

Original research paper**Meat Hygiene and Associated Health Hazards Awareness among Consumers of Jammu District of Jammu and Kashmir****ABSTRACT**

The present study analyses the awareness regarding meat hygiene and associated health hazards among consumers in Jammu district of Jammu and Kashmir. After preparing the comprehensive list of meat markets operating in Jammu district, three meat markets were selected, and from each selected meat market ten retail meat shops were randomly chosen. From each randomly selected retail meat shop, a list of consumers was prepared. Out of the list four consumers were selected randomly from each randomly selected retail meat shop to make a sample size of 120 consumers. Thus a total of one twenty respondents consuming meat were randomly selected for the study. Data were collected through interview schedule. The data were coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean and standard deviation were worked out for meaningful interpretation. It was found that majority of the consumers were less concerned about cleanliness and health status of retailers. Very few respondents enquired for license of shop and meat inspection by veterinarians while, majority of respondents enquired regarding freshness and quality of meat before purchasing. High awareness was noticed about zoonotic diseases, mainly for bird flu, rabies and tuberculosis. But they lack information regarding transmission of these diseases through handling meat consumption. A significant proportion of respondents showed reduction in the consumption of chicken and eggs due to the fear of bird flu outbreak. Consumers preferred information on price, quality and freshness while purchasing meat.

KEY WORDS: *Awareness, Consumers, health status, meat inspection, Meat hygiene Hazards, zoonotic diseases.*

INTRODUCTION:

Rapid increase in the household income, urbanization and changing lifestyle have combined to shift consumption towards non-traditional cereals and value added products, including many derived from livestock. Access to good quality, safe and nutritious food is considered as basic right of the people, and illness resulting from the consumption of foods has been a basic problem for consumers. Even more

recently, despite a continuous increase in demand, the image of animal products has been tarnished by the risk of meat borne diseases. Now a day, economic lifestyle and consumer's attitudes to food regarding quality are tending to be more and more consistent in the world. As income rise in relation to the cost of living, consumers generally tend to spend more on protein products of animal origin than before, thus quality of food of animal origin especially meat and meat products is now a days a predominant key for everyone in society [1]. Meat is a perishable commodity and therefore from production till consumption it needs to be good enough. Many pathogenic micro-organisms grow in the meat if hygienic procedures are not followed. Meat acts as a vehicle for disease transmission mainly bacterial, protozoan and helminthic. It is observed that along with meat, water used for meat processing also carries some diseases (*campylobacteriosis*, *amoebiasis*, and *ascariasis*) to human being during unhygienic handling of meat and its products, particularly in unorganized sector in developing countries like India.

Globally, food borne illness is a growing public health problem because of increasing global trade in food, changes in the way food is produced and changes in the consumer's requirements. These changing pattern cause new challenges in the way of food safety management. About 75 percent of the new communicable diseases that have affected humans over the past 10 years have been caused by pathogens originating from animals or from products of animal origin. Many of these new human diseases are called zoonotic diseases which are associated with handling of diseased domestic and wild animal, slaughtering, meat cutting, retailing and processing. Although developing countries face increasingly strict sanitary and phytosanitary standards in their export markets, they can maintain and improve market access and improve domestic food safety and agricultural productivity by adopting a strategic approach to food safety, public health and trade [18]. International organizations like Food and Agriculture Organization (FAO) and World Health Organization (WHO) of United Nations are concerned with the prevention and transmission of human diseases through contaminated food, and with improvement of hygienic production, processing and distribution. An important development is the establishment of joint FAO/WHO food standards programme whose main responsibility is to prepare the "Codex Alimentarius", a collection of internationally adopted standards for food and food products. The Codex Alimentarius Code of Hygienic Practice for Meat (CHPM) constitutes the primary international standard for meat hygiene and incorporates a risk-based approach to application of sanitary measure throughout meat production chain.

Lack of empirical studies on butchers, meat handlers and retailers are some of the major causes hampering any effort to bring desirable change in the availability of hygienic meat to consumers. People who are dietary conscious are willing to pay good amount of money for quality meat and meat product. Consumers in both developed and developing countries expect quality meat, a broad diversity of meat cuts, more ease in preparation and enhanced assurances of safety [19]. This study was undertaken to assess the awareness regarding meat hygiene and associated health hazards among consumers in Jammu district of Jammu and Kashmir.

71 MATERIALS AND METHODS:

72 The present study was carried out to analyses the awareness regarding meat hygiene and associated
 73 health hazards among consumers in Jammu district of Jammu and Kashmir. After preparing the
 74 comprehensive list of meat markets operating in Jammu district, three meat markets were selected, and
 75 from each selected meat market ten retail meat shops were randomly chosen. From each randomly
 76 selected retail meat shop, a list of consumers was prepared. Out of the list four consumers were selected
 77 randomly to make a sample size of 120 consumers. Thus a total of one twenty respondents consuming
 78 meat were randomly selected for the study. Data was collected through interview schedule. The data was
 79 coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science
 80 (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the
 81 specific objectives. Frequencies, percentage, mean and standard deviation were worked out for
 82 meaningful interpretation.

84 RESULT AND DISCUSSION:

85 GENERAL CONSUMERS PROFILE

86 Age

87 Respondents were categorized into three groups on the basis of mean and standard deviation viz. young
 88 (< 30 years), middle aged (30-50 years) and old (> 50 years). A perusal of table 1 reveals that majority
 89 (55.00%) of consumers were from middle aged group. Overall, 30%, 55.00% and 15.00% of respondents
 90 represented young, middle and old group, respectively.

91

92 **Table 1: Distribution of respondents according to their age**

Age	Consumers (n=120)	
	Frequency	Percent
Young (< 30 years)	36	30.00
Middle (30-50 years)	66	55.00
Old (> 50 years)	18	15.00

Religion

A perusal of table 2 reveals that 80.80%, 13.30% and 5.80% of respondents were Muslims, Hindu and Sikh, respectively.

Table 2: Distribution of respondents according to their religion

Religion	Consumers (n=120)	
	Frequency	Percent
Muslim	97	80.80
Hindu	16	13.30
Sikh	07	5.80

Education

An analysis of table 3 displays that all the respondents were literate, all having education high school and above.

Table 3: Distribution of respondents according to their education

Education	Consumers (n=120)	
	Frequency	Percent
Low	0	0.00
Medium	0	0.00
High	120	100

Duration of consuming meat

The respondents were enquired about their duration of consuming meat and meat products. Result reveals that majority of respondents (95.80%) were consuming meat from their childhood whereas only, 4.20% of respondents started consuming meat since last 10 years.

Table 4: Distribution of respondents according to duration of consuming meat

Duration of consuming meat	Consumers (n=120)	
	Frequency	Percent
From childhood	115	95.80
Past 10 years	05	4.20
Past 5 years	0	0.00

Change in meat consumption habit in last 5 years

As evident from the table 5 that majority of respondents (85.00%) remained unaltered with consumption habit whereas only 15.00% of respondents change their meat consumption habit .Further analysis of table 5 indicates that out of 15.00% of respondents 1.70% changed from vegetarian food to non-vegetarian food, 2.50% changed from egg to meat habit and 10.80% of respondents avoided taking any specific type of meat. Similar finding were observed by Kubickova and Serhantova [7] who reported the changes in meat and meat products consumption by some consumers in the Czech Republic in the past ten years and observed that because of the change in the lifestyle promoted by health education, the structure of the consumption of different kinds of meat and meat products has been changing too, the decreased consumption of beef and tinned meat and a moderately reduced consumption of pork.

Table 5: Distribution of respondents according to change in meat consumption habit in last 5 years

Habit	Consumers (n=120)	
	Frequency	Percent
Changed	18	15.00
Not change	102	85.00
Specific changes in meat consumption habits (n=18)		
Avoid taking any specific animals meat	13	10.80
Eggs to meat	03	2.50
Veg to non-veg	02	1.70

AWARENESS REGARDING MEAT HYGIENE AND ASSOCIATED HEALTH HAZARDS AMONG CONSUMERS OF JAMMU DISTRICT

Enquiry for license, inspection and quality of meat

A proper issuance of license to the retail meat shop by local authority and inspection of meat by veterinarians are must for safe and suitable meat. An analysis of table 1 displays that majority of the respondents (95%) did not enquire for license of shop while purchasing meat, whereas 93.30% of respondents did not enquire for meat inspection by veterinarians. Table 1 further indicate that 86.70% of respondents enquired regarding quality of meat before purchasing it, while 13.30% of respondents did not enquire about quality of meat. Similarly findings were also reported by Maza and Boukhalat [8], Rajasekhar and Reddy [11], Reddy and Raju [14], and Resurreccion [15] who reported that quality, freshness and hygiene was the key determinants for consumer's preference of meat. The findings were also in agreement with the result of De Silva and Sandika [3] who reported that slaughter method is a very important attribute to meat purchasing behaviour of Muslims and around 34 % respondents seek out Halal logo when they purchase meat

Table 6: Distribution of respondents according to enquiry made for license, inspection and quality of meat while purchasing.

Enquiry	Consumers (n=120)	
	Frequency	Percent
Enquiry made for license		
Enquired	06	5.00
Not enquired	114	95.00
Enquiry made for inspection of meat		
Enquired	08	6.70
Not enquired	112	93.30
Enquiry made for quality of meat		
Enquired	104	86.70
Not enquired	16	13.30

Indicators for identification of meat quality

Different individual apply different organoleptic indicators to judge the quality of meat. An analysis depicted in table 2 explore that visual examination was preferred indicators for 31.70% of consumers, whereas visual and colour combination of meat, colour of meat, smell of meat, touch and taste after cooking were others indicators used for identification of meat quality by 27.5%, 10%, 12.5%, 1.7% and 2.5% respondents, respectively . Similar finding were also observed by Richardson *et al.* [16], Ward and Moon [21], Maza and Boukhalat [8] and Raghavendra *et al.* [10].

Table 7: Distribution of respondents according to indicators used for identification of meat quality

Indicators for meat quality	Consumers (n=120)	
	Frequency	Percent
Colour	12	10.00
Smell	15	12.50
Touch	02	1.70
Visual examination	38	31.70
Taste after cooking	03	2.50
Visual+colour	33	27.50
Visual+colour+smell	17	14.20

Desired meat quality

The consumers were enquired to point out desired qualities of meat and, analysis of their opinion in table 3 reveals that fresh and disease free meat was the most prominent desired meat quality by 100% respondents, whereas fresh meat, disease free meat and medicine/ antibiotic free meat were other desired quality of meat used by 95.80%, 88.30% and 54.20% of respondents, respectively. Similarly findings were also reported by Maza and Boukhalat [8], Rajasekhar and Reddy [11], Reddy and Raju [14], and Resurreccion [15] who reported that quality, freshness and hygiene was the key determinants for consumer's preference of meat

Table 8: Distribution of respondents according to desired meat quality

Desired meat quality	Consumers (n=120)	
	Frequency	Percent
Should be fresh	115	95.80
Should be disease free	106	88.30
Should be lean meat	28	23.30
Should be medicine/antibiotic free	65	54.20
Should be hormone free	46	38.30
Fresh +diseased free	120	100.00

Concern about cleanliness of retailer's cloths and his health status

Majority of respondents (52.50%) did not care about the cleanliness of retailer's cloths whereas 47.50% of respondents cared about cleanliness retailers cloths. A thorough inspection of table 4 reveals that majority of respondents (72.50%) do not care about the retailer's health condition or aliments, while 27.50% of respondents were conscious about the health status of retailers. These are in agreements with the findings of Sahay *et al.* [17].

Table 9: Distribution of respondents according to the concern about retailer's health status and cleanliness of cloths while purchasing meat

Concern	Consumers (n=120)	
	Frequency	Percent
Cleanliness of retailers cloths		
Concern	57	47.50
Not concern	63	52.50
Health status		
Concern	33	27.50
Not concern	87	72.50

Observation of sick animals being slaughtered

The consumption of sick animal's carcass is unhealthy practice. As evident from table 5 only 10.80% of respondents at least once noticed sick animal's being slaughtered for sale, while 89.20% did not noticed any such incidence ever. The findings were also in agreement with the result of De Silva and Sandika [3].

Table 10: Distribution of respondents according to their observation of sick animals being slaughtered

Observation of sick animal slaughter	Consumers (n=120)	
	Frequency	Percent
Observed	13	10.80
Not observed	107	89.20

Opinion about hygienic meat

Consumers were enquired regarding their opinion about hygienic meat. As evident from the table 6 that 35.83% respondent's desired meat from healthy animals while 31.7% and 32.50% of respondents prefer it from hygienic processing and hygienically slaughtering and dressing of healthy animals, respectively. Similarly findings were also reported by Rajasekhar and Reddy [11], Reddy and Raju [14], and Resurreccion [15].

Table 11: Distribution of respondents according to their opinion about hygienic meat

Opinions on hygienic meat	Consumers (n=120)	
	Frequency	Percent
From healthy animal	43	35.83
Hygienically slaughtered and dressed	38	31.70
Carcass/meat washed with hot water	0	0.00
carcass/meat washed with plain water	0	0.00
Hygienically slaughtered and dressed + healthy	39	32.50

General awareness about zoonotic diseases and their transmission

Consumers were enquired to assess their awareness for zoonotic and meat borne diseases. An analysis of table 7 reveals that majority of consumers (66.70%) were aware of zoonotic diseases whereas 91.7% Of respondents reveals that meat act as source of disease to human being.. Further table 7 unveils that 94.20% and 90.80% consumers were aware that improper handling and consumption of raw meat could lead to diseases. The findings are in contrast to the reports of Babu *et al.* [2] who reported that that due to lack of proper education majority of the rural households were unaware about the zoonotic diseases and do not know about the nutritive value of meat .But finding were agreement with the finding of Radam *et al.* [9] and Sahay *et al* [17] who reported studied the consumer's awareness, perception and attitudes towards meat safety and observed that majority of consumers were aware of meat borne diseases while one few have right perception towards it.

Table 12: Distribution of respondents according to their awareness about meat associated diseases

Statement	Opinion	Consumers (n=120)	
		Frequency	Percent
Zoonotic disease	Aware	80	66.70
	Not aware	40	33.30
Meat as a source of disease	Aware	110	91.70
	Not aware	10	8.30
Raw meat consumption as a source of disease	Aware	109	90.80
	Not aware	11	9.20
Improper meat handling as a source of disease	Aware	113	94.20
	Not aware	07	5.80

215 **Awareness about symptoms of meat borne diseases**

216 Meat borne diseases often results flu like symptoms such as nausea, vomiting, diarrhoea or fever. The
 217 awareness about such symptoms will facilitate to decide the cause and seek medical assistance. The
 218 consumers awareness about general symptoms were investigated and result obtained as shown in table
 219 8 reveals that a significant proportion 29.20% and 24.20% of respondents were aware of the Salmonella
 220 food poisoning and *Echeria coli* infection whereas very few consumers 8.30%, 2.5%, 6.7%, and 5.8%
 221 were aware about symptoms of *Campylobacteriosis*, *Listeriosis*, *Brucellosis*, and *Sarcocystosis*
 222 symptoms, respectively. Similarly findings were also observed by Sahay *et al.* [17].

223
 224 **Table 13: Distribution of respondents according to their awareness about symptoms of meat**
 225 **borne diseases**

Symptoms	Consumers (n=120)	
	Frequency	Percent
Nausea, vomiting, abdominal pain, diarrhoea, headache (<i>Salmonella</i> food poisoning)	35	29.20
Watery diarrhea with vomiting and fever (<i>E.coli</i>)	29	24.20
Acute gastroenteritis followed by headache, diarrhea, abdominal cramps and fever (<i>Campylobacteriosis</i>)	10	8.30
Gastroenteritis with nausea, vomiting, headache, fatigue, dryness of skin, mouth and throat, paralysis of muscle. double vision, respiratory failure (<i>Clostridium botinum</i>)	07	5.80
Nervousness, loss of weight, abdominal pain and digestive disturbances(<i>Taeniasis</i>)	07	5.80
Generalized febrile illness with pneumonia,weakness,hepatitis,splenomegaly (<i>Q fever</i>)	0	0.00
Fever, chills, abdominal pain, headache. discoloured urine, nervous sign, meningitis (<i>Listeriosis</i>)	03	2.50
Acute or chronic undulant fever, headache, swelling and pain in the joints and muscle, lymph-nitis(<i>Brucellosis</i>)	08	6.70

Weakness', anemia, nausea, diarrhea, loss of appetite, allergic muscular pain, bronchial asthma(<i>Sarcocystosis</i>)	07	5.80
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226

227 Illness due to meat consumption

228 Consumers were enquired about any history of illness due to meat consumption in last 1 year. A look
 229 over the table 9 reveals that only 9.20% of respondents suffered illness due to meat consumption. The
 230 symptoms described by them were correlated with the specific diseases by researcher as no definite
 231 diagnosis was made during illness and were treated for symptomatic relief only. As evident from the table
 232 4.10.9 that 63.63% and 36.36% of respondents were suffered with *E.coli* infection and *salmonellae* food
 233 poisoning in last 1 year. Similarly findings were also observed by Sahay *et al.* [17].

234 **Table 14: Distribution of respondents according to their illness suffered by meat consumption in**
 235 **last 1 year**

Illness suffered	Consumers (n=120)	
	Frequency	Percent
Suffered	11	9.20
Not suffered	109	90.80
Symptoms noticed (n= 11)		
Nausea, vomiting, abdominal pain, diarrhoea, headache (<i>Salmonella</i> food poisoning)	04	36.36
Watery diarrhea with vomiting and fever (<i>E.coli</i>)	07	63.63
Acute gastroenteritis followed by headache, diarrhea, abdominal cramps and fever (<i>Campylobacteriosis</i>)	0	0.00
Gastroenteritis with nausea, vomiting, headache, fatigue, dryness of skin, mouth and throat, paralysis of muscle, double vision, respiratory failure (<i>Clostridium botinum</i>)	0	0.00
Nervousness, loss of weight, abdominal pain and digestive disturbances	0	0.00

(<i>Taeniasis</i>)		
Generalized febrile illness with pneumonia, weakness ,hepatitis, spleenomegaly (<i>Q fever</i>)	0	0.00
Fever, chills, abdominal pain, headache. discoloured urine, nervous sign, meningitis (<i>Listeriosis</i>)	0	0.00
Acute or chronic undulant fever, headache, swelling and pain in the joints and muscle, lymph-nitis (<i>Brucellosis</i>)	0	0.00
Weakness, anemia, nausea, diarrhea, loss of appetite, allergic muscular pain, bronchial asthma (<i>Sarcocystosis</i>)	0	0.00

236

237 **Awareness about specific zoonotic diseases**

238 The consumers' awareness of important zoonotic diseases which can be transferred to humans by any
 239 means was ascertained. As evident from Fig. 1 that majority of respondents (68.30 %,) were aware
 240 about bird flu, whereas rabies and tuberculosis were known to 44.20% and 46.70% of respondents,
 241 respectively. Further, analysis of table 10 reveals that anthrax (10.00%), tetanus (10.80%), taeniasis
 242 (10.00%), fasciolosis (6.70%) and Leptospirosis (5.00%) were other zoonotic disease with comparatively
 243 less awareness among consumers. The consumers' awareness varied greatly to different disease and a
 244 strategy should be formulated to improve the public awareness towards less aware zoonotic diseases.
 245 These finding were agreement with the finding of Radam *et al.* [9] and Sahay *et al* [17].

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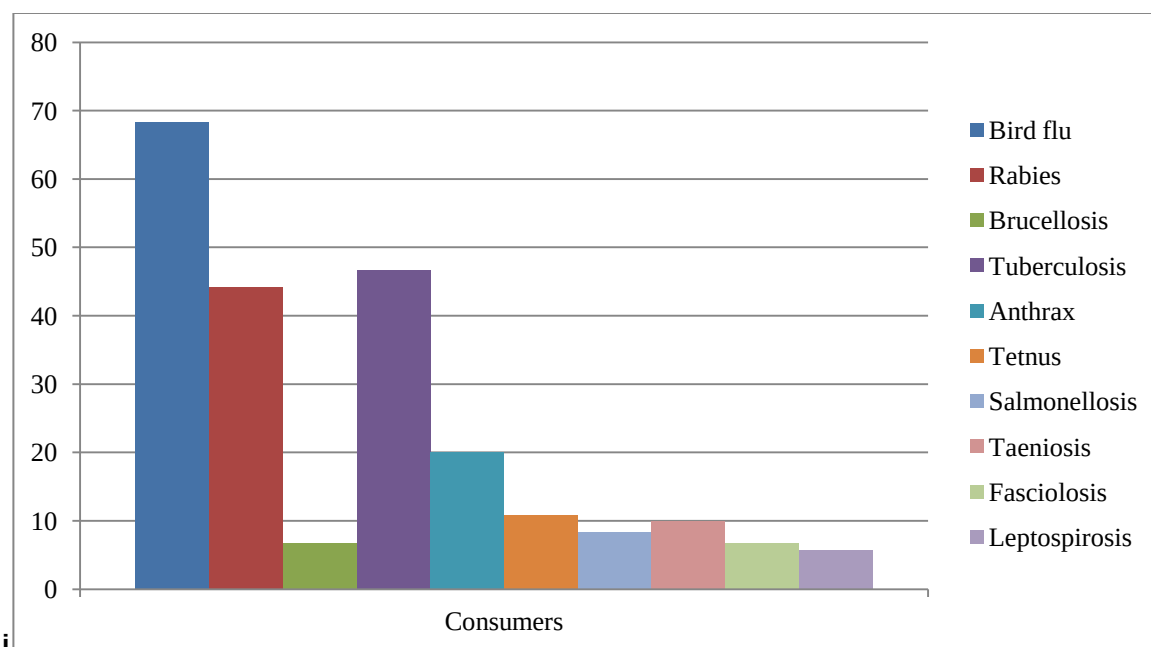


Fig.1: Distribution of respondents according to their awareness about zoonotic diseases

Consumers awareness about meat borne diseases

An analysis of table 10 displays that a significant proportion (48.30%) of consumers were aware that bird flu could be transmitted through handling/consumption of infected bird, whereas (rabies14.20%), brucellosis(7.50%) , tuberculosis (46.70%), anthrax (10.00%), tetanus (13.30%), salmonellosis 12.50 % and taeniasis 10.80%) are another such diseases which can be spread to human being if infected meat is being consumed . Similarly findings were observed by Tesfaye *et al*, (2013) Kansime *et al*. [20] .

Table 15: Distribution of respondents according to their awareness for meat borne diseases

Disease	Consumers (n=120)	
	Frequency	Percent
Bird flu	58	48.30
Rabies	17	14.20
Brucellosis	09	7.50
Tuberculosis	56	46.70
Anthrax	12	10.00
Tetanus	16	13.30
Salmonellosis	15	12.50
Taeniasis/cysticercosis	13	10.80
Fasciolosis	07	5.80
Leptospirosis	04	3.30

Meat consumption behaviour during 'Bird flu' outbreak

Consumers were asked during the course of study towards their response to meat consumption behaviour during bird flu outbreak. As evident from Fig.2 that majority of respondents (58.30%) reported that they avoided consuming poultry meat, while 20.80% of respondents do not change their consumption behaviour during bird flu outbreak. Further table indicates that 17.50% and 3.30% of respondents avoided meat of all species and egg only, respectively. These finding were in agreement with the finding of Huang *et al.* [4] and Ramdurg *et al.* [12] who stated that there was a reduction in the consumption of chicken and eggs by the individual and bulk consumer due to the fear of bird flu while in contrast to the finding of Rathod *et al.* [13] who observed that 52.6% of consumers felt no hesitation in meat consumption during bird flu outbreak.

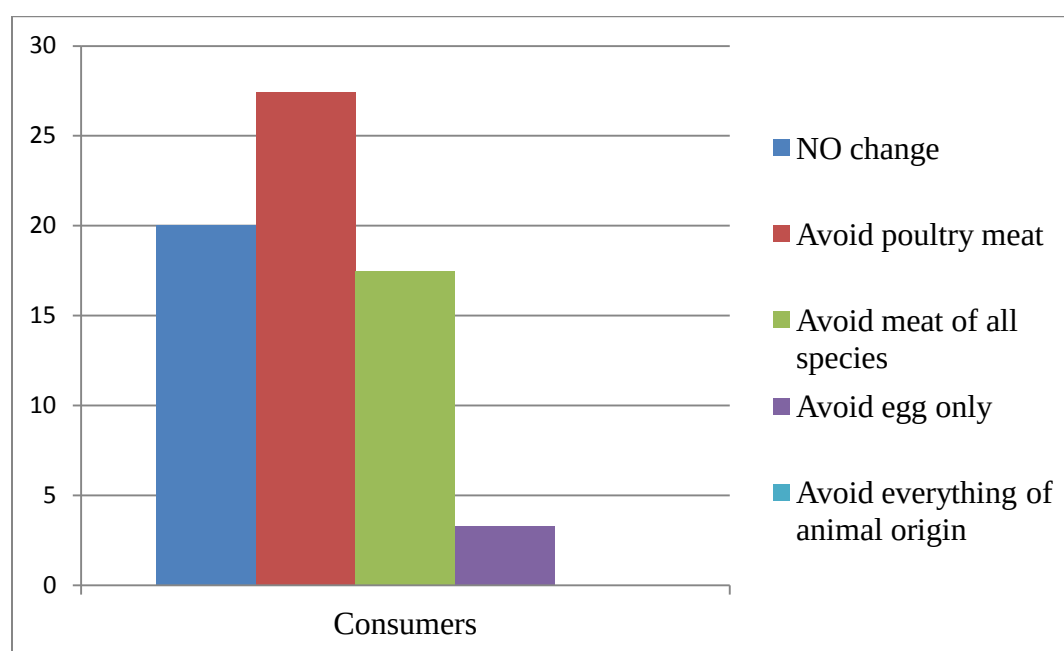


Fig.2: Distribution of respondents according to their response to meat consumption pattern during bird flu incidence

Safety measures followed while handling or cooking meat

Consumers were asked for safety measure which they regularly practice to avoid any incidence of meat borne diseases. A look over the table 11 clearly points out that consumers were following more than one measure to avoid incidence of meat safety and suitability lapses. Washing hands with plain water and with soap after handling raw meat or poultry were the safety measures followed by 37.50% and 30.00% of respondents, respectively whereas 3.30% of the respondents avoid preparing food when they fell sick or recovering from recent illness. These finding were in agreements with the findings of Tesfaye *et al* [20] and Kansime *et al.* [6].

278 **Table 16: Distribution of respondents according to the safety measures fallowed while handling or**
 279 **cooking meat**

Safety measures fallowed by consumers while handling or cooking meat	Consumers (n=120)	
	Frequency	Percent
Usually wash hands with soap after handling raw meat or poultry	36	30.00
Usually wash hands with plain water after handling raw meat or poultry	45	37.50
Usually do not wash hands after handling raw meat or poultry	12	10.00
Wash hands with soaps all the time before preparing food	23	19.20
Not preparing food when sick or recovering from recent illness	04	3.30

280

281 **Frequently asked question while purchasing meat**

282 Consumers were enquired about the frequently asked question during purchase of meat. As evident from
 283 the table 12 that price of meat and freshness of meat quality were frequently asked question by
 284 69.20% and 47.50% of consumers, respectively whereas diseases status of carcass, nutritional status of
 285 meat and slaughter method were the other frequently asked question by 18.30%, 22.50% and 24.20% of
 286 respondents, respectively (Fig.3). Similar result were observed by De Silva and Sandika [3] and
 287 Kanagaraiu *et al.* [5] who reported that consumers usually enquired for freshness, price quality and
 288 method of slaughter during purchase of meat.

289 **Table 17: Distribution of respondents according to their response for frequently asked question**
 290 **while purchasing meat**

Frequently asked question while purchasing meat	Consumers (n=120)	
	Frequency	Percent
Quality of meat	57	47.50
Price of meat	83	69.20
Freshness of meat	78	65.00
Diseases status of carcass	22	18.30

Nutritional status of meat	27	22.50
Slaughter method	29	24.20

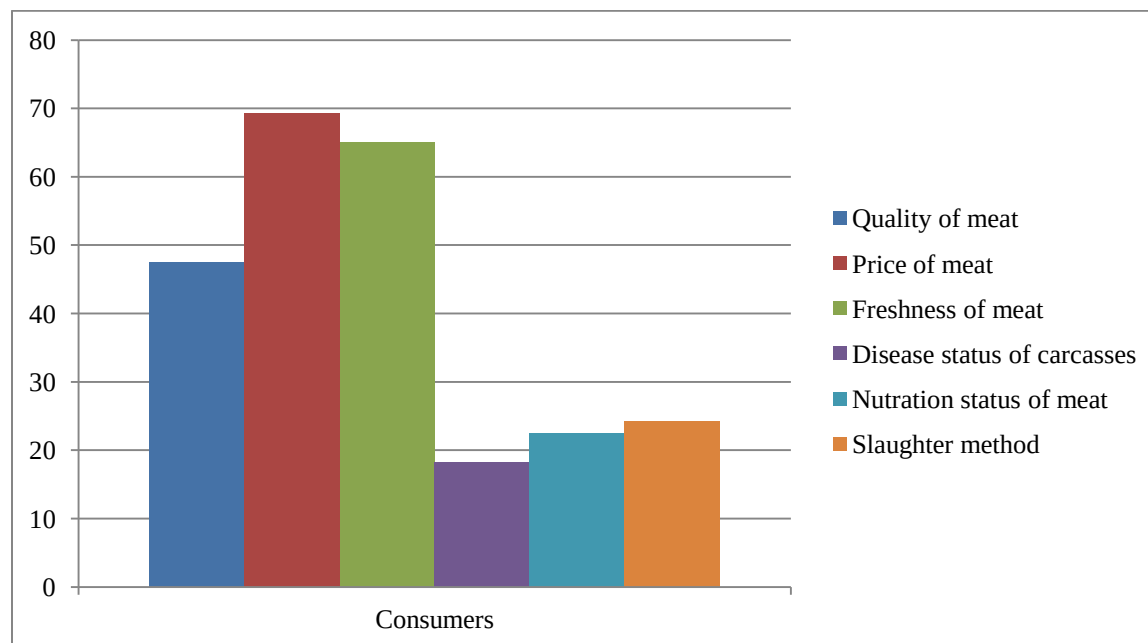


Fig.3: Distribution of respondents according to their response for frequently asked question while purchasing meat

CONCLUSION:

Consumers were less concerned about cleanliness and health status of retailers. Very few respondents enquired for license of shop and meat inspection by veterinarians while, majority of respondents enquired regarding freshness and quality of meat before purchasing. High awareness was noticed about zoonotic diseases, mainly for bird flu, rabies and tuberculosis. A significant proportion of respondents showed reduction in the consumption of chicken and eggs due to the fear of bird flu outbreak. Consumers preferred information on price, quality and freshness while purchasing meat.

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