations met is crucial part of their satisfaction and buying behaviour. The level of education amongst consumers significantly impacts their consumption patterns in terms of various aspects such as dietary choices, health awareness, environmental consciousness, and ethical considerations. The educational level and status affect consumption frequency of meat and the awareness regarding public health issues as well as environmental campaigns, that alters meat consumption patterns, is largely influenced by education level of consumers (Veiga *et al.*, 2023). Thus, understanding the role and level of education in determining consumption patterns and preferences for meat consumption can help the processors to market their products accordingly and may prove to be a game changer in increasing perception about meat consumption. In the light of above observations, this study was planned and executed to understand about varying effect of levels of education of consumers on meat consumption in the different zones of Ludhiana city of Punjab state.

MATERIALS AND METHODS

In present study the effect of level of education of consumers was assessed on consumption and processing pattern, awareness and hygienic considerations for meat in different zones of Ludhiana city through sample survey. A bilingual (Punjabi and English) questionnaire/interview schedule comprising questions related to meat consumption, processing pattern, awareness of consumers regarding type of meat and hygiene was designed as per Singh *et al.* (2019). A total sample size of 800 respondents was taken for the survey by dividing Ludhiana city into four hypothetical zones, namely; Zone I, II, III and IV

by using a random sampling method (Yamane, 1967). Three different parameters viz., meat consumption and processing, awareness of consumers and hygienic practices adopted were considered and all the questions were allocated under these three heads for computation and analysis of responses by 800 respondents in all the four zones of Ludhiana city. The respondents in this study were divided into four groups on the basis of level of education viz. secondary (education group 1), senior secondary (education group 2), graduation (education group 3) and post-graduation (education group 4). Data obtained through the questionnaires was analyzed using the descriptive statistics and frequency tables in the Statistical Analysis System (SAS). The data was analyzed by the chi square, one-way ANOVA and 2-way ANOVA test.

RESULTS AND DISCUSSION

Effect of level of education of consumers on consumption and processing pattern of meat and its products

Respondents from all the education groups (secondary, senior secondary, graduation and post-graduation) had a higher preference for poultry meat than other categories of meat (Table 1). This could be due to easy availability and religious non-biasness associated with it. A significant ($p < 0.05$) effect of education on preference of carcass part was observed. However, irrespective of educational level, a higher preference for poultry leg for consumption was observed but the consumers in post-graduation group had almost equitable positive responses for whole carcass and chicken breast as well. It might be due to their knowledge regarding the nutritive value of meat as whole.

Researches showed that poultry pieces were more preferred compared to whole poultry carcass in parallel to the increase in education and income levels (Tatlidil *et al.*, 1993). Respondents from secondary and senior secondary education level groups preferred sausages (17.86% and 21.43%, respectively) as processed meat for consumption whereas, graduation and post-graduation group preferred nuggets (27.63% and 33.59%, respectively). An increase in level of education amongst respondents make them aware of different classes of processed products whereas people with lower educational backgrounds generally prefer the commonest product, which was sausage under this study.

Table 1: Effect of level of education of consumers on consumption and processing pattern of meat and its products

Question No.	Options	Education Level of consumers				P-Value
		Secondary (Group 1)	Senior Secondary (Group 2)	Graduation (Group 3)	Post-Graduation (Group 4)	
Which meat do you prefer to consume?	Red	26 (30.95%)	58 (23.02%)	87 (26.13%)	39 (29.77%)	0.7768
	Poultry	42 (50.00%)	150(59.52%)	201(60.63%)	72 (54.96%)	
	Pork	2 (2.38%)	11 (4.37%)	9 (2.70%)	5 (3.82%)	
	All of them	13(15.48%)	29 (11.51%)	33 (9.91%)	13 (9.92%)	
	None	1 (1.19%)	4 (1.59%)	3 (0.90%)	2 (1.53%)	
What do you prefer: Shelf packed/ Hot served meat	Shelf-packed	10 (11.90%)	30 (11.90%)	59 (17.72%)	16 (12.21%)	0.1587
	Hot served meat	74(88.10%)	222(88.10%)	274(82.28%)	115(87.79%)	
In Poultry, which Carcass part you prefer?	Whole carcass	19(22.62%)	88 (34.92%)	90 (27.03%)	37 (28.24%)	0.0165
	Chest	8 (9.52%)	46 (18.25%)	69 (20.72%)	34 (25.95%)	
	Wing	12 (14.29%)	18 (7.14%)	37 (11.11%)	11 (8.40%)	
How often do you consume meat?	Leg	45 (53.57%)	100(39.68%)	137(41.14%)	49 (37.40%)	0.0719
	Every day	8 (9.52%)	15 (5.95%)	18 (5.41%)	4 (3.05%)	
	Once in a week	28 (33.33%)	75 (29.75%)	98 (29.43%)	22 (16.79%)	
	1-3 times a week	24 (28.57%)	88 (34.92%)	113(33.93%)	61 (46.56%)	
	3-5 times a week	11 (13.10%)	40 (15.87%)	49 (14.71%)	18 (13.74%)	
Which processed meat product you prefer?	Once in Month	13(15.48%)	34 (13.49%)	55 (16.52%)	26 (19.85%)	<0.001
	Nuggets	14(16.67%)	67 (26.59%)	92 (27.63%)	44 (33.59%)	
	Patties	8 (9.52%)	26 (10.32%)	44 (13.21%)	20 (15.27%)	
	Meat Balls	13(15.48%)	37 (14.68%)	62 (18.62%)	23 (17.56%)	
	Sausages	34(17.86%)	68 (21.43%)	89 (26.73%)	32 (24.43%)	
Which traditional meat you prefer?	Other	15(10.48%)	54 (36.98%)	46 (13.81%)	12 (9.16%)	<0.001
	Soup	8(9.52%)	13 (5.16%)	28(8.14%)	7 (5.34%)	
	Tandoori	36(42.86%)	144(57.14%)	180(54.05%)	70 (53.44%)	
	Kababs	6 (7.17%)	37 (14.68%)	61 (18.32%)	38 (29.01%)	
	Pickle	11(13.10%)	30 (11.90%)	34 (10.21%)	11 (8.40%)	
Which meat processing do you prefer	Any other	23(27.38%)	28 (11.11%)	30 (9.01%)	5 (3.82%)	0.0022
	Hot Processing	61(72.62%)	127(50.40%)	184(55.26%)	64(48.85%)	
Will you prefer the branded outlets (KFC, McDonalds) over traditional meat market	Cold Processing	23(27.38%)	125(49.60%)	149(44.74%)	67 (51.15%)	<0.001
	Yes	37(44.05%)	131(51.98%)	223(66.97%)	90 (68.70%)	
	No	47(55.95%)	121(48.02%)	110(33.03%)	41 (31.30%)	

Irrespective of level of education, a higher preference for tandoori meat (42.86% to 54.05%) as traditional meat product was observed. Education group 1, 2 and 3 preferred hot processed meat (72.62, 50.40 and 55.26%, respectively) whereas, group 4 opted cold processed meat (51.15%). It could be due to change in the eating behavior in group with higher education over a period of time due to knowledge acquired during studies. Similar observations have been reported by Petroman *et al.* (2015). The analysis

of responses revealed that respondents in lowest education group i.e. secondary level preferred traditional meat market (55.95%) over branded outlets like KFC and McDonalds, whereas, groups 2, 3 and 4 had a higher preference for branded outlets (51.58, 66.97 and 68.70%, respectively). It was discovered that as the level of education increased, the preference and inclination towards branded outlets increased amongst consumers in the study.

Effect of level of education of consumers on awareness regarding consumption of meat and its products

The awareness regarding meat and meat products amongst the respondents in different groups based on education level was found significant ($p < 0.05$) on a number of queries (Table 2). In response to whether the consumers think that their meat was hygienically processed, a significantly higher ($p < 0.01$) percentage of respondents from education group 3 and 4 stated that they were not satisfied with hygiene adopted during processing whereas, respondents from group 1 and 2 stated affirmative. This could be due to better understanding of hygienic

aspects with the increasing level of education. Similar observations have already been reported by Aygen (2012). Further, the respondents in education group 1 reported that they think frozen meat is stale whereas, as the level of education increased, the respondents were assured about safety of frozen meat. This suggests that level of education bears direct positive correlation with awareness of consumers regarding meat safety and processing. As the level of education increased, the awareness of respondents regarding the processed and traditional meat products increased ($p < 0.01$). The values ranged from 71.83 to 95.42% for awareness regarding processed meat products

Table 2: Effect of level of education of consumers on awareness regarding consumption of meat and its products

Question	Options	Education Level of consumers				P-Value
		Secondary (Group 1)	Senior Secondary (Group 2)	Graduation (Group 3)	Post-Graduation (Group 4)	
Do you think Red Meat/Poultry/Pork you consume is hygienically processed	No	16(19.05%)	120(52.38%)	216(64.86%)	69 (52.67%)	<0.001
	Yes	68(80.95%)	132(47.62%)	117(35.14%)	62 (47.33%)	
Do you think frozen packed meat is stale/ unsafe	No	52(61.90%)	115(45.63%)	153(45.95%)	61 (46.56%)	0.0526
	Yes	32(38.10%)	137(54.37%)	180(54.05%)	70 (53.44%)	
Have you heard of processed meat products?	No	24(28.57%)	29 (11.51%)	34 (10.21%)	6 (4.58%)	<0.001
	Yes	60(71.83%)	223(88.49%)	299(89.79%)	125(95.42%)	
Have you heard of traditional meat products?	No	21(25.00%)	23 (9.13%)	20 (6.01%)	2 (1.53%)	<0.001
	Yes	63(75.00%)	229(90.87%)	313(93.99%)	129(98.47%)	
Do you have any knowledge about age group of poultry affecting taste of meat?	No	63(75.00%)	157(62.30%)	202(60.66%)	76 (58.02%)	0.0667
	Yes	21(25.00%)	95 (37.70%)	131(39.34%)	55 (41.98%)	
Can you judge broiler or spent hen meat by tasting it?	No	58(69.05%)	145(57.54%)	200(60.06%)	76 (58.05%)	0.2949
	Yes	26(30.95%)	107(42.46%)	133(39.94%)	55 (41.98%)	
Are you aware of Food Safety and Standards Act (FSSAI) in meat production?	No	18(21.43%)	78 (30.95%)	133(39.94%)	47 (35.88%)	0.0066
	Yes	66(78.57%)	174(69.05%)	200(60.06%)	84(64.12%)	
Do you think the shop/ retail outlet from where you purchase meat is FSSAI registered or HACCP Certified?	No	67(79.76%)	195(77.38%)	246(73.87%)	89 (67.94%)	0.1464
	Yes	17(20.24%)	57 (22.62%)	87 (26.13%)	42 (32.06%)	
Do you think proper cooking at home kills all the pathogens in meat?	No	26(30.95%)	55(21.83%)	78 (23.42%)	33 (25.19%)	0.3852
	Yes	58(69.05%)	197(78.17%)	255(76.58%)	98 (74.81%)	
Are you aware of Animal welfare issues for slaughter like humane slaughter	No	57(67.86%)	147(58.33%)	161(48.35%)	51(38.93%)	<0.001
	Yes	27(32.14%)	105(41.67%)	172(51.65%)	80(61.07%)	
Are you aware of Government policies for meat production and export in India	No	74(88.10%)	205(81.35%)	240(72.07%)	95 (72.52%)	0.0024
	Yes	10(11.90%)	47 (18.65%)	93 (27.93%)	36 (27.48%)	
Are you aware of the potent environmental hazards by disposal of untreated slaughter house by products	No	33(39.29%)	81(32.14%)	146(43.84%)	57 (43.51%)	0.0267
	Yes	51(60.71%)	171(67.86%)	187(56.16%)	74 (56.49%)	

and 75.00 to 98.47% for awareness regarding traditional meat products in secondary to post graduation educational groups, respectively.

Awareness for Food Safety and Standards Act (FSSA) was observed in all the education groups (secondary, senior secondary, graduation and post-graduation), whereas, education group 3 and 4 (graduation and post-graduation) were aware regarding the animal welfare issues for slaughtering (51.65% and 61.07%, respectively). The respondents in all education groups (secondary, senior secondary, graduation and post-graduation) were aware regarding the potent environmental hazards by disposal of the untreated slaughter byproducts (56.16% to 67.86%).

Effect of level of education of consumers on hygienic considerations of meat and its products

From hygiene point of view, significant results for 51.98% to 70.99% of respondents stated that even after encountering with stale meat their mind-set has not changed (Table 3). The consumption of meat in incidence of any disease like avian flu or swine flu had not impacted the consumption pattern in any of the educational groups, however, the respondents from postgraduate group have a significantly higher ($p < 0.01$) percentage of people aware regarding this aspect. The consumption of meat from road side vendors was found to have a direct correlation with educational level.

Table 3: Effect of level of education of consumers on hygienic considerations of meat and its products

Question	Options	Education Level of consumers				P-Value
		Secondary (Group 1)	Senior Secondary (Group 2)	Graduation (Group 3)	Post-Graduation (Group 4)	
What are the criteria to purchase raw meat?	Freshness	1 (1.19%)	4 (1.59%)	9 (2.70%)	1 (0.76%)	0.4563
	Cost	10(11.90%)	25(9.92%)	25 (7.51%)	8 (6.11%)	
	Health	65(77.38%)	192(76.19%)	252(75.68%)	110(83.97%)	
	Social issues	8(9.52%)	31 (12.30%)	47 (14.11%)	12 (9.16%)	
From where do you purchase meat?	Butcher Shop	43(51.19%)	143(56.75%)	152(45.65%)	75(57.25%)	0.1046
	Super Market	14(16.67%)	33(13.10%)	44(13.21%)	12(9.16%)	
	Slaughter at home	4 (4.76%)	18(7.14%)	21(6.31%)	8 (6.11%)	
	No preference	23(27.38%)	58 (23.02%)	116(34.83%)	36(27.48%)	
Which one you think is healthier?	Pork	18(21.43%)	37(14.68%)	53(15.92%)	15(11.45%)	0.3764
	Red meat	43(51.19%)	149(59.13%)	187(56.16%)	71(54.20%)	
	Poultry	23(27.38%)	66 (26.19%)	93 (27.93%)	45(34.35%)	
Have you ever encountered stale/unhygienic meat served to you?	Yes	61(72.62%)	177(70.24%)	228(68.47%)	100(76.34%)	0.3937
	No	23(27.38%)	75(29.76%)	105(31.53%)	31(23.66%)	
If Yes, has it changed your mind-set to consume meat again?	No	57(67.86%)	131(51.98%)	196(58.86%)	93(70.99%)	0.0014
	Yes	27(32.14%)	121(48.02%)	137(41.14%)	38(29.01%)	
Did any of diseases like Avian flu/Swine flu impacts your consumption pattern?	No	36(42.86%)	128(50.79%)	128(38.44%)	23(25.19%)	<0.001
	Yes	48(57.14%)	124(49.21%)	205(61.56%)	98(74.81%)	
Do you prefer to consume meat from road side vendors?	Yes	40(47.62%)	55(21.83%)	90(27.03%)	21(16.03%)	<0.001
	No	44(52.38%)	197(78.17%)	243(72.97%)	110(83.97%)	
Are you satisfied with the hygiene conditions adopted by them?	Yes	28(33.33%)	64(25.40%)	92(27.63%)	30(22.90%)	0.3597
	No	56(66.67%)	188(74.60%)	241(72.37%)	111(77.10%)	

In the postgraduate group, 83.97% of people denied consumption from roadside whereas, in secondary education group, 52.38% denied meat consumption from road side vendors. As the level of education increased, a knowledge regarding ill effects of consumption of meat from road side vendors increased.

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CONCLUSION

It can be concluded from the study that Respondents from all the education groups had a higher preference for poultry meat than other categories of meat. An increase in level of education amongst respondents make them aware of different classes of processed products whereas people with lower educational backgrounds generally prefer the commonest product, which was sausage under this study. The analysis of responses revealed that respondents in lowest education group i.e. secondary level preferred traditional meat market over branded outlets like KFC and McDonalds, whereas, groups 2, 3 and 4 had a higher preference for branded outlets. As the level of education increased, the preference and inclination towards branded outlets increased amongst consumers. Further, the respondents in education group 1 reported that they think frozen meat is stale whereas, as the level of education increased, the respondents were assured about safety of frozen meat. This indicates that level of education bears direct positive correlation with awareness of consumers regarding meat safety and processing. The consumption of meat from road side vendors was found to possess a direct correlation with educational level. As the level of education increased, a knowledge regarding ill effects of consumption of meat from road side vendors increased. It can be concluded that consumer education on meat quality and hygiene issues is critically important, and this can be accomplished through awareness campaigns and trainings. Further, the government policies should also focus on consumer education to make them aware regarding the meat they consume.

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