

**CONSUMER PREFERENCES AND AWARENESS ABOUT
SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS**

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(21-MVM-36)**



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MANNUTHY, THRISSUR – 680 651
KERALA, INDIA
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SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS**

ASWATHY CHANDRAN

(21-MVM-36)

THESIS

Submitted in partial fulfillment of the requirement for the degree of

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MANNUTHY, THRISSUR – 680 651
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DECLARATION

I hereby declare that this thesis entitled **“Consumer preferences and awareness about safety and quality of meat and meat products”** is a bonafide record of research done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, fellowship or other similar title, of any other University or Society.

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Certified that this thesis, entitled “**Consumer preferences and awareness about safety and quality of meat and meat products**” is a record of research work done independently by **Aswathy Chandran (21-MVM-36)**, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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We, the undersigned members of the Advisory Committee of **Aswathy Chandran (21-MVM-36)**, a candidate for the degree of Master of Veterinary Science in Veterinary and Animal Husbandry Extension Education, agree that this thesis entitled “**Consumer preferences and awareness about safety and quality of meat and meat products**” may be submitted by **Aswathy Chandran (21-MVM-36)** in partial fulfilment of the requirement for the degree.

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LIST OF ABBREVIATION

BAHS	Basic Animal Husbandry Statistics
DADH	Department of Animal Husbandry and Dairying
NFHS	National Family Health Survey
KSPB	Kerala State Planning Board
FSSAI	Food Safety and Standard Authority of India
FSSA	Food Safety and Standards Act
HACCP	Hazard Analysis Critical Control Point

*Dedicated to my
beloved family and all
my guides*

Introduction

1. INTRODUCTION

Traditionally meat consumption has been an integral part of the human diet because of its being a rich source of valuable proteins, vitamins, minerals, micronutrients and lipids. The rate of consumption of meat is increasing every year in India and due to the effects of globalisation, improved quality of life and changing lifestyles. The amount of meat produced in India was 7.02 million tonnes in the year 2015-16 and in 2021–22, it increased to 9.29 million tonnes. According to Basic Animal Husbandry Statistics in 2022 (DADH, 2022) there has been a steady, continuous increase in the per capita availability of meat from 6.52 kg/ annum in the year 2020-2021 to 6.82 kg/ annum in the year 2021-2022.

Kerala is ideal for the development of meat industries when compared to the other Indian states, as there exists no taboos or intense emotions against any particular type of meat in the state. According to the National Family Health Survey (NFHS) in 2021, almost 96.05 per cent of the population consumed meat in Kerala. The factors responsible for increased consumption of meat and meat products in Kerala include the high literacy rate, rising socioeconomic position and high health consciousness. Kerala had the highest per-capita meat intake among the Indian states as per the Basic Animal Husbandry Statistics in 2022 (DADH, 2022) Kerala produced 4.99 per cent of the total meat produced in the country and per capita availability of meat during the year 2021-22 was 13.06 kg/annum.

A variety of interconnected factors are involved when a consumer makes a choice about the meat products for familial consumption. Both intrinsic and extrinsic qualities of meat and sensory properties also affect the acceptability of meat. Price, product presentation, origin and brand are examples of extrinsic quality cues. The physiological characteristics of the product, such as colour, visible fat, and tenderness are intrinsic quality indications for meat. Details such as date of packing and expiry in terms of use by date are indications of keeping quality. Other factors that influence the purchase behaviour are socioeconomic characteristics ethnic or religious beliefs, local norms on food choices as well as cultural and traditional aspects of the buyer.

Nowadays, consumer preference for meat and meat products is mainly influenced by the hygienic conditions of meat at the time of production and processing. It is also important to ensure that consumers are aware of the indicators of fresh and wholesome meat so that they can make informed choices in this regard. Hygienic environment and practices are necessary for the production and processing of high-quality meat. Awareness of consumers about basic steps in safe handling of meat is also crucial in ensuring both the safety of consumers and the adoption of best practices by producers. The increasing awareness of food safety issues would have significant implications for the meat industry in the coming years. The industry must make sure that the meat it produces satisfies the consumer expectations. Meeting the expectations of consumers, the last link in the production chain, is a vital step in ensuring their satisfaction as well as purchase behaviour. An understanding of consumer preferences would provide valuable information to the marketer, based on which marketing mix strategies can be designed or modified.

Awareness of consumers regarding proper hygienic practices in purchasing, cooking, storage and handling of meat and meat products is also crucial in ensuring adoption of best practices and procedures which would be of help in protecting public from foodborne diseases. Understanding consumer's awareness about the essential aspects of meat hygiene is the first step before any realistic attempt can be made to address any shortcomings in the awareness levels. Additionally, understanding the consumers' meat consumption patterns and preferences would assist in the development of effective steps for promoting public awareness of meat hygiene and health risks.

Studies on consumer preferences, and consumer awareness on safe handling and indicators of wholesome meat are however very few. It is in this context that the present study was done with the following objectives.

1. Study the preference of consumers towards meat and meat products
2. Assess the extent of awareness of consumers about safety and quality of meat and meat products

Review of literature

2. REVIEW OF LITERATURE

Review of literature is presented in the form of a comprehensive summary of a specific topic from the previous related researches. This chapter provides a review of relevant studies presented under the different headings and subheadings as follows:

- 2.1 Socio-demographic characteristics of respondents
- 2.2 Factors pertaining to consumption of meat and meat products
 - 2.2.1. Consumer assessment methods of meat quality
 - 2.2.2. Frequency of consumption of meat
 - 2.2.3. Preferred place of purchase of meat and reason
 - 2.2.4. Preferred meat type
 - 2.2.5. Preferred meat products
- 2.3. Relationship between demographic characteristics and meat consumption
- 2.4. Extent of consumer awareness about safety and quality of meat and meat products

2.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

2.1.1 Age

Madhav (2010) in a study on mobile telephony in creating awareness on meat hygiene among urban consumers reported that majority of the consumers were middle aged (up to 30 years), 16.67 per cent came under the young (up to 30 years) and 14.16 per cent were under old (above 55 years) age groups.

Bafanda *et.al* (2017) in a study on meat hygiene and associated health hazards awareness among consumers of Jammu District of Jammu and Kashmir opined that majority of the consumers were (55 per cent) middle-aged (30-50 years) whereas 30 per cent and 15 per cent of them respectively were categorised as young (< 30 years) and old group (> 50 years).

Kiran *et al.* (2018) in their study on consumption patterns, consumer attitude and consumer perception of meat quality and safety in southern India, reported that majority of the respondents (55 per cent) were middle-aged who fell between 30 to

44 years whereas, 28.1 per cent belonged to the 16 to 30 years age category and 16.9 per cent of them belonged 45 to 58 years age category.

Arun and Bhuvaneshwari (2019) in their study on buying behaviour of meat consumption related to food safety from the north and south parts of Coimbatore city reported that majority (58 per cent) of respondents were in the age groups of 19 to 28 years, 24 per cent were below 18 years of age, 13.3 per cent were in the 29-39 years age group, 2.7 per cent were in 40-50 age group and only two per cent were of above 51 years of age.

Sunitha (2019) conducted a study on consumption pattern and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk and reported that maximum number of the consumers (48 per cent) were in middle age group of 31-50 years, followed by young age between 20-30 years (37.33 per cent) and old age of 51 years and above (14.66 per cent).

Ayman (2020) in a study on consumption behaviour towards meat and meat products among the households in Srinagar city, stated that the highest number of consumers were in the (48.16 per cent) young age group up to 39 years followed by 39.59 per cent and 12.25 per cent were in the middle (40-60years) age group and old (more than 60 years) age group respectively.

Najeeb *et al.* (2020) in a study conducted to assess the factors associated with meat consumption in Kerala found that majority of the respondents (52.23 per cent) were under 18- 35 years of age and 34.82 per cent of respondents came under below 18 years of age whereas, 21.28 per cent and 14.88 per cent were under 36-50 years of age and above 50 years of age categories respectively.

Abraham and Kumar (2021) conducted a study on consumer preferences and marketing of ready-to-eat meat products in Thrissur city of Kerala. In their research they reported that maximum number of the respondents (29.46 per cent) were in the age group of 35-45 years, followed by 27.67 per cent in the age group of 45-55 years, 22.32 per cent in the age group of 25- 35 years, 10.71 per cent in the age group of 15-25 years, and 9.82 per cent in the age group of 55-65 years.

Chandirasekaran *et al.* (2021) in their study on socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu reported that majority of the respondents (50%) were in the age group of 30-50 years whereas 32.5 per cent and 17.5 per cent of them were categorised as young and old respectively.

Joseph *et al.* (2021) conducted a study on consumer preference for pork chops differing in fat thickness, lean thickness and lean color and observed that maximum number of respondents (28.6 per cent) were in the age group of 51-60 years, followed by 26.4 per cent of the respondents who were in the age group of 41-50 years and the lowest number (2.2 per cent) of respondents belonged to the age group of below 20 years.

2.1.2 Education

Madhav (2010) in a study on mobile telephony in creating awareness on meat hygiene among urban consumers observed that highest number of the consumers (42.50 per cent) were graduates and 17 per cent were post graduates. About 28.33 per cent of the consumers had studied up to intermediate level and 15 per cent had high school education.

Kiran *et al.* (2018) in their study on consumption pattern, consumer attitude and consumer perception on meat quality and safety in south India reported that the highest number of respondents (46.1 per cent) were undergraduates and 26.6 per cent had post-graduation, 16.9 per cent had completed primary education and 10.4 per cent were illiterate.

Arun and Bhuvaneswari (2019) in their study revealed that maximum number of the respondents (39.3 per cent) had got education up to 10th standard, 27.3 per cent of the respondents had completed under graduation and 18 per cent had done education up to school level, 14 per cent were post-graduates and the remaining 1.3 per cent had higher secondary education.

According to Sunitha (2019) in a study on consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk reported that 62.66 per cent of the consumers had secondary education while 21.33 per cent and 12 per cent respectively had college and primary education and even four per cent were found to be illiterate.

Chandirasekaran *et al.* (2021) in their study on the socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu reported that maximum number of the respondents (32.5 per cent) had education up to less than high school and none of the respondents had post-graduation qualification.

2.1.3 Gender

Kiran *et al.* (2018) indicated that 74.6 per cent of the respondents were male in their study.

Arun and Bhuvaneshwari (2019) in their study on buying behaviour of meat consumption related to food safety from north and south parts of the Coimbatore city opined that majority of respondents were female (62.7 per cent).

Ayman (2020) reported that in a study on consumption behaviour towards meat and meat products among the households in Srinagar city majority of the consumers (61.22 per cent) were female.

Abraham and Kumar (2021) in their study on consumer preferences and marketing of ready-to-eat meat products in Thrissur city indicated that 53.57 per cent of the respondents were male.

Chandirasekaran *et al.* (2021) in their study on the socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu observed that 82.5 per cent of the respondents were female.

Joseph *et al.* (2021) in their study on consumer preference for pork chops differing in fat thickness, lean thickness, and lean color reported that the majority of the respondents (71.6 percent) were men.

Waghmare *et al.* (2021) in a study on an online survey of consumers of Maharashtra concerning the expected change in the meat and meat product business reported that 89.12 per cent of the consumers were male.

2.1.4 Marital status

Sreeshma *et al.* (2018) in a study on the analysis of socioeconomic profile of pet bird owners in Thrissur, revealed that 77.14 per cent of respondents were married and 22.86 per cent were not married.

Joseph *et al.* (2021) in their study on consumer preference for pork chops differing in fat thickness, lean thickness in Thrissur and Kottayam districts of Kerala, and lean color stated that out of 580 respondents, 87.8 percent were married.

2.1.5 Type of family

Kiran *et al.* (2018) in their study on consumption patterns, consumer attitude, and consumer perception of meat quality and safety in southern India observed that majority (75.4 per cent) of respondents had small family size and very few (9.2 per cent) respondents had large family size.

Sunitha (2019) highlighted in a study of consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk that majority of consumers (78.66 per cent) had family size of less than four members and the rest had more than four members in their families.

Ayman (2020) observed that in a study on consumption behaviour towards meat and meat products among the households in Srinagar city, majority (60 per cent) of the consumers were the members of nuclear family whereas the remaining 40 per cent of the consumers were having joint family.

Joseph *et al.* (2021) in their study on consumer preference for pork chops differing in fat thickness, lean thickness and lean color found that majority of the respondents (50.5 per cent) had a family size of four members followed by respondents having five members (24.5 per cent), three members (8.8 per cent), six members (6.4 per cent), more than six members (6.1 per cent), two members (2.6 per cent) and one member (1.2 per cent) in the decreasing order.

2.1.6 Household size

Kiran *et al.* (2018) in their study on consumption pattern, consumer attitude and consumer perception on meat quality and safety in southern India reported that based on the number of members in the family, they categorised the families with three to five people as small sized families, having five to eight people as medium families and having more than eight members as large families.

Sunitha (2019) in a study regarding consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk

highlighted that according to consumers' household size, families were grouped into two such as less than four members and more than four members.

Ayman (2020) in a study on consumption behaviour towards meat and meat products among households in Srinagar city stated that families were categorised into small size with two to four members, medium size with five to seven, and large size with eight members and above.

2.1.7 Annual income

Sunitha (2019) found that in a study of consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk, 52 per cent of the consumers were in medium (Rs. 50,000 to Rs. 2,00,000) category annual income whereas 30.66 per cent followed by 30.66 per cent and 17.33 per cent high (Rs. 2,00,000 to Rs. 5,00,000) and low (less than Rs. 50,000) income group respectively.

Ayman (2020) found that in a study on consumption behaviour towards meat and meat products among the households in Srinagar city, 43.27 per cent of the consumers fell under the moderate annual income (Rs. 3,60,001 to Rs. 6,60,000 per year), while 38.37 per cent and 18.38 per cent had fallen under the less (up to Rs. 3,60,000 per year) and high categories (more than Rs. 6,60,000 per year).

Abraham and Kumar (2021) reported that the majority (24.1 per cent) of the respondents had an income between Rs.30,001 to Rs. 40,000, whereas 21.03 per cent had between Rs. 20,001 to Rs. 30,000, about 25.85 per cent had between Rs.40,001 to Rs. 60, 000 and nearly 16.1 per cent had income between Rs.10,001 to Rs. 20,000, while 9.82 per cent had less than Rs.10,000 only 3.1 per cent had more than Rs. 60,000 monthly in Thrissur city.

Chandirasekaran *et al.* (2021) in their study on the socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu reported that majority (70 per cent) of the respondents fell in the medium income group of Rs. 30,000 to Rs. 70,000 per annum whereas 22.5 per cent came under the lower income group of below Rs. 30000 per annum, 7.5 per cent of the respondents earned more than Rs. 70,000 per annum.

Joseph *et al.* (2021) in their study on consumer preference for pork chops differing in fat thickness, lean thickness, and lean color found that the respondents in different income groups were, up to Rs. 20000 (55.9 per cent), Rs. 20000 to Rs. 40000 (26.9 per cent), Rs. 40000 to Rs. 60000 (9.7 per cent), Rs. 60000 to Rs. 80000 (2.4 per cent), and above Rs. 80000 (2.6 per cent).

2.1.8 Occupation

Suresh (2016) in a study on consumers' attitudes towards meat consumption in two metropolitan cities of India found that, majority (52 per cent) of the respondents were employed in the organised sector. Around 20 per cent of consumers were from the business sector followed by 16 per cent who were casual labours and another seven per cent were skilled labourers.

Arun and Bhuvaneshwari (2019) conducted a study on buying behaviour of meat consumption in north and south part of Coimbatore city and found that 35.3 per cent of respondents were government employees whereas 24 per cent were private employees and 20.7 per cent were housewives and 13.3 per cent were businessmen and the rest 6.7 per cent of the respondents were students.

Sunitha (2019) observed in a study on consumption pattern and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk that, 38.66 per cent of respondents were self-employed, while 33.33 per cent were in private sector and 24 per cent were engaged in agriculture.

Ayman (2020) in a study on consumption behaviour towards meat and meat products among the households in Srinagar city reported that the occupation of 44.49 per cent of consumers were in business sector followed by government services (40.41 per cent), caste occupation (6.12 per cent), other occupations (5.31 per cent) and agricultural farming (3.67 per cent).

2.2 FACTORS PERTAINING TO CONSUMPTION OF MEAT AND MEAT PRODUCTS

2.2.1 Consumer assessment methods of meat quality

Smulders (1986) in a study on sensory meat quality and its assessment denoted that sensory quality characteristics such as colour, water-binding, tenderness and flavour were the major criteria used by the consumers to assess the freshness of meat.

Risvik (1994) in a study on sensory properties and preferences for meat and meat products reported that the sensory attributes of meat considered at the time of purchase of meat were colour or appearance, flavour, odour and texture.

Suresh (2016) in a study on consumers' attitude towards meat consumption in India and insights from a survey conducted in two metropolitan cities reported that the majority of consumers assessed the meat quality by their own visual observation and one-fifth of the consumers assessed by touching the meat whereas, 15 per cent of consumers had never touched meat products at the time of purchasing. Only few of them smelled the meat to test the quality. Consumers considered vendors' opinions also as an important source of information on the quality of meat.

In a study on meat hygiene and associated health hazards awareness among consumers in Jammu and Kashmir, Bafanda *et al.* (2017) observed that the consumers used different indicators for the identification of meat quality such as visual (31.70 per cent), both visual and colour (27.5 per cent), smell of meat (12.5 per cent), colour of meat (10 per cent), touch (1.7 per cent) and taste after cooking (2.5 per cent).

Rao *et al.* (2017) in their study on the consumption pattern of meat in and around the rural locality of Gannavaram found that the respondents were able to detect spoilage by their experience and quality consciousness. Majority of them (55 per cent) detected spoilage of meat either by smell, by taste (25 per cent), by colour (18.3 per cent) and by other methods (01.66 per cent).

Kiran *et al.* (2018) in their study on consumption pattern, consumer attitude and consumer perception on meat quality and safety in southern India stated that

71.5 per cent of consumers detected the freshness of the meat based on its colour, 25.8 per cent by texture and 2.7 per cent by other methods.

In a study of consumption behaviour towards meat and meat products among the households in Srinagar city, Ayman (2020) reported that majority of the consumers considered sensory qualities like meat colour (80.81 per cent), followed by leanness (51.42 per cent), smell (45.30 per cent) and fat marbling (19.59 per cent). For meat products, consumers primarily considered taste (86.53 per cent) followed by, colour (80.81 per cent) juiciness (62.02 per cent), tenderness (58.77 per cent), and smell (45.30 per cent).

In a study entitled on colour and marbling as predictors of meat quality perception of Argentinian consumers, Testa *et al.* (2021) found that 90 per cent of the respondents agreed with colour of meat was used to determine the freshness of the meat.

2.2.2 Frequency of consumption of meat

Ahmad *et al.* (2018) in their study on the nutritional composition of meat reported that meat contain different types of nutritional components such as vitamin, proteins, fatty acids and minerals which helps to maintain health.

Arun and Bhuvaneshwari (2019) in their study on buying behaviour of meat consumption related to food safety in north and south parts of Coimbatore city reported that 28.7 per cent of the respondents consumed meat weekly once and weekly twice, 26 per cent consumed every day, 10 per cent and 6.7 per cent of the respondents consumed weekly once and monthly once respectively.

Sunitha (2019) in a study of consumption patterns and consumer behaviour of meat consumption in rural consumer households stated that 49.33 per cent of the consumers consumed meat once in a week, 29.33 per cent consumed once in 15 days, while 13.33 per cent and 8 per cent consumed in once in a month and very rare respectively.

Abraham and Kumar (2021) in their study on consumer preferences and marketing of ready-to-eat meat products in Thrissur city reported the consumption pattern of meat as follows 41 per cent of the respondents consumed meat only on

Sundays, 38 per cent on Saturdays and Sundays. 13 per cent consumed meat at least three days per week and eight per cent of the respondents consumed meat on all days.

Chandirasekaran *et al.* (2021) in a study on the socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu reported that about 57.5 per cent of the respondents preferred to consume meat once a week whereas, 20 per cent of the respondents consumed meat twice in a week. None of the respondents consumed meat daily.

According to NFHS-5, 2021 nearly 95 per cent of the population in Kerala consumed chicken meat regularly.

Waghamare *et al.* (2021) in their study on the online survey of consumers of Maharashtra concerning the change in the meat and meat product business indicated that majority (70.62 per cent) of consumers consumed non-vegetarian diet one to two times a week, whereas, 29.96 per cent consumed three to four times a week.

2.2.3 Preferred place of purchase of meat and reason

Suresh (2016) in a study on consumers' attitudes towards meat consumption and observed that more than half of the consumers (65 per cent) in Delhi purchased meat from registered meat shops but in Hyderabad, 20 per cent of consumers only purchased from the registered shop. The number of registered shops was higher in Delhi when compared to Hyderabad. In Hyderabad, 82.85 per cent of the consumers purchased frequently from known shops, and this was one of the methods for ensuring the quality of the meat according to them.

Singh *et al.* (2019) in a study on consumer studies on meat consumption and processing pattern in different zones of Ludhiana city indicated that respondents from all four zones preferably purchased meat from butcher shops (39.00 per cent to 67.00 per cent). Whereas, 50.00 per cent to 68.00 per cent preferred the branded outlets.

According to Sunitha (2019) in a study of consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk in Tamil Nadu state all consumers purchased meat from retail

shops whereas no one purchased meat from wholesale shops or supermarkets. The reason for this was that consumers purchased meat in small quantities for home consumption only.

Ayman (2020) in a study on consumption behaviour towards meat and meat products among households in Srinagar city reported that all respondents purchased meat from the retail shop, and no one got it either from the slaughterhouses or supermarkets.

Chandirasekaran *et al.* (2021) in their study on the socio-economic status and meat preferences of consumers in Erode city, observed that the majority (77.5 per cent) of the consumers preferred to purchase from roadside meat shops whereas, 22.5 per cent of people preferred to purchase from branded retail outlets.

Waghamare *et al.* (2021) in an online survey of consumers of Maharashtra concerning the expected change in the meat and meat product business reported that 71.26 per cent of the consumers preferred to purchase meat from a known shop where they get freshly slaughtered meat frequently, and the majority (70.62 per cent) of them preferred less than one km distance from their residence and this helped to ensure the quality of meat. It was found in the study that 90.21 per cent of consumers preferred hot and fresh meat products prepared in front of their eye. Only 9.39 per cent of the respondents preferred chilled or frozen meat.

Sahu *et al.* (2023) in their study on consumption patterns of meat and value-added meat products, stated that in Chhattisgarh consumers from all zones preferred to buy meat from the butcher shop because they were considered as the place for the most fresh meat.

2.2.4 Preferred meat type

Suresh (2016) in a study on consumers attitudes towards meat consumption in Delhi and Hyderabad observed that 36 per cent of the respondents preferred poultry meat and 35 per cent indicated mutton as the second most preferred choice. Buffalo meat was preferred by 3.6 per cent and pork was the least preferred one while, high price of mutton limited it from being accessed by consumers compared to poultry meat.

Singh *et al.* (2019) in a study on consumer studies on meat consumption and processing patterns indicated that respondents from all four zones in Ludhiana city preferred poultry meat first, red meat second and pork meat third. Based on its taste, affordability, and accessibility of meat.

According to Sunitha (2019) in a study of consumption patterns and consumer behaviour of meat consumption in rural consumer households in Vilavancode, majority of the consumers (61.33 per cent) preferred chicken, 17.33 per cent of them preferred rural chicken whereas, only 12 per cent and 9.33 per cent preferred mutton and beef respectively.

Ayman (2020) in a study on consumption behaviour towards meat and meat products among the households in Srinagar city reported that the majority of the consumers (99.59 per cent) consumed mutton, followed by broiler chicken (92.65 per cent), chevon (53.46), local chicken (45.30 per cent), carabeef (39.59), others meat types (25.71) and layer chicken (11.11 per cent) in the decreasing order of preference.

Chandirasekaran *et al.* (2021) in their study on the socio-economic status and meat preferences of consumers in Erode city, observed that majority (55 per cent) of the respondents preferred chicken followed by 27.5 per cent who preferred chevon. It was also noticed that all the respondents preferred to buy fresh meat and no one liked frozen meat.

Waghmare *et al.* (2021) in a study on an online survey of consumers of Maharashtra concerning the expected change in the meat and meat product business stated that majority of the consumers (77.32 per cent) preferred chicken followed by mutton (63.41 per cent) and other types of meat (19.59 per cent).

Sahu *et al.* (2022) in their study on consumption patterns of meat and value-added meat products in Chhattisgarh reported that the majority of the consumers from the three-zone preferred poultry meat followed by sheep or goat or pork.

2.2.5 Preferred meat products

Suresh (2016) in a study on consumers attitude toward meat consumption reported that more than half of the consumers in Delhi and Hyderabad (68 per cent,

59 per cent) never purchased processed meat products available in the form of pickles, sausage, nuggets and kebab.

Singh *et al.* (2019) in a study on consumer studies on meat consumption and processing patterns in different zones of Ludhiana city indicated that majority of the consumers from zones I, and II, preferred nuggets but in zones III and IV had the most preference for sausages.

Talukder *et al.* (2020) in a study regarding evaluation of consumption pattern of meat found that 73.33 per cent of the respondents from the north Indian cities preferred meat products such as chicken and chevon kabab.

Abraham and Kumar (2021) in their study on consumer preferences and marketing of ready-to-eat meat products in Thrissur city reported that 36 per cent of the consumers consumed meat cutlets followed by 24 per cent meat puffs, 17 per cent sausages, 15 per cent salami, 5 per cent hot dogs, 2 per cent nuggets and one per cent retort packed products.

Sahu *et al.* (2023) in their study on the consumption pattern of meat and value-added meat products in Chhattisgarh reported that majority of the consumers from the three zone (80 per cent), 77 per cent, 76.5 per cent) chose chicken curry than other value-added meat products.

2.3. RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND MEAT CONSUMPTION

Unusan (2007) in a study on consumer knowledge of food safety and home practices in Turkey reported that the food safety knowledge level of consumers positively impacts the education level of the consumers ($p < 0.01$).

Najeeb *et al.* (2020) assessed the factors associated with meat consumption in Kerala. The finding revealed that occupation, family size, family income, and frequency of meat consumption influenced the consumption of meat significantly ($p < 0.01$) and positively influenced the consumption of meat.

Abraham and Kumar (2021) conducted a study on consumer preferences and marketing of ready-to-eat meat products in Thrissur city of Kerala. The research verified that the relationship between age group and monthly household consumption of meat and meat products showed a negative correlation ($r -$

0.08866). And also found that the relationship between gender and monthly consumption of meat and meat products revealed a positive correlation. ($r = 0.04469$) and there was a positive relationship between monthly income and consumption of meat and meat products ($r = 0.2859$).

In their study on socio-economic status and meat preferences of consumers in Erode city of Tamil Nadu, Chandirasekaran *et al.* (2021) revealed that the common reason for non-consumption of meat on a daily basis was meat associated with health problems (72.5 per cent) followed by the cost of meat (25 per cent). The authors also observed the middle-income group was spending more money to buy meat but was unwilling to pay extra for better-quality products.

Tschanz *et al.* (2022) in a study entitled characterisation of meat consumption across socio-demographic, lifestyle and anthropometric groups in Switzerland, found that the association between income and meat consumption was not significant.

2.4. EXTENT OF CONSUMER AWARENESS ABOUT SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS

Madhav (2010) conducted a survey among urban consumers regarding awareness of hygiene in Andhra Pradesh and it revealed that only 30 per cent of consumers were aware of the appropriate method to store meat in the deep freezer.

According to Food Safety and Standards Regulations (2011) of licensing and registration of food businesses, the person who handle the meat for their work should do medical examination prior to their employment and medical examination carried out routinely and when clinically or epidemiologically indicated, at least once in 12 months.

Kavitha and Ajithkumar (2014) conducted a study to determine the consumption pattern of meat in a rural locality of north Kerala and found that the consumers were well aware about adulteration and quality detection by taste (40 per cent), colour and visible changes in the normal appearance (60 per cent).

Koppel *et al.* (2016) in a study on food leftover practices including meat among consumers in the United States and Argentina reported that most of the

respondents in the United States older than 35 (60.6 per cent) stored food within an hour after cooked, while in the Argentina 30.4 per cent of respondents younger than 35-year-old left food out for more than two hours.

In a study on meat hygiene and associated health hazards awareness among consumers of Jammu district of Jammu and Kashmir, Bafanda *et al.* (2017) observed that the majority of the respondents (95 per cent) did not enquire about the license of the shop while purchasing meat, and 93.30 per cent of respondents did not enquired for meat inspection by veterinarians, while 86.8 per cent of consumers enquired quality of meat before purchase and 13.30 per cent did not enquired about the quality of meat. Most of the consumers (52.50 per cent) did not care about the cleanliness of retailer's cloths and 47.50 per cent of consumers cared about retailers' health conditions 27.5 per cent were conscious for the health condition of retailers They also found that in their study regarding meat hygiene and associated health hazards awareness among consumers in Jammu majority of consumers (66.70 per cent) were aware of zoonotic diseases. According to 91.7 percent of respondents, meat acted as a source of disease to human being.

Moreb *et al.* (2017) in a study on food handlers' knowledge of food safety and food handling practices in the Republic of Ireland reported that more than half of the respondents had an awareness regarding the proper storage temperature of frozen food.

Kiran *et al.* (2018) in their study on consumption pattern, consumer attitude and consumer perception of meat quality and safety in southern India mentioned that half of the consumers (54.2 per cent) were not aware of food safety and quality and 37.7 per cent of respondents were aware of Act of Food Safety and Standards Authority of India (FSSAI) and its role, while 85.4 per cent were unaware of licensing and registration of shops selling meat.

Arun and Bhuvanewari (2019) in their study on buying behaviour of meat consumption related to food safety from north and south parts of Coimbatore city reported that there was a necessary for consumer education on how to handle the equipment and raw meat cleanly and clearly, such as a cutting board and knife, was

necessary. The merchants must be instructed on how to handle raw meat and how to maintain equipment like cutting board and knife clean and free of debris. After handling raw meat, hands should always be completely cleansed. The necessity for food safety training for butcher shop employees exists. Consumer education regarding food safety is required. To reduce risk, food safety guidelines should be taught in schools and colleges.

Singh *et al.* (2019) in a study on consumer studies on meat consumption and processing patterns through contact survey in different zones of Ludhiana city namely zone I, II, and III. From zone I and II (57.50 per cent and 65.50 per cent) consumers stated that frozen packed meat was not stale and it was safe for consumption. whereas those from Zone III and IV (53.50 per cent and 60.00 per cent) reported that frozen packed meat was stale and unsafe. It was also noticed that a significantly higher ($p < 0.01$) number of respondents from the entire four zones were not aware of the Food Safety and Standards Act (FSSA) in the meat industry (53.50 per cent to 75.00 per cent) and respondents from all the four zones purchased meat from the shop or retail outlet which were not FSSAI registered or Hazard Analysis Critical Control Point (HACCP) certified (60.00 per cent to 84.50 per cent).

Ayman (2020) in a study on consumption behaviour towards meat and meat products among the households in Srinagar city, observed that majority of the consumers (65.71 per cent) were least aware of the temperature needed for proper cooking of meat.

Muştu, *et al.* (2021) in a study on knowledge of food safety and attitude and practices of consumers regarding meat consumption at home, stated that majority (85.3 per cent) of the respondents checked the expiration date at the time of purchase of packed products.

Waghamare *et al.* (2021) in a study on consumers concerning the expected change in the meat and meat product business in Maharashtra reported that the majority (85.49 per cent) of customers were unaware of the meat shop's FSSAI registration status at the time of purchase of meat. While 47.42 per cent revealed that meat shops smelled bad and half 42.78 per cent of the consumers were

concerned about the hygienic and cleaning practice adopted by the meat shops and nearly 82.38 per cent of consumers preferred to purchase machine cut with minimal handling. The safe storage of meat and meat products for more than three days which restricts the both sale and consumption of chilled or frozen were not aware by 36.27 per cent whereas 45.60 per cent were not aware of the quality guiding principle for chicken or mutton and majority of the consumers (96.89 per cent) opined that it was necessary to impart awareness regarding clean and hygienic production of meat.

According to the Fourteenth five-year plan of KSPB (2022) adoption and strategic action plans for meat processing and production, awareness and training, and research reported that all meat shops should have facilities with air-conditioned areas for processing and sale, display chillers for holding the carcass/meat, sterilization, sanitation, tables and utensils made of stainless steel 304.

Kurugala (2022) in a study on the consumers consciousness of the quality of meat while purchasing from meat outlets in the area of Kaduwela municipal council in Sri Lanka, reported that most (56 percent) of the consumers visually assessed the cleanliness of the shops, 25 per cent of consumers assessed the hygiene of the meat handlers and only nine per cent assessed the technique of handling of meat shops.

Benli and Yildiz (2023) in a study on consumer perception of marbling and beef quality during purchase reported that about 58.1 per cent of consumers were not aware of marbling of meat they assumed it was one of the fatty portions of the meat.

Sahu *et al.* (2023) in their study on consumption patterns of meat and value-added meat products, reported that in Chhattisgarh consumers from all zones purchased meat shops from not having FSSAI or HACCP registration/ certification. They were unaware of the Food Safety and Standards Act regarding meat. Consumers from all zones reported that proper cooking of meat helps to kill all pathogens.

Materials and methods

3. MATERIALS AND METHODS

This section describes, in detail, the methods that have been used to conduct this study and are presented as follows:

3.1 Locale of the study

3.2 Sampling plan

3.3 Selection of variables

3.4 Operationalisation and measurement of variables

3.5 Method of data collection

3.6 Statistical tools used

3.1 LOCALE OF THE STUDY

The study was conducted among consumers of meat and meat products in Thrissur corporation area.

3.2 SAMPLING PLAN

Multistage sampling design was adopted for the study. In the first stage, Thrissur corporation was purposively selected. There are 55 divisions or wards in Thrissur corporation. For the purpose of this study, the divisions in Thrissur corporation were arbitrarily grouped into three contiguous zones based on physical proximity, *viz.* the eastern zone of 18 divisions, central zone of 18 divisions and the western zone containing 19 divisions. In the second stage of sampling, zones were considered as the sampling units and the list of divisions in each zone was prepared. Five divisions were selected at random from each zone so that a total of 15 divisions were selected for the study. The divisions selected for the study are given in Table 1.

Table 1. Selected divisions and zones

Eastern zone		Central zone		Western zone	
Division Selected	Division number	Division selected	Division number	Division Selected	Division number
Cherur	9	Viyyur	4	Punkunnam	1
Mullakkara	17	Patturaikkal	3	Kuttankulangara	2
Mannuthy	18	Peringavu	5	Poothole	38
Paravattani	14	Kuttumukku	7	Civil Station	54
Villadam	8	Kannamkulangara	34	Kottappuram	37

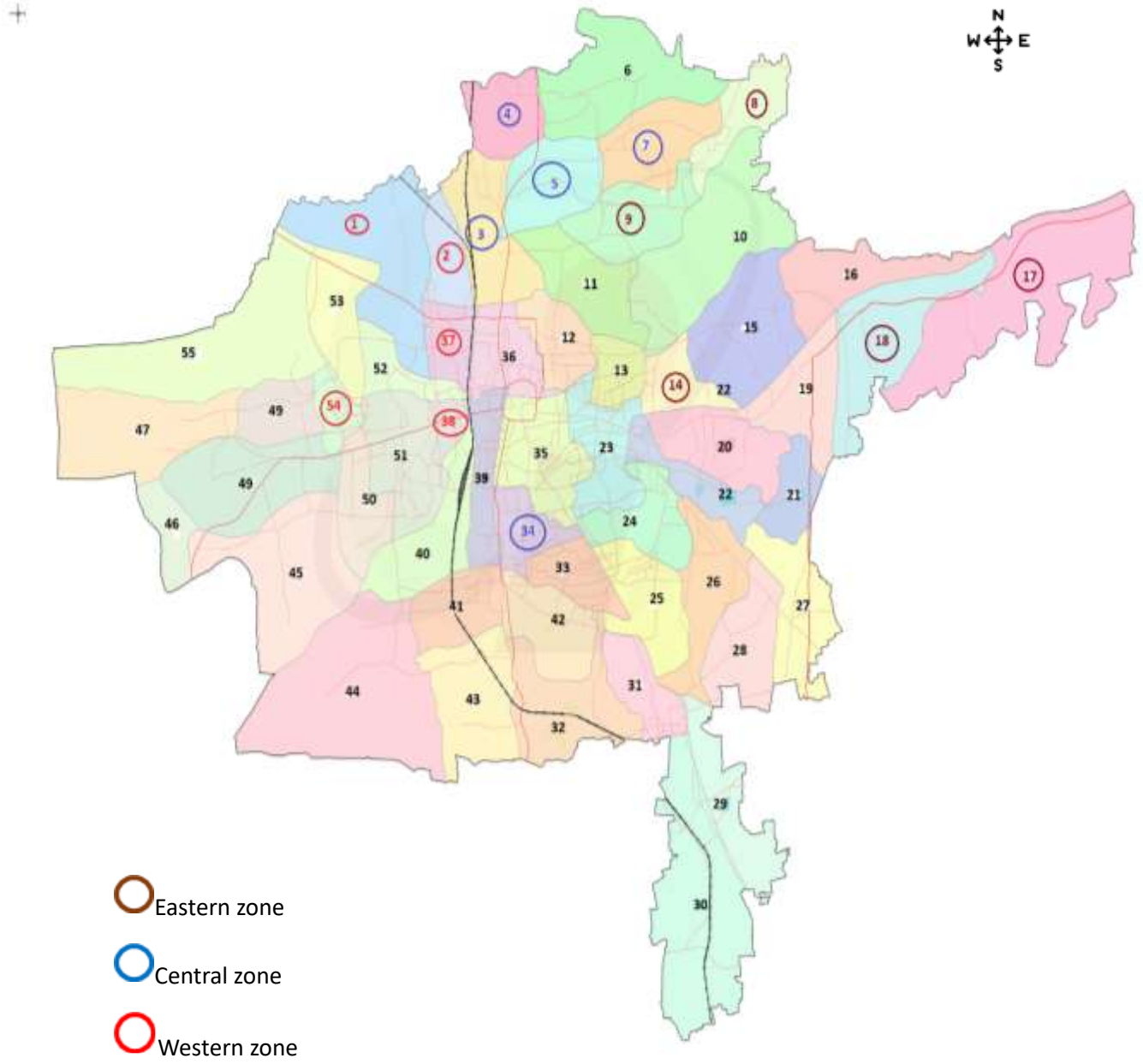


Fig. 1. Map of the study area (Thrissur corporation)

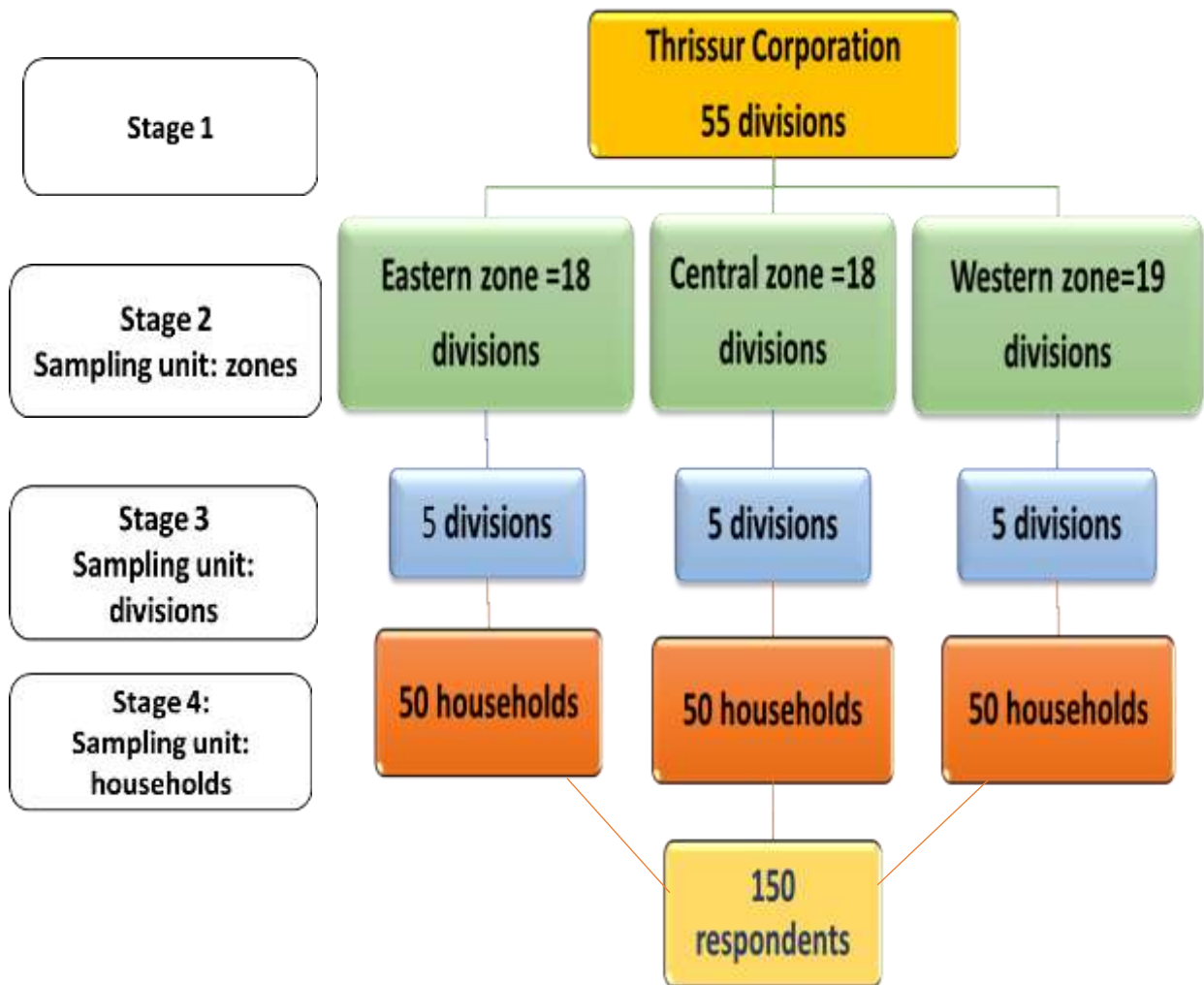


Fig. 2. Sampling plan

In the last stage of sampling, the household were considered as the sampling units. The lists of households in the selected divisions formed the sampling frame from which 10 households each that reportedly consumed meat and meat products were selected by simple random sampling by replacement. An adult member of the selected household was approached for collecting data. Thus, a total of 150 consumers spread over 15 divisions of Thrissur corporation formed the final sample of the study.

3.3 SELECTION OF VARIABLES

Eight background variables and other variables were selected based on the objectives of the study after thorough review of literature and discussion with experts. The selected variables along with the methods of assessment are discussed below.

3.4 OPERATIONALISATION AND MEASUREMENT OF VARIABLES

Table 2. Variables selected and assessment methods

Sl. No.	Variable	Assessment method
a) Background variables		
i.	Age	Structured schedule
ii.	Education	-do-
iii.	Gender	-do-
iv.	Marital status	-do-
v.	Type of family	-do-
vi.	Household size	-do-
vii.	Annual income	-do-
viii.	Occupation	-do-
b) Other variables		
i.	Factors pertaining to consumption of meat and meat products a. Consumer methods to assess meat quality b. Frequency of consumption of meat c. Preferred place of purchase of meat d. Reasons for preference of place of purchase e. Preferred meat type f. Preferred meat products	-do-
ii.	Extent of awareness of consumers about safety and quality of meat and meat products	Scale developed

3.4.1 Background variables of consumers

3.4.1.1 Age

Age was operationally defined as the number of years completed by the respondent at the time of the interview. Respondents were grouped into three categories with the following codes:

Category	Code
Young (less than 30 years)	1
Middle-aged (30 – 50 years)	2
Old (Above 50 years)	3

3.4.1.2 Education

Education was referred to as the respondents' completed years of formal education at the time of the interview. The respondents were classified into four categories based on their education level with the following codes:

Category	Code
Illiterate	0
Primary and Secondary	1
Higher Secondary	2
Graduate and above	3

3.4.1.3 Gender

Gender was operationalised as the gender to which the respondent identified with, either male or female. The respondents were assigned into two groups, male and female with the codes as follows.

Category	Code
Male	1
Female	2

3.4.1.4 Marital status

Marital status was referred as whether the respondent was married or not at the time of the study and the codes assigned were as follows.

Category	Code
Married	1
Unmarried	2

3.4.1.5 Type of family

Type of family was operationalised as either a joint or nuclear family, to which the respondent reportedly belonged to at the time of the study. The variable was categorised as follows with the codes indicated.

Category	Code
Joint family	1
Nuclear family	2

3.4.1.6 Household size

It was operationalised as the total number of family members residing in the respondents' household. The codes were given as follows.

Category	Code
Up to 4	1
5 – 7	2
More than 7	3

3.4.1.7 Annual income

It was operationally defined as the total income, in rupees, which was earned by family members through different sources. Consumers were categorised into three based on their annual income with the following codes.

Category	Code
Up to one lakh	1
1 – 10 lakhs	2
More than 10 lakhs	3

3.4.1.8 Occupation

It was operationalised as the major income generating vocation that the individual was reportedly engaged in to generate income. The respondents were categorised into four categories with the following codes.

Category	Code
Government job	1
Private job	2
Business	3
Others	4

3.4.2 Other variables

3.4.2.1 Factors pertaining to consumption of meat and meat products

3.4.2.1.1 Consumer methods to assess meat quality

Consumer methods to assess meat quality was operationalised as the organoleptic characteristics of meat that were used to judge the quality of meat and these included the colour, juiciness, tenderness, flavour and smell of meat. Respondents had to indicate their responses in the form of yes or no depending on whether a particular attribute was used by them for assessing meat quality.

Attributes of meat used by consumers for assessing meat quality	Response
Colour	Yes/No
Juiciness	Yes/No
Tenderness	Yes/No
Flavour	Yes/No
Smell	Yes/No

3.4.2.1.2 Frequency of consumption of meat

The frequency of consumption of meat was operationalised as the number of times meat was consumed during a specified period. The responses were categorised as follows with appropriate codes as follows.

Frequency	Code
Once or twice a day	1
3-4 times/week	2
1-2 times/week	3
Once a month	4

3.4.2.1.3 Preferred place of purchase of meat

This referred to the place where the consumer preferred to purchase meat such as university sales outlet, supermarkets, local meat stalls, online purchases and branded retail outlets. Responses were either yes or no for each option for place of purchase.

Preferred place of purchase of meat	Response
University sales outlets	Yes/No
Supermarkets	Yes/No
Local meat stall	Yes/No
Online purchase	Yes/No
Branded retail outlets	Yes/No

3.4.2.1.4 Reasons for preference of place of purchase

This indicated the reason behind the consumers preference for a place of purchase of meat. Various possible options to which responses were solicited included price of meat, availability of the desired meat, quality or freshness of meat available, cleanliness of meat shop, packaging, proximity of the shops, and trust due to previous acquaintance with the shop. Responses to each option were recorded as either yes or no.

Reason for preference of place of purchase	Response
Price of meat	Yes/No
Availability of the desired meat	Yes/No
Storage facilities	Yes/No
Quality and freshness of meat available	Yes/No
Cleanliness of meat shop	Yes/No
Packaging	Yes/No
Proximity of the shops	Yes/No
Previous acquaintance with the shop	Yes/No

3.4.2.1.5 Preferred meat type

Referred the species of meat that the consumer preferred to buy and included options poultry, chevon, beef, pork, and rabbit. This variable also included the consumers preference for fresh, frozen or chilled forms of the particular meats. Responses were obtained as yes or no for the given options.

Preferred meat type	Preferred form	Response
Poultry	Fresh	Yes/No
	Frozen	Yes/No
	Chilled	Yes/No
Chevon	Fresh	Yes/No
	Frozen	Yes/No
	Chilled	Yes/No
Beef	Fresh	Yes/No
	Frozen	Yes/No
	Chilled	Yes/No
Pork	Fresh	Yes/No
	Frozen	Yes/No
	Chilled	Yes/No
Rabbit	Fresh	Yes/No
	Frozen	Yes/No
	Chilled	Yes/No

3.4.2.1.6 Preferred meat products

This referred to the type of meat product that the customer preferred to buy. The various options included meat cutlets, sausages, hot dogs and nuggets, meat puffs and others. Responses were obtained as yes or no for the given meat product.

Preferred meat products	Response
Meat cutlets	Yes/No
Sausages	Yes/No
Hot dogs and nuggets	Yes/No
Meat puffs	Yes/No
Others	Yes/No

3.4.2.2 Extent of awareness of consumers about safety and quality of meat and meat products

Extent of awareness of consumers was operationally defined as the extent to which the customer knew about information on hygiene at the meat shop, hygiene of the meat handler, packed meat and meat products, meat quality, post buying hygienic meat handling practices, hygienic cooking and meat storage practices, optimum storage conditions and maximum consumption period of meat. Extent of awareness was assessed using a scale developed for the purpose. The scale was developed in various phases as follows:

Phase I:

In phase one of scale development, relevant domains and items pertaining to each domain were identified through discussion with subject experts from Meat Technology Unit, Mannuthy and the Department of Public Health, CVAS Mannuthy. Thus, a total of 70 items were listed under eight major domains to assess the awareness of the respondents but various domains and number of items under each domain were critically checked for grammatical errors or duplication of ideas after which ten statements were deleted. The 60 items that remained were then subjected to relevancy rating by a group of 30 judges that consisted of experts from Meat Technology Unit, Veterinary Public Health, Preventive Medicine and Livestock Production and Management. Judges were requested to rate each item on a three-point continuum *viz.* most relevant, relevant, and not relevant, with scores of three, two, and one respectively. The maximum score that a statement could fetch was 90 and the minimum score, 30. The midpoint of the scores was 60 and this was assumed to be the cut-off point for the selection of items. Items with scores of above 60 were selected for inclusion in the final scale (Kumar, 2003). Out of the 70 statements that had been initially identified, 60 were selected based on this criterion.

Phase II:

In phase two, content validation of the scale was done. Content validity was conceptualised as the extent to which the items in the measuring instrument were appropriate enough to represent the domain of content, according to various researchers (Waltz *et al.*, 2005; Polit and Beck, 2006). Waltz and Bausell (1981) proposed the 'Content Validity Index (CVI)' as a quantitative measure of content validity. The CVI is a measure of inter-rater agreement based on the expert ranking of items on a scale of relevance to the variable being assessed. Based on their experience and qualifications, a panel of nine subject matter experts were chosen to examine the content validity of the scale. The experts were asked to rank the relevance of the items on a four-point continuum, with scores of 4, 3, 2, and 1 for highly relevant, relevant, slightly relevant and not relevant, respectively. Item Content Validity Index (I-CVI) for each statement was then calculated as follows:

I-CVI = $\frac{\text{Number of experts giving a rating of 3 or 4}}{\text{Total number of experts}}$

Total number of experts

The items with I-CVIs of 0.78 and above were retained (Lynn, 1986), while the others were eliminated, based on the results of content validation. As a result 59 items were retained. The I-CVI values for items that were retained ranged from 0.78 to 1. The item-validated scale was then subjected to content validation at the scale level. The formula for calculating the scale level Content Validity Index (S - CVI) is given below:

$\frac{\text{Sum of I-CVIs}}{\text{Number of items}}$

S-CVI =

As a result, the S-CVI of the scale was calculated and determined to be 0.9. This demonstrated that the content validity of the scale was excellent according to Waltz *et al.* (2005).

Phase III:

In phase three, the reliability or internal consistency of the scale was determined using Cronbach's alpha coefficient. The content-validated scale was administered to 30 consumers who were selected randomly from a non-sampling area. Cronbach's alpha coefficient was then used to assess the internal consistency of the scale. The scale obtained an alpha coefficient of 0.89 which was deemed to be acceptable (Hair *et al.*, 2006). Since there was high internal consistency, all 59 items were selected for the final scale. The final scale is given in Appendix I.

The final scale developed was administered to the respondents under study. The consumers were asked to respond to each statement by giving a response of yes or no as answers to each statement which were then scored as one mark for yes and zero for no in the case of positive statements. The scoring pattern was reversed for negative statements. Thus the maximum score obtainable by the respondent was 59 and the minimum score was zero with respect to the variable awareness. The respondents were grouped into three categories, the highly aware group (HA group), the medium awareness group (MA group) and low awareness group (LA group) based on their awareness scores.

Domain wise total score was calculated and based on the scores, the respondents were grouped into three groups as High, Medium and Low awareness groups under each domain.

3.5 METHOD OF DATA COLLECTION

Data were collected by personal interview schedule using a structured pretested interview schedule.

The interview schedule developed was pre-tested among 30 respondents from the non-sampling area, Nadathara and Madakkathara panchayath for understanding ambiguities if any and the schedule was accordingly modified before final data collection.

3.6 STATISTICAL TOOLS USED

The data collected from the respondents were tabulated and analysed using SPSS (Statistical Product and Service Solutions) version 24.0 The statistical tools employed for data analysis are listed below.

1. Frequency
2. Percentage
3. Chi- square test
4. Fisher's exact test



Fig 3. Personal interview

Results

4. RESULTS

In this chapter, the results of the study are given under the following headings:

- 4.1 Socio-demographic characteristics of respondents
- 4.2 Factors pertaining to the consumption of meat and meat products
- 4.3 Extent of consumer awareness about safety and quality of meat and meat products
- 4.4 Relationship between demographic characteristics and meat consumption

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

4.1.1 Age

Table 3. Distribution of consumers based on age

n*=150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Young (less than 30 years)	11	7.40
2	Middle-aged (30-50 years)	77	51.30
3	Old (Above 50 years)	62	41.30
	Total	150	100

*Number of respondents

Data in Table 3 indicated that majority of the respondents were middle-aged (51.3 per cent) followed by older (41.3 per cent) and younger (7.4 per cent) age group respectively.

4.1.2 Education

Table 4. Distribution of consumers based on education

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Illiterate	0	0
2	Primary and secondary	33	22.00
3	Higher secondary	56	37.30
4	Graduate and above	61	40.70
	Total	150	100

Data in Table 4 revealed that 40.7 per cent of the respondents were graduates and above and 37.3 per cent of consumers had higher secondary education and 22

per cent had primary and secondary education. None of the respondents was found to be illiterate.

4.1.3 Gender

Table 5. Distribution of consumers based on gender

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Male	52	34.70
2	Female	98	65.30
	Total	150	100

The data in Table 5 indicated that the majority of the respondents (65.3 per cent) were female and 34.7 per cent were male.

4.1.4 Marital status

Table 6. Distribution of consumers based on marital status

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Married	145	96.70
2	Unmarried	5	3.30
	Total	150	100

The majority (96.7 per cent) of the respondents were married and 3.3 per cent of them were unmarried as per data indicated in Table 6.

4.1.5 Type of family

Table 7. Distribution of consumers based on type of family

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Joint family	33	22.00
2	Nuclear family	117	78.00
	Total	150	100

It can be inferred from Table 7 that 78 per cent of consumers were from nuclear families and 22 per cent were from joint families.

4.1.6 Household size

Table 8. Distribution of consumers based on household size

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Up to 4	118	78.70
2	5 - 7	29	19.30
3	More than 7	3	2.00
	Total	150	100

The data in Table 8 indicated that the majority of the respondents had a family size of up to four members (78.7 per cent) followed 19.3 per cent of consumers who had a family size of five to seven members and a mere two per cent came from large families of more than seven members.

4.1.7 Annual income

Table 9. Distribution of consumers based on annual income

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Up to one lakh	50	33.30
2	1 – 10 lakhs	100	66.70
3	More than 10 lakh	0	0
	Total	150	100

Table 9 revealed that the majority of the consumers (66.7 per cent) had an annual income of between one and ten lakh while rupees only 33.3 per cent had an income of less than one lakh rupees. None of the respondents reported an income of more than ten lakh rupees per year.

4.1.8 Occupation

Table 10. Distribution of consumers based on occupation

n = 150

Sl. No.	Category	Frequency (f)	Per cent (%)
1	Government job	13	8.70
2	Private job	49	32.70
3	Business	45	30
4	Others	43	28.70
	Total	150	100

Data in Table 10 revealed that private jobs (32.7 per cent) and businesses (30 per cent) were the major occupations of consumers followed by other jobs (28.7 per cent) and government jobs (8.7 per cent).

4.2 FACTORS PERTAINING TO CONSUMPTION OF MEAT AND MEAT PRODUCTS

4.2.1 Consumer methods to assess meat quality

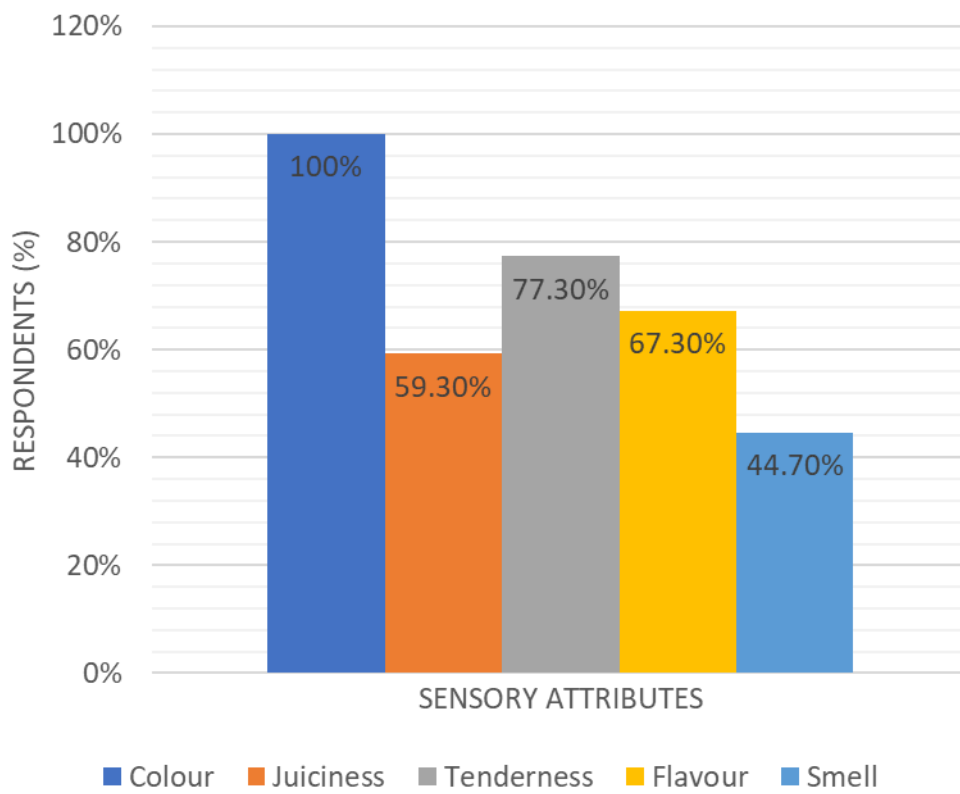
Table 11. Distribution of consumers based on attributes of meat used by consumers for assessing meat quality

n = 150

Sl. No.	Sensory attributes of meat used by consumers for assessing meat quality	Response	Frequency (f)	Per cent (%)
1	Colour	Yes	150	100
		No	0	0
2	Juiciness	Yes	89	59.30
		No	61	40.70
3	Tenderness	Yes	116	77.30
		No	34	22.70
4	Flavour	Yes	101	67.30
		No	49	32.70
5	Smell	Yes	67	44.70
		No	83	55.30

It is apparent from Table 11 that all the consumers relied to a greater extent on the colour of meat to assess meat quality. Tenderness was used as a criterion by 77.3 per cent, flavour by 67.3 per cent, juiciness by 59.3 per cent and smell by 44.7 per cent of the respondents.

Fig 4. Distribution of consumers based on attributes of meat used by consumers for assessing meat quality



4.2.2 Frequency of consumption of meat

Table 12. Distribution of consumers based on the frequency of consumption of meat

n = 150

Sl. No.	Frequency of consumption of meat	Frequency (f)	Per cent (%)
1	Daily	0	0
2	1 – 2 times/week	110	73.30
3	3 – 4 times/week	40	26.60
4	Once a month	0	0
	Total	150	100

Majority (73.3 per cent) of the consumers consumed meat one to two times a week while the remaining 26.6 per cent prefer to consume meat three to four times a week and none of the respondents reported that they consumed meat everyday.

4.2.3 Preferred place of purchase of meat

Table 13. Distribution of consumers based on the preferred place of purchase of meat

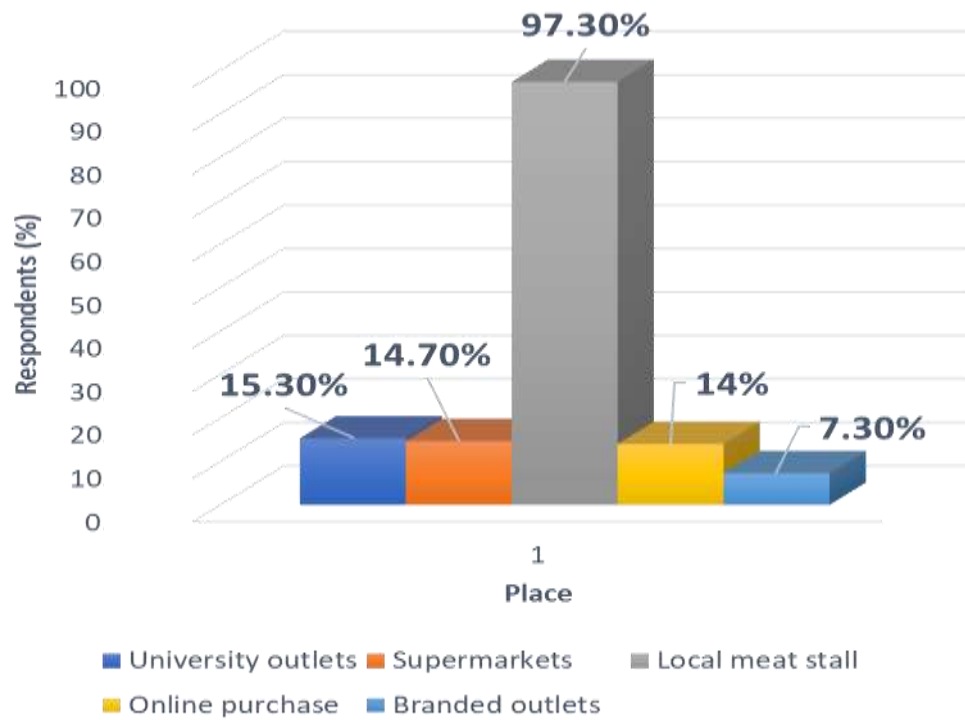
n = 150

Sl. No.	Preferred place of purchase of meat	Response	Frequency (f)	Per cent (%)
1	University sales outlet	Yes	23	15.30
		No	127	84.70
2	Supermarkets	Yes	22	14.70
		No	128	85.30
3	Local meat stall	Yes	146	97.30
		No	4	2.70
4	Online purchase	Yes	21	14.00
		No	129	86.00
5	Branded retail outlets	Yes	11	7.30
		No	139	92.70

The data in Table 13 indicated that 97.3 per cent of consumers preferred to purchase meat from local meat stalls while 15.3 per cent favoured university outlets

and 14.7 per cent preferred supermarkets. Results also indicated that 14 per cent of consumers preferred online purchases while 7.3 per cent made their purchases from branded retail outlets.

Fig 5. Distribution of consumers based on the preferred place of purchase of meat



4.2.4 Reason for preference of place of purchase

Table 14. Distribution of consumers based on the reason for preference of place of purchase

n = 150

Sl. No.	Reason for preference of place of purchase	Response	Frequency (f)	Per cent (%)
1	Price of meat	Yes	51	34.00
		No	99	66.00
2	Availability of the desired meat	Yes	52	34.70
		No	98	65.30
3	Storage facilities	Yes	132	88.00
		No	18	12
4	Quality and freshness of meat available	Yes	150	100
		No	0	0
5	Cleanliness of meat shop	Yes	137	91.30
		No	13	8.70
6	Packaging	Yes	58	38.70
		No	92	61.30
7	Proximity of shop	Yes	75	50
		No	75	50
8	Previous acquaintance with the shop	Yes	49	32.70
		No	101	67.30

According to the data in Table 14, all the consumers reported that quality and freshness of meat was the important criterion influencing their decision to select a place to purchase of meat and meat products. Other important criteria were cleanliness of meat shop (91.3 per cent), storage facilities (88 per cent) and proximity of meat shop (50 per cent), good packaging of meat (38.7 per cent), availability of the desired meat (34.7 per cent) and price of meat (34 per cent) in the descending order.

4.2.5 Type of meat preferred

Table 15. Distribution of consumers based on the type of meat preferred

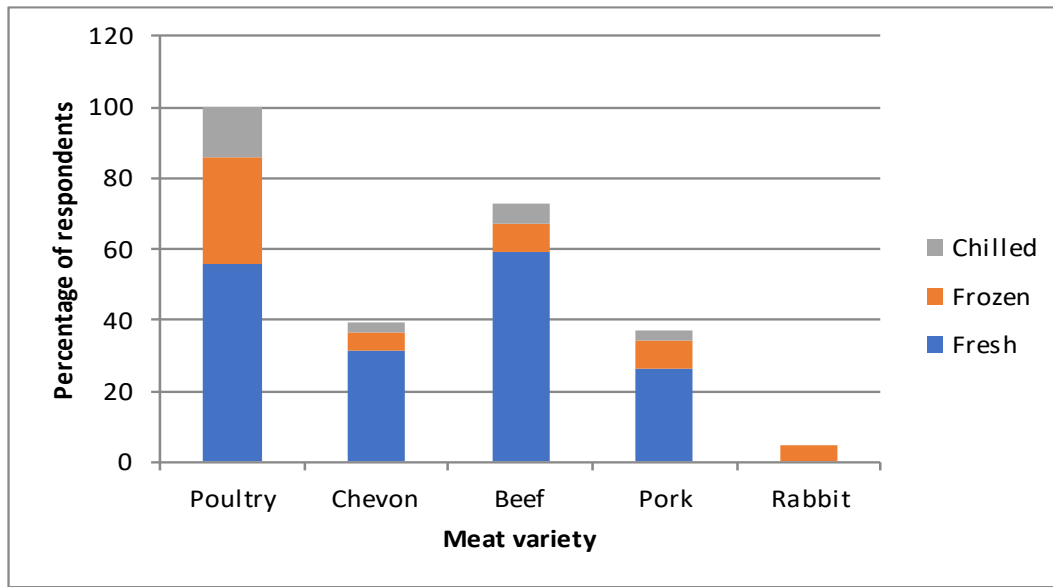
n = 150

Sl. No.	Preferred meat type	Preferred form	Frequency (f)	Per cent (%)
1	Poultry	Fresh	84	56.00
		Frozen	45	30.00
		Chilled	21	14.00
2	Chevon	Fresh	47	31.30
		Frozen	8	5.30
		Chilled	4	2.70
3	Beef	Fresh	89	59.30
		Frozen	12	8.00
		Chilled	8	5.30
4	Pork	Fresh	39	26.00
		Frozen	12	8.00
		Chilled	5	3.30
5	Rabbit	Fresh	0	0
		Frozen	7	4.70
		Chilled	0	0

Consumer preferences for various types and forms of meat is illustrated in Table 15. From the data, it is evident that poultry meat was the most preferred choice of type of meat with all the consumers. This was followed by beef (72.6 per cent), chevon (39.3 per cent), pork (37.3 per cent) and rabbit (4.7 per cent) in the said order. The majority of poultry meat consumers (56 per cent) preferred fresh meat, 30 per cent preferred frozen meat and only 14 per cent of them preferred chilled meat. In the case of beef consumers, 59.3 per cent preferred fresh meat and eight per cent frozen meat and last 5.3 per cent preferred chilled meat. Whereas 31.3 per cent of consumers of chevon preferred to buy fresh meat followed by 5.3 per cent who preferred frozen meat and 2.7 per cent who preferred chilled meat. It was also observed that among consumers of pork, 26 per cent preferred fresh meat and eight per cent preferred frozen meat whereas 3.3 per cent preferred chilled meat.

Frozen meat was preferred by 4.7 per cent of the consumers of rabbit meat consumers.

Fig 6. Distribution of consumers based on the type of meat preferred



4.2.6 Preferred meat products

Table 16. Distribution of consumers based on preferred meat products

n = 150 for each preferred meat products

Sl. No.	Preferred meat products	Frequency (f)	Per cent (%)
1	Meat cutlets	141	94
2	Sausages	85	56.60
3	Hotdogs and nuggets	63	42
4	Meat puffs	146	97.30

Table 16 indicated that the meat puffs were the most preferred meat products (97.3 per cent) and thus was followed by cutlets (94 per cent), sausages (56.6 per cent) and hot dog nuggets (42 per cent) in that order.

4.3 EXTENT OF CONSUMER AWARENESS ABOUT SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS

4.3.1 Domain-wise awareness of consumers

4.3.1.1 Hygiene at the meat shop

Table 17. Item-wise analysis of consumers based on various purchases on hygiene at the meat shop

n = 150

Sl. No.	Awareness about hygiene at the meat shop	Aware	
		Frequency (f)	Per cent (%)
1	Buying meat only from shops having updated FSSAI safety license registration	107	71.30
2	It is not necessary to display FSSAI license at a prominent location in a meat shop*	116	77.30
3	Meat shop should be located in an area that is free from objectionable odour, smoke, dust, and other contaminants	137	91.30
4	The consumer need not be aware of the minimum standard of quality guidelines issued by FSSAI*	115	76.70
5	Buying meat from shops that have an adequate light source, ventilation, clean water, and proper disposal of slaughter waste	135	90
6	It is fine to buy chicken from a chicken stall don't have Separate areas for processing and stocking chicken*	63	42
7	It is preferable to buy meat from a meat shop which hangs the carcass in the open area (in front of a stall) *	67	44.70
8	Meat sold in meat shops should be kept chilled (0- 4°C)	30	20
9	Buying meat from a shop without refrigerators or other chilling facilities*	66	44
10	Buying meat from a meat shop where there is blood on the wall and slaughter waste on the floor*	143	95.30
11	Meat stall should have an insectocutor	144	96

*negative statements

Results with respect to the awareness of consumers based on the extent of awareness about hygiene at the meat stall (Table 17) that indicated among all statements, consumers were well aware about the need for insectocutor at stalls (96 per cent), followed by the need for cleanliness of the wall and floor of meat stalls (95.3 per cent). Majority of the consumers were aware that meat should be bought from shops that were free from bad odour, smoke, dust and other contaminants (91.3 per cent) and shops selling meat should have adequate light it was also evident that ventilation, clean water and facilities for proper disposal of slaughter waste (90 per cent). It was also evident that 77.3 per cent of respondents were aware that FSSAI license should be displayed at a prominent location in a meat shop. The results also shed light on the fact that 76.7 per cent of consumers were aware of the FSSAI minimum standard of the quality guidelines and that 71.3 per cent of consumers knew that meat should be bought from shop that were registered with FSSAI safety license. The result also indicated that 44.6 per cent of the respondents were aware of consequences of buying meat from shops where carcasses were hung in open area, only 42 per cent consumers were aware that there should be a separation of processing and stocking areas in chicken stalls. Similarly, only 44 per cent of consumers were aware of the fact that there should be facilities for chilling at the meat shop and only 20 per cent of them were aware of the need to keep meat for sale shops chilled between 0 to 4 °C.

Table 18. Distribution of consumers based on overall awareness about hygiene at the meat shop

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0 – 3)	1	0.67
2	Medium (4 – 7)	77	51.33
3	High (8 – 11)	72	48
	Total	150	100

The results of Table 18 indicate that majority of the consumers had (51.33 per cent) a medium level of awareness about the hygiene at the stall. It was also

evident that 48 per cent of the consumers were highly aware about this domain while only 0.67 per cent had a level of low awareness.

4.3.1.2 Hygiene of the meat handlers

Table 19. Item-wise analysis of consumers based on various practices on hygiene of the meat handler

n = 150

Sl. No.	Hygiene of the meat handler	Aware	
		Frequency (f)	Per cent (%)
1	Cleanliness of the meat handlers dress will not affect the meat quality*	137	91.30
2	Annual medical examination and inoculation of meat handlers against the enteric group of diseases should be done as per recommended schedule	16	10.70
3	Persons suffering from a disease or illness or with open wounds or burns can be involved in the handling of meat*	139	92.70
4	It is not necessary that meat handlers maintain personal cleanliness and hygiene (hand washing, no watch, no loose jewellery, no smoking, no spitting, trimmed nails) *	150	100
5	There is no requirement for meat handlers to wear suitable aprons, gloves, headgear wherever necessary*	138	92.00
6	All equipment, implements, tables, utensils including knives, saws, mechanical instruments and containers should be cleaned and sanitized at the start and end of each work day and whenever required	142	94.70
7	All utensils and tables coming in contact with the meat should be stainless steel	111	74.00

*negative statement

Data in Table 19 showed that all the consumers were aware of the need for meat handlers to maintain standards of personal cleanliness and hygiene conditions, 94.7 per cent were aware that meat stall equipment should be cleaned and sanitized at the start and end of each workday day and whenever required and 92.7 per cent were aware that the meat handlers should be free from the disease or illness or with open wounds or burns involved in the handling of meat. The results also shed light on the fact that 92 per cent of consumers were aware of the requirement of aprons, gloves and headgear of meat handlers and 91.3 per cent of consumers were aware that the cleanliness of the meat handlers dress would affect the meat quality and 74 per cent were aware of utensils and tables coming in contact with the meat should be that stainless steel. However only, 10.7 per cent of consumers knew that were aware of meat handlers should undergo medical examination and inoculation against the enteric group of disease every year.

Table 20. Distribution of consumers based on overall awareness about various practices on hygiene of the meat handler

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0-2)	4	2.70
2	Medium (3-5)	126	84
3	High (6-7)	20	13.30
	Total	150	100

Table 20 revealed that the majority (84 per cent) of the consumers had a medium level of awareness about the hygiene of the handler, only 13.3 per cent of consumers had high awareness and just 2.7 per cent of consumers had a low-level of awareness about this domain.

4.3.1.3 Awareness regarding meat quality

Table 21. Item-wise analysis of consumers based on meat quality

n = 150

Sl. No.	Meat quality	Aware	
		Frequency (f)	Per cent (%)
1	Meat quality depends on its composition	57	38
2	When purchasing meat, give little consideration to the meat's quality*	74	49.30
3	Lean to-fat ratio is a compositional quality of meat	53	35.30
4	Marbling is one of the most important traits determining the quality of meat	11	7.30
5	Always make sure that meat is firm to touch, has no yellow or green discolorations, stickiness/sliminess, and off-odours, fungal formation	116	77.30
6	Which among the following sensory characteristics can be used to judge the quality of meat products, tick the right ones a) Colour b) Smell c) Texture d) Taste f) All	86	57.30
7	The safety of meat is not impacted by adulteration with lower-quality meat*	144	96
8	The safety of meat is not impacted by chemical residue in meat with contaminants such as pesticides, and hormones*	135	90
9	Meat that has been properly bled is healthier than meat that has not been properly bled	71	47.30
10	In slaughterhouse, rubbing of fresh blood on the meat surface leads to contamination of the meat	64	42.60
11	The meat is still edible if it has blood spots and blemishes*	132	88

*negative statements

Table 21 illustrated that 96 per cent of the consumers were aware that adulteration of meat with lower quality meat compromised the safety of meat and 90 per cent were aware that chemical residues in meat due to contaminants such as pesticides, and hormones also affected meat quality. It was also evident from the study that 88 per cent of consumers knew that the presence of any blood spots and blemishes would make meat inedible and 77.3 per cent of them knew that one always had to ensure that meat purchased for home use was firm to touch with no yellow or green discoloration. No stickiness/sliminess and off-odour or fungal formation at the time of purchase or at the time of cleaning. Result also indicated that 57.3 per cent of the consumers were aware of using sensory characteristics like colour, smell, texture and taste to judge the quality of the meat products. It can also be inferred from the results that 49.3 per cent of the consumers were aware that due consideration to the meat quality at the time of meat purchase should be given; 47.3 per cent were aware that properly bled meat was healthier than meat that had not been properly bled; 42.6 per cent consumers knew that the presence of fresh blood on the meat at the time of purchase of meat could lead to contamination. It was also evident that fewer consumers were aware of the fact that the composition of meat influences meat quality (38 per cent); 35.3 per cent of were aware of lean to fat ratio and marbling was the one of the most important traits for determining the quality of meat (7.3 per cent).

Table 22. Distribution of consumers based on overall awareness about meat quality

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0 – 3)	0	0
2	Medium (4 – 7)	112	74.70
3	High (8 – 11)	38	25.30
	Total	150	100

Regarding the overall domain-wise awareness of consumers awareness about various practices related to meat quality, it was evident from Table 22 that 74.7 per cent of the consumers had medium level of awareness and 25.3 per cent had high awareness. None of the respondents had low awareness.

4.3.1.4 Packed meat and meat products

Table 23. Item-wise analysis of consumers based on various practices related to packed meat and meat products

n = 150

Sl. No.	Packed meat and meat products	Aware	
		Frequency (f)	Per cent (%)
1	Fresh/wet meat is safer to consume than frozen/chilled packed meat*	83	55.30
2	When purchasing meat, one should read the label to know the nutritional factors and handling of the package	84	56
3	There is no need to check the manufacturing and expiry date before buying meat*	68	45.30
4	All packaged meat and meat products must carry the FSSAI labelling requirement and contain requisite information as per regulations	136	90.70
5	It is acceptable that the meat package with tears holes or excessive amounts of fluid*	150	100
6	It is not necessary to use tongs and gloves when handling meat items that are ready to consume*	148	98.70
7	It is a good practice to ensure that the meat package is completely sealed before purchase	148	98
8	It is fine to buy meat that is wrapped in newspaper or any ordinary paper	133	88.70
9	Coloured/ recycled plastic bags can be used for carrying meat*	124	82.70
10	Only virgin (75 microns) packing materials should be used to pack meat	106	70.70

*negative statements

It was evident from the data in Table 23 that all the studied consumers were aware that they should not accept the meat packets that were torn or with excessive amounts of fluid, whereas 98.7 per cent of consumers were aware of using tongs and gloves when handling meat items, and that meat package should be checked for seals before purchase (98 per cent). It was also clear that 90.7 per cent of the consumers knew that one should check for the FSSAI label before purchase, and that the meat should not be wrapped in newspaper or any ordinary paper (88.7 per cent); 82.7 per cent of the consumers knew that coloured /recycled plastic bags should not be used for carrying meat, while 70.7 per cent were aware that only virgin (75 microns) packing materials should be used to pack meat. The results also showed that 56 per cent of consumers were aware of the importance of reading the label to know the nutritional factors and guidelines for handling the package, 55.3 per cent were aware that frozen/chilled packed meat was safer than freshly hung meat, but only 45.3 per cent checked the manufacturing and expiry date when buying packed meat.

Table 24. Distribution of consumers based on overall awareness about packed meat and meat products

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0-3)	0	0
2	Medium (4-7)	97	64.70
3	High (8-10)	53	35.30
	Total	150	100

It can be observed from Table 24 that 64.7 per cent of the consumers had a medium level of awareness level about 35.3 per cent had a high level of awareness about this domain. None of the respondents had a low level of awareness regarding packed meat and meat products.

4.3.1.5 Post buying hygienic meat handling practices for consumers

Table 25. Item-wise analysis of consumers based on various practices on post buying hygienic meat handling

n = 150

Sl. No.	Post buying hygienic meat handling practices for consumers	Aware	
		Frequency (f)	Per cent (%)
1	Always wash hands with soap and warm water for 20 seconds before and after handling meat/meat products	103	68.70
2	After cutting raw meat, cleaning of cutting board, knife, and countertops with hot, soapy water is not necessary*	133	88.70
3	It's safe to keep raw meat with other foods in your grocery shopping cart, grocery bags, and refrigerator *	150	100
4	Using the same cutting board and knife for raw meat and vegetables is not harmful to our health *	110	73.30
5	Never place cooked food on a plate that previously held raw meat unless the plate has been washed in hot, soapy water	150	100

*negative statements

The results in Table 25 depicted that all the consumers were aware that it was not advisable to keep raw meat in the refrigerator with other vegetable and food items, and that these should be kept separate in the grocery shopping cart and grocery bags. All the respondents were aware that cooked food should not be taken in a plate on which raw meat had been kept unless the plate had been washed in hot, soapy water. Majority of the respondents were aware that the cutting board, knife and countertop should be cleaned with hot soapy water after cutting raw meat (88.7 per cent) and separate cutting boards should be used for cutting raw meat and

vegetable (73.3 per cent). Also, 68.7 per cent of the respondents were aware of the importance of washing hands before and after handling meat and meat products.

Table 26. Distribution of consumers based on overall awareness about post buying hygienic meat handling practices

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0-1)	0	0
2	Medium (2-3)	18	12
3	High (4-5)	132	88
	Total	150	100

Table 26 revealed that 88 per cent of the consumers had a high level of awareness about post buying hygienic meat handling practices and the 12 per cent had medium awareness. None of the respondents had low awareness about the post buying hygienic meat handling practices

4.3.1.6 Awareness regarding meat storage practices

Table 27. Item-wise analysis of consumers based on various practices related to meat storage

n = 150

Sl. No.	Meat storage practice	Aware	
		Frequency (f)	Per cent (%)
1	Ideally while storing meat at home it should be kept, a) In the freezer b) In refrigerator c) Marinated d) At room temperature	150	100
2	Which techniques are used to defrost meat at home? a) In the refrigerator b) In cold water c) In the microwave d) At room temperature	67	44.60
3	Defrosting meat at room temperature won't result in any microbial contamination *	57	38
4	Defrost meat should be cooked immediately.	137	91.30
5	The quality of meat does not change by frequent freezing and thawing*	70	46.60
6	Holding meat and meat products at room temperature for a long duration is not a good practice	127	84.60
7	Cooked meat kept at room temperature for more than 2 hours should be discarded	15	10
8	Simply immerse the frozen meat directly in the water for defrost without putting it in a proper bag or container *	67	44.60

*negative statements

Data in the Table 27 showed that all the consumers were aware of ideal storage of meat should kept in the freezer; 91.3 per cent of consumers knew that defrosted meat should be cooked immediately after thawed, 84.6 per cent were aware that holding meat and meat products at room temperature for a long duration

was not a good practice; while 46.6 per cent of consumers were aware that frequent freezing and thawing could affect the quality of meat, 44.6 percent of consumers were aware of defrost of meat should done in the refrigerator, microwave, or in cold water and 44.6 percent of them used to submerge frozen meat in water for defrost without being placed in an appropriate bag or container, 38 per cent of the respondents were aware that defrosting of meat should not done at room temperature caused microbial contamination and only 10 per cent of the consumers were aware that cooked meat should be kept in refrigerator if they want to store it for more than two hours.

Table 28. Distribution of consumers based on overall awareness about meat storage practices

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0 – 2)	1	0.60
2	Medium (3 – 5)	120	80
3	High (6 – 8)	29	19.30
	Total	150	100

Data in Table 28 revealed that most of the consumers (80 per cent) had a medium level of awareness about 19.3 per cent who had high level of awareness. Only 0.6 per cent of the consumers had low level of awareness regarding the domain meat storage practices.

4.3.1.7 Optimum storage conditions and consumption period for meat

Table 29. Item-wise analysis of consumers based on various practices on optimum storage conditions and consumption period for meat

n = 150 for each statement

Sl. No.	Optimum storage conditions and consumption period for meat	Aware	
		Frequency (f)	Per cent (%)
1	Chilled meat must be stored at 0-4°C for short-term storage	23	15.30
2	Frozen Meat must be stored at -18°C or below for long term storage.	117	78
3	Chilled meat should be consumed within 2 to 4 days of storage under normal chilling conditions (0-4°C)	44	29.30
4	Frozen meat can be consumed within a few months (10-12 months)	41	27.30

Table 29 illustrated that 78 per cent of the consumers were aware of the ideal temperature for long term storage of frozen meat, 29.3 per cent were aware that chilled meat can be consumed within two to four days if stored under proper storage conditions, 27.3 per cent of them were aware that frozen meat could be consumed within a few months if kept under proper storage temperature and only 15.3 per cent were aware about the proper storage temperature of chilled meat.

Table 30. Distribution of consumers based on overall awareness about optimum storage conditions and consumption period for meat

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0-1)	77	51.30
2	Medium (2- 3)	72	48
3	High (4)	1	0.67
	Total	150	100

Table 30 revealed that the majority (51.3 per cent) of the consumers had low awareness about optimum storage conditions and consumption period for meat, while 48 per cent and 0.67 per cent had medium and high levels of awareness respectively.

4.3.1.8 Hygienic cooking practices

Table 31. Item-wise analysis of consumers based on various practices related to hygienic cooking practices

n = 150

Sl. No.	Hygienic cooking practices	Aware	
		Frequency (f)	Per cent (%)
1	Cooked meat can be kept overnight and reheated the next day for consumption*	134	89.30
2	Meat must be cooked to a safe minimum internal temperature of 72-75°C to destroy any harmful bacteria	150	100
3	Zoonotic diseases can be transmitted by consuming improperly cooked meat and meat products	138	92

*negative statements

The data in Table 31 showed that all consumers were aware that meat should be cooked to a safe minimum internal temperature of 72-75 °C to destroy bacteria while 92 per cent were aware that improperly cooked meat could result in transmission of zoonotic disease and 89.3 per cent were aware that it was not good to keep the cooked meat overnight under room temperature before consumption in the succeeding day.

Table 32. Distribution of consumers based on overall awareness about hygienic cooking practices

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	Low (0 - 1)	1	0.7
2	Medium (2)	26	17.3
3	High (3)	123	82
	Total	150	100

Data in Table 32 illustrated that more than three-fourths of the consumers (82 per cent) had high level of awareness while 17.3 per cent and 0.7 per cent had the medium and low level of awareness about hygienic cooking practices.

4.3.2 Total awareness of consumers about safety and quality of meat and meat products

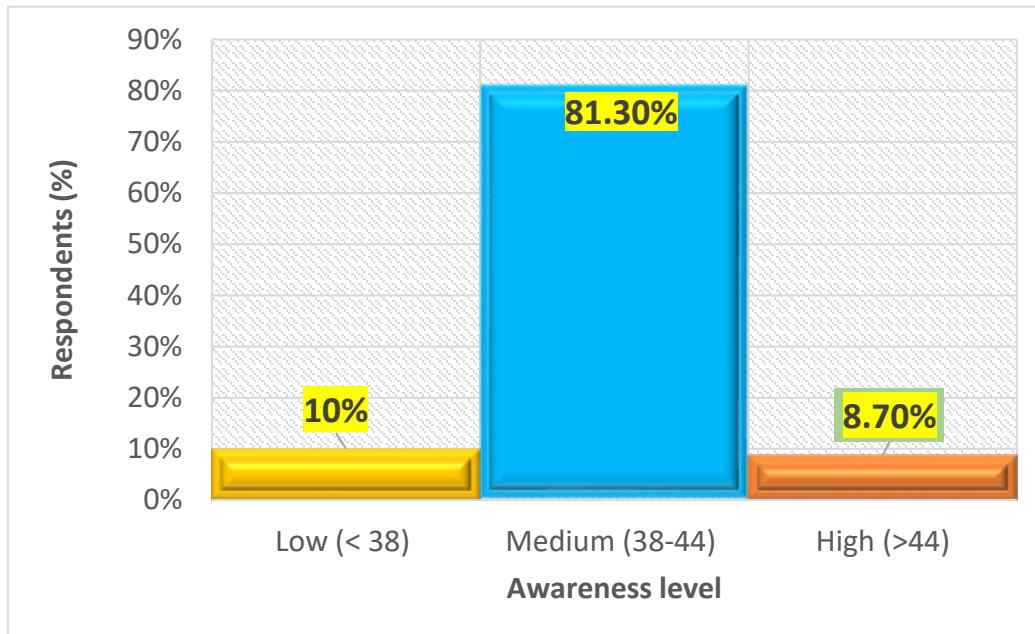
Table 33. Total awareness of consumers on safety and quality of meat and meat products

n = 150

Sl. No.	Scores	Frequency (f)	Per cent (%)
1	< 38	15	10
2	38-44	122	81.3
3	>44	13	8.7
	Total	150	100

From data in Table 33 it can be inferred that with respect to the extent of awareness of consumers about the safety and quality of meat and meat products, 81.3 percent of consumers had a medium level of awareness while 10 per cent of consumers had a low level of awareness only 8.7 per cent consumers had a high level of awareness.

Fig 7. Total awareness of consumers on safety and quality of meat and meat products



4.4 RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND MEAT CONSUMPTION

Table 34. Association between background variable and frequency of meat consumption

Sl. No.	Background variable	Independent variable	p value
1	Annual income	Frequency of meat consumption	0.042*
2	Household size		0.801
3	Education		0.076
4	Occupation		0.404
5	Age		0.998

*(p<0.05)

It could be observed from Table 34 that there was a significant association ($p < 0.05$) between annual income and the frequency of meat consumption and there was no significant association between other demographic variables and the frequency of meat consumption.

Table 35. Association between frequency of meat consumption and annual income

n = 150

Frequency of meat consumption			Annual income	
			Up to one lakh	One to ten lakh
1	1-2 times/week	Frequency	21	89
		Per cent (%)	60	77.4
2	3-4 times/week	Frequency	14	26
		Per cent (%)	40	22.6
	Total	Frequency	35	115
		Per cent (%)	23.3	76.7
	p value	0.042*		

* $p < 0.05$

Evidence from the Table 35 showed as per Chi- square test that there was a significant ($p < 0.05$) association between annual income and frequency of meat consumption. Among the respondents with annual income of up to one lakh, 60 per cent of the consumers consumed meat one to two per week and 40 per cent of the consumers consumed meat three to four times per week. Among the respondents 77.4 per cent of consumers with incomes of within one to ten lakh consumed meat one to two times per week and only 22.6 percent consumed meat three to four times per week.

Table 36. Association between domain-wise awareness about safety and quality of meat and meat products of consumers and background variables

n = 150

Sl. No.	Awareness of consumers on safety and quality of meat and meat products	Background variables		
		Age	Education	Occupation
		p value	p value	p value
1	Hygiene at the meat shop	0.608	0.882	0.414
2	Hygiene of the meat handlers	0.517	0.009**	0.405
3	Meat quality	0.379	0.619	0.593
4	Packed meat and meat products	0.343	0.723	0.808
5	Post-buying hygienic meat handling practices for consumers	0.587	0.275	0.226
6	Meat storage practice for consumer	0.564	0.521	0.133
7	Optimum storage conditions and consumption period for meat	0.435	0.563	0.912
8	Hygiene cooking practice	0.992	0.538	0.788

**p<0.01

It can be inferred from Table 36 that there was a association between consumers education level and awareness of consumers about hygiene of meat handlers and there was no significant association between the other consumers background variables and their domain-wise awareness about safety and quality of meat and meat products.

Table 37. Association between consumers education level and consumers awareness about the hygiene of meat handler

n = 150

Education level			Awareness score on total hygiene of the meat handler				
			3	4	5	6	7
1	Primary and secondary	Frequency (f)	3	5	5	16	4
		Per cent with in each sore (%)	75	41.7	11.9	20	33.3
2	Higher Secondary	Frequency (f)	1	2	20	26	7
		Per cent with in each sore (%)	25	16.7	47.6	32.5	58.3
3	Graduate and above	Frequency (f)	0	5	17	38	1
		Per cent with in each sore (%)	0	41.7	40.5	47.5	8.3
4	Total	Frequency (f)	4	12	42	80	12
		Per cent of consumers with different scores (%)	2.7	8	28	53.3	8
p value			0.007**				

**p<0.01

Analysis using Fisher's exact test (Table 37) indicated that there was a significant association ($p < 0.01$) between the education of the respondent and awareness about the hygiene of meat handlers. Most of the respondents (53.3 per cent) had a score of six and among them 47.5 per cent had education of graduate and above. Only 20 per cent had primary and secondary education and 32.5 per cent with higher secondary education. The lowest score three was obtained by only 2.7 per cent respondents. The per cent of consumers with lowest score, three was only 2.7 per cent. Among them 75 per cent were with primary and secondary education, 25 per cent were with higher secondary. None of the consumers with education of graduate and above obtained the lowest score.

Discussion

5. DISCUSSION

In this chapter, the analyses of the results are discussed and presented under the following headings:

- 5.1 Socio-demographic characteristics of respondents
- 5.2 Factors pertaining to the consumption of meat and meat products
- 5.3 Relationship between demographic characteristics and factors related to meat consumption
- 5.4 Extent of consumer awareness about safety and quality of meat and meat products

5.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The demographic characteristics of the respondents studied were age, education, gender, marital status, type of family, household size, annual income and occupation.

5.1.1 Age

The results of this study with respect to age of the meat consumers revealed that 51.3 per cent fell in the middle age group (between 30 to 50 years of age). The findings were quite similar to that of Kiran *et al.* (2018) where 55 per cent of the meat consumers in South India were middle-aged with age between 30 to 44 years. Bafanda *et al.* (2017) in a study regarding awareness on meat hygiene and associated health hazards, reported similar findings. The study reported that majority of the meat consumers in Jammu District of Jammu and Kashmir were middle-aged (30-50 years).

5.1.2 Education

The findings of this study revealed that majority of the were graduates. Only a small percentage of the consumers (22 per cent) had an educational level of primary and secondary school education. This could be due to the greater extent of urbanization and improved living standards in the state of Kerala. These findings were in concurrence with those of Madhav (2010) who conducted the study among urban consumers in Visakhapatnam of Andhra Pradesh.

5.1.3 Gender

In this study, majority of consumers were female and these findings agreed with those of Arun and Bhuvaneshwari (2019), Chandirasekaran *et al.* (2021) and Ayman (2020). These findings were however contrary to the results of Waghmare *et al.* (2021) and Joseph *et al.* (2021) who reported that most of the respondents were male. According to the prevailing social system, in most of households, handling and cooking of meat were done by females and hence, it would stand to reason that females responded more than males to the present study.

5.1.4 Marital status

It was evident from the results of the present study that majority of the respondents were married. This could be due to the fact that majority of the respondents were middle-aged followed by old-age category. This finding agreed with that of Joseph *et al.* (2021), who stated that most of the respondents were married.

5.1.5 Type of family and household size

The majority of the consumers were living in nuclear families with a family size of four members and it shows the general pattern of urban households in Kerala. People moving to cities in pursuit of occupations higher education and financial stability is the present-day trend. This result was in conformity with Joseph *et al.* (2021), and Sunitha (2019) who reported that majority of the respondents were from nuclear families having size of four members.

5.1.6 Annual income

Regarding annual income, it was observed that majority of meat consumers had an annual income of between one to ten lakh rupees. It could be due to the fact that this study was conducted in Thrissur corporation area is fast moving towards urbanization. This result was in accordance with Ayman (2020) who reported that in Srinagar city most of the consumers had moderate income ranging from Rs. 360001 to Rs. 660000 per year. However, these findings are contrary to the result

of Sunitha (2019) who reported that among rural were consumers in Vilayancode taluk, majority of the consumers had an annual income between Rs. 20,000-50,000.

5.1.7 Occupation

It could be inferred from the study that the main occupation of almost one-third of the families was private job followed by own business. It might be due to the abundance of private firms cropping up in urban areas. The results are in agreement with Ayman (2020), who reported that the majority of the consumers' occupation was business because of maximum urbanisation in Srinagar city. These findings contradicted those of Arun and Bhuvaneshwari (2019) who found that in the north and south parts of Coimbatore, majority of the respondents worked in government sectors.

5.2 FACTORS PERTAINING TO THE CONSUMPTION OF MEAT AND MEAT PRODUCTS

5.2.1 Consumer methods to assess meat quality

The study revealed that all the consumers assessed the quality of meat by colour. Consumers reported that bright red colour with small streaks of fat in red meat and light pink colour in white meat indicated freshness and good quality. In their opinion tenderness meant that meat should be soft in nature and flavour determined at the time of cooking with the presence of good aroma and bad smell indicated poor quality meat, juiciness inferred that meat should be chewable with firmness. Consumers reported that they hesitated to purchase meat from the same shop if they experienced any changes in the above-mentioned sensory qualities of meat at the time of cooking after purchase. These findings were consistent with the results of Kiran *et al.* (2018), Bafanda *et al.* (2017), Suresh (2016), Testa *et al.* (2021), and Ayman (2020) who stated that most consumers assessed the freshness of meat based on the meat colour. Further, the results were in contrast with Rao *et al.* (2017), who reported that majority of the consumers detected spoilage of meat by smell.

5.2.2 Frequency of consumption of meat

The results denoted that majority of the consumers consumed meat one or two times per week. As per the National Family Health Survey 2019-21, nearly 95 per cent of the population in Kerala were regular consumers of chicken. According to Ahmad *et al.* (2018) meat and meat products played an important role in the sustenance of human health. Being aware of the nutritional importance of non-vegetarian food, people in Kerala consume it regularly. This might also be because of the ready access to meat stalls within the locality of the corporation area. This finding was similar to those of Arun and Bhuvaneswari (2019) and Waghmare *et al.* (2021).

5.2.3 Preferences of meat consumers regarding place of purchase and type of meat

The results indicated that majority of consumers preferred local meat stalls for purchasing meat. Probably the consumers were satisfied with meat cleaning and cutting being done in front of their eyes while purchasing directly from the meat stall. Similarly, they revealed that they could buy the preferred portion and quantity of meat from the local shops. This was in accordance with the reports of Sunitha (2019) and Ayman (2020) who in their study reported that all the consumers preferred local retail shops and none preferred supermarkets. Chandirasekaran *et al.* (2021) observed that most of the respondents preferred roadside meat shops than branded retail outlets.

Also, it could be observed that the respondents reported quality and freshness of meat along with cleanliness of meat shop as important criteria for selection of meat shops. All consumers preferred to buy meat from shops that had good quality and fresh meat available. These findings are in line with those of Bafanda *et.al* (2017), who reported that less than half of the consumers frequently enquired about the quality and more than half enquired about the freshness of meat at the time of purchase.

In case of consumption and preference of species-wise meat, poultry (chicken) came in first place. All consumers preferred to consume poultry meat, followed by beef, chevon, pork, and rabbit. A higher preference for chicken/ poultry might be due to its affordable price, availability and ease of cooking compared to others. Chevon was preferred to a lesser extent than chicken and beef. This might be due to the high price of chevon in the market the research findings were in agreement with Suresh (2016), Chandirasekaran *et al.* (2021), Sunitha (2019) and Waghmare *et al.* (2021) who found that most of the consumers preferred poultry meat. The findings were in contrast with those of Ayman (2020) who revealed that majority of the respondents preferred mutton first and chicken second in the Srinagar city.

It was also evident from the findings of the study that the majority of the consumers preferred fresh meat from the local meat stalls for purchase this might be due to their assumption that the meat could be fresh due to daily slaughter of animals / birds. Only less number of consumers preferred to buy frozen and chilled meat. This could be because of their perception that frozen and chilled meat had less freshness when compared to fresh meat obtained through daily slaughter. Also chilled and frozen meat require more time for defrosting. This result was in conformity that of Chandirasekaran *et al.* (2021) who reported that majority of the respondents preferred to buy fresh meat and no one preferred to buy frozen meat. The finding was also similar to that of Waghmare *et al.* (2021) who reported that majority of the consumers favoured purchasing hot and fresh meat and a few only preferred chilled and frozen meat.

5.2.4 Type of meat products preferred

The results of this study pointed out that most of the consumers preferred meat puffs and meat cutlets, among the meat products purchased. These findings were similar to the result of Abraham and Kumar (2021) who reported that most of the consumers preferred meat cutlets in the Thrissur corporation area.

2.3. RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND MEAT CONSUMPTION

The results of present study indicated that there was a significant association between the frequency of meat consumption and annual income of the respondents at 0.05 level. It might be because higher income could essentially lead to higher purchasing power of consumers. This finding was in contrast with that of Najeeb *et al.* (2020) who reported that income influenced the frequency of consumption of meat significantly ($p < 0.01$) and positively.

There was a significant association between formal education of the consumers and consumer awareness regarding the hygiene of meat handlers at 0.01 level. It could be due to high education level impact on the awareness level of consumers. This result was similar to Unusan (2007) who reported that the food safety knowledge level of consumers positively impacts the education level of the consumers ($p < 0.01$).

2.4. EXTENT OF CONSUMER AWARENESS ABOUT SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS

The respondents were grouped into high, medium, and low categories based on the scores of consumer awareness regarding the safety and quality of meat and meat products.

It was evident from the results of present study that majority of the consumers were highly aware of post-buying hygienic meat handling practices and hygienic cooking practices.

All consumers were aware that meat should always be separated from other foods in the refrigerator, grocery shopping cart and grocery bags. They were aware that separation of uncooked meat helps to avoid cross-contamination and ensure food safety. Above two-third of the respondents were aware of washing hands with soap and warm water for 20 seconds before and after handling of meat and meat products. This finding was in accordance with the findings of Ayman (2020) where,

more than half of the consumers were aware of washing of hands with soap water while handling of meat.

Regarding hygienic cooking practices, all consumers were aware that meat should be cooked under 72-75 °C and they were well aware of transmissible diseases spread through improperly cooked meat. This finding was in contrast with that of Ayman (2020) which revealed that majority of the respondents were not aware of the temperature needed for proper cooking of meat.

Coming to the other domains, consumers had medium level of awareness with respect to hygiene practices at the meat shop, personal hygiene of the meat handler, meat quality, packed meat and meat products, and meat storage practices.

Regarding hygiene at the meat shop, more than half of the consumers revealed that they visually observed meat shop hygiene and cleanliness conditions at the time of purchase of meat. Most of them opined that keeping an insectocutor in shops would help to avoid contamination of meat and transmission of diseases, Al most all consumers were not ready to purchase meat from the shops that dispose slaughter waste improperly, refused to clean bloodstain on the walls and meat cutting area. They were more conscious about the transmissible diseases. These findings were similar to those of Kurugala (2022), who reported that majority consumers purchased meat by visually assessing the cleanliness of meat shops, whereas, Waghmare *et al.* (2021) opined that 42.78 per cent of consumers were not satisfied with the cleaning practices and hygienic conditions adopted by them.

The result of the study pointed out that only a few consumers were aware that meat sold in meat shops should be kept chilled using the storage facilities of meat shops. This might be because most of them were unaware of Kerala State Planning Board (2022) strategic action plans for meat shops which stipulated that all meat shops should display chillers for holding the meat for processing and the sale of the meat should done in air-conditioned area. This finding was in agreement with that of Kurugala (2022) where only five per cent were aware about the temperature of the displayed of meat in meat shops.

It could be inferred from the study that consumers had medium level of awareness regarding the hygiene of meat handler. All consumers were aware about the meat handler's personal hygiene practices and cleanliness perceived as one of the important factors for the hygienic production of meat and meat products. They revealed that majority of them refused to purchase meat from the handler who had blood stains on their dress and hands and not following personal hygiene. They were aware that cross-contamination and bacterial growth of meat were caused by improper handling of meat and unhygienic practices. This was in contrary to with the findings of Kurugala (2022), who reported that 25 per cent of consumers visually assessed the hygiene of the meat handlers. In the present study, only very few consumers were aware of the recommended annual schedule of medical examination and vaccination of meat handlers. As per the Food Safety and Standards Regulations (2011), meat handlers should undergo medical examination before and after their employment.

The awareness of consumers regarding meat quality was medium. The finding showed that majority of the consumers had high level of awareness regarding the adulteration of meat, *ie*, the practice of fraudulent adulteration of costly meat with inferior quality meat. These findings were somewhat similar to those by Kavitha and Ajithkumar (2014), where it was observed that the consumers were well aware of adulteration which was noticed by visible changes in the colour and appearance of meat. Only less than ten per cent of the consumers were aware of the importance of marbling of meat which helps to improve eating quality, since they perceived that intramuscular fat was not good for health. These findings were in line with those of Benli and Yildiz (2023), who reported that majority of consumers did not understand the importance of marbling of meat and they assumed that marbling of meat would cause a higher fat content in the meat.

Regarding the findings of this study on the awareness of consumers about packed meat and meat products, majority of the consumers had a medium level of awareness. All the consumers were aware that they should check the seal of the packet on purchase. They were aware that packed meat products with holes and

tears on the packet and fluid accumulated inside were not good for consumption. They were aware of the significance of proper sealing in avoiding food poisoning. Only less than half of the consumers were (43.5 per cent) of the importance of checking expiry date of packed meat products. Others reported that they trusted the shopkeepers and believed that the shopkeepers would replace the expired products regularly. The findings were also different from the findings those of Muştu, *et al.* (2021) who observed that majority of the respondents in Istanbul, checked the manufacture and expiration date on food packets.

With respect to meat storage practices, all the respondents were aware that the ideal storage place of meat was in the freezer, because it could avoid microbial contamination of meat on storage. The findings of the present study were also different from those reported by Madhav (2010) who observed that only 30 per cent of consumers stored meat in the deep freezer. Only 10 per cent of consumers were aware that cooked meat should not be kept at room temperature for more than two hours. The finding was contrary to that of Koppel *et al.* (2016) who reported that more than half of the consumers in the United States stored food in refrigerator within an hour after being cooked.

With regard to optimum storage conditions and consumption period of meat, more than half of the consumers were aware that frozen meat should be stored at -18 °C or below for long-term storage. Only 15.3 per cent of the respondents were aware that storage of chilled meat should be done at zero to 4 °C. However, the consumers seem to be less aware about ideal storage temperature of chilled meat which helps to control bacterial growth. These findings are in line with those of Moreb *et al.* (2017), who reported that more than half of the consumers were aware of proper temperature for storage of frozen food (-18°C).

Summary

6. SUMMARY

Meat is one of the main sources of protein and so the consumption of meat is very important in the human diet. Nowadays consumption of meat and meat products increased with the improvement of lifestyle and globalisation. Consumers' preference for meat depends on many factors by understanding these factors, sellers can modify and design new marketing mix strategies in the meat industry. Nowadays consumers are concerned about the safety and quality of meat and meat products but they are unaware of some aspects of the safety and quality of meat.

The present research was conducted among meat consumers in the Thrissur corporation area to study the preference of consumers towards meat and meat products and to assess the extent of awareness of consumers about safety and quality of meat and meat products. By multistage sampling technique, a total of 150 households were selected and data were collected by personal interviews with a structured pretested interview schedule from an adult member of the selected household.

Analysis of background and demographic details of consumers revealed that majority of the consumers were middle-aged, graduates, more than half of the consumers were female, majority of consumers were married and from a nuclear family with household size of up to four and had annual income between one to ten lakhs. The majority of the consumers' occupation was private job and business.

The findings of factors pertaining to consumption of meat and meat products revealed that all consumers assessed the meat quality based on the colour of the meat. Most of the consumers consumed meat one to two times a week and they preferred to purchase the meat from the local meat stall, all the consumers reported that the quality and freshness of the meat were the primary considerations in their decision to select the place of purchase meat. All of the consumers preferred to consume poultry meat which was followed by beef, chevon, pork, and rabbit meat in the decreasing order and also preferred to purchase fresh meat when compared

to chilled and frozen. The majority of consumers chose to buy meat puffs and meat cutlets.

Regarding the extent of awareness of consumers about safety and quality of meat and meat products, analysis of the consumers' awareness was done under the eight major domains. In the first domain, hygiene at the meat shop, more than half of the consumers had the medium level of awareness. Under this, majority of the consumers were aware of the importance of the insectocutor in the meat shops and cleanliness of the wall and floor of the meat stall. They were least aware that meat sold in meat shops should be kept chilled by using the storage facilities of meat shops

Coming to the hygiene of the meat handlers, more than half of them had medium awareness. It was understood in this domain that, all consumers were aware of the need for to maintain meat handlers' personal hygiene and cleanliness however they had a low level of awareness about the need for annual medical examination and inoculation of meat handlers against enteric diseases.

The awareness level of the consumers regarding meat quality was of a medium level. In the statement wise analysis it was evident that majority of them aware of the adulteration of meat done with lower-quality of meat. Only below 10 per cent of the consumers were aware that marbling could be used to determine the quality of meat.

The findings on awareness of consumers about on the packed meat and meat products revealed that majority of the consumers had a medium level of awareness. On further observation, it was noticed that under this domain all of them were aware of the fact that it was not safe to consume packed meat products that had tears and holes in the cover or excessive amounts of fluid. Consumers also had low awareness about the importance of checking the date of manufacture and expiry before buying packed meat products.

The consumers showed a high level of awareness about post buying hygienic meat handling practices and all consumers were aware of the need to

separate raw meat from other food items in the grocery bag and refrigerator. Nearly 30 per cent of the consumers were not aware of the need to wash hands always with soap and warm water for 20 seconds before and after handling of meat and meat products.

The awareness level of consumers regarding meat storage practices was medium, and among the statements, all of them were aware that the ideal storage of meat at home was in the freezer. Only 10 per cent were aware that cooked meat should not be kept outside for more than two hours.

Analysis of domain related to optimum storage conditions and consumption period for meat indicated that majority of the consumers had a low-level of awareness. It was also observed that more than half of the consumers were aware of the right storage temperature of meat. However, less numbers of the consumers were aware of proper storage temperature of chilled meat.

In the domain of hygiene cooking practices, most of the consumers had high level of awareness and all of them were aware that meat must be cooked at 72-75 °C for safe consumption nearly 10 per cent were not aware that cooked meat should not be kept overnight and reheated the next day for consumption.

On analysis of total consumer awareness, it was found that from the highest portion of the consumers had a medium level of awareness with respect to the extent of awareness about safety and quality of meat and meat products.

With regards to the association between demographic characteristics and meat consumption, it was observed that there was a significant association between annual income and frequency of meat consumption ($p < 0.05$) it indicated the higher income could essentially lead to higher purchasing power of consumers. There was also a significant association between consumers education level and awareness of consumers about hygiene of meat handlers this showed that when consumer education level increased their awareness level regarding meat handlers also increased.

References

7. REFERENCES

- Abraham, J. and Kumar, S. 2021. Consumer preferences and marketing of ready-to-eat meat products in Thrissur city of Kerala. *Int. J. of Livestock Res.* **11**: 16-21.
- Ahmad, R.S., Imran, A. and Hussain, M.B. 2018. Nutritional composition of meat. *Meat Sci. Nutr.* **61**: 61-75
- Arun, R. and Bhuvaneswari, R. 2019. Buying behavior of meat consumption relates to food safety from north and south part of the Coimbatore city. *Int. j. Recent Technol. and Engng.* **7**: 429-433.
- Ayman, N. 2020. Consumption behaviour towards meat and meat products among the households in Srinagar city. *M.V.Sc thesis*, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir, 154p.
- Bafanda, R., Khandi, S., Minhaj, S. and Choudhary, F. 2017. Meat hygiene and associated health hazards awareness among consumers of Jammu district of Kashmir. *Curr. J. Appl. Sci. Technol.* **23**: 1-16.
- Benli, H. and Yildiz, D.G. 2023. Consumer perception of marbling and beef quality during purchase and consumer preferences for degree of doneness. *Anim. Biosci.* **36**: 1274–1284.
- Chandirasekaran, V., Sureshkumar, S. and Rathod, K.S. 2021. Socio-economic status and meats preferences of consumers in Erode city of Tamil Nadu. *The Pharma Innovation J.* **10**: 388-391.
- DAHD [Department of Animal Husbandry and Dairying], 2022. *Basic Animal Husbandry Statistics*. Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, 141p.

- FSS Regulation [Food Safety and Standards Regulation] 2011. *Licensing and Registration of Food Businesses*. Food Safety and Standards Authority of India, New Delhi, 118p. Available online at: <http://www.fssai.gov.in/GazettedNotifications.aspx#regulations2011> [1st Aug.2023].
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. and Tatham, R. L. 2006. *Multivariate data analysis*. (6th Ed.). Upper Saddle River, New Jersey: Pearson University Press. 74p.
- Joseph, S.T., George, S., Vasudevan, V.N. and Sasidharan, M. 2021. Consumer preference for pork chops differing in fat thickness, lean thickness and lean color. *The Pharma Innovation J.* **10**: 410-416.
- Kavitha, R. and Ajithkumar, K.G. 2014. A study on the consumption pattern of meat in a rural locality of north Kerala. *Asian J. Anim. Sci.* **9**: 202-206.
- Kiran, M., Nagabhushan, C., Prabhu, N.K., Paramesha, S.C., Rajshekar, T., Praveen, M.P., Punitkumar, C., Puneetha, S.C., Kumar, R. and Rahul, Y. 2018. Consumption pattern, consumer attitude and consumer perception on meat quality and safety in southern India. *Int. Food Res. J.* **25**: 1026-1030.
- Koppel, K., Higa, F., Godwin, S., Gutierrez, N., Shalimov, R., Cardinal, P., Di Donfrancesco, B., Sosa, M., Carbonell-Barrachina, A.A., Timberg, L. and Chambers IV, E. 2016. Food leftover practices among consumers in selected countries in Europe, south and north America. *Foods*, **5**: 1-14.
- Kumar, N.V.R. 2003. Training needs of dairy farm instructors of the Dairy Development Department of Kerala. *M.V.Sc. thesis*, College of Veterinary and Animal Sciences, Mannuthy, 140p.
- Kurugala, G.S. 2022. Consumers consciousness on quality of meat, while purchasing from meat outlets in Kaduwela municipal council area. *S. Fla J. Environ. and Anim. Sci.* **2**: 152-161.

- KSPB [Kerala State Planning Board]. 2022. *Working group on increasing meat production in Kerala: the role of public policy*. Agriculture Division, Government of Kerala, 24p. Available: <https://spb.kerala.gov.in/sites/default/files/inlinefiles/Meat%20production.pdf> [6th Aug. 2023].
- Lynn, M.R. 1986. Determination and quantification of content validity. *Nursing Research*. **35**: 382– 385.
- Madhav. P.V. 2010. Mobile telephony in creating awareness on meat hygiene among urban consumers. *M.V.Sc thesis*, Sri Venkateswara Veterinary University, Tirupati, 151p.
- Moreb, N.A., Priyadarshini, A. and Jaiswal, A.K. (2017). Knowledge of food safety and food handling practices amongst food handlers in the Republic of Ireland. *Food Control*. **80**: 341-349.
- Muştu, Ç., Ceylan, V. and Sariisik, M. 2021. Food safety knowledge, attitudes and practices of consumers regarding meat consumption at home. *Academic Food J*. **19**: 381-392.
- Najeeb, A.P., Babu, R.N., Abraham, R.J. and Pandian, A.S.S. 2020. Assessing the factors associated with meat consumption in Kerala. *Ind. J. Pure App. Biosci*. **8**: 674-677.
- NFHS-5 [National Family Health Survey- 5]. 2019-21. *Compendium of fact sheets INDIA and 14 states/UTs (Phase-11)*. Ministry of Health and Family Welfare New Delhi and International Institute for Population Sciences, Mumbai. Government of India, 116p. Available: https://sciresol.s3.us-east-2.amazonaws.com/srs-j/bujournals/GA/pdf/Volume-10/issue-2/GA_v10i2_1.pdf [10th July 2023].
- Polit, D.F. and Beck, C.T. 2006. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Res. Nurs. Health*. **29**: 489-497.

- Rao, B. E., Bhaskar, K., Mallika, E. N., Naveen. Z. and Gupta, R. S. D. A. 2017. Study on consumption pattern of meat In and around rural locality of Gannavaram Andhra Pradesh. *Chem. Sci. Rev. Lett.* **6**: 1363-1368.
- Risvik, E. 1994. Sensory properties and preferences. *Meat Sci.* **36**: 67-77.
- Sahu, C.K., Verma, S.K., Das, K., Patyal, A. and Thakre, A. 2023. Consumption pattern of meat and value added meat products in durg district of Chhattisgarh India. *J. Anim. Res.* **13**: 99-106.
- Singh, S., Mehta, N., Chatli, M.K. and Malav, O.P. 2019. Consumer studies on meat consumption and processing pattern through contact survey in different zones of Ludhiana City. *J. Anim. Res.* **9**: 605-611.
- Smulders, F.J.M. 1986. Sensory meat quality and its assessment. *Vet. Q.* **8**: 158-167.
- Sreeshma, M.P., Geetha, N., George, P.R., Sasidharan, M., George, S., Anil, K.S. and Sunanda, C. 2018. Analysis of the socio-economic profile of pet bird owners in Thrissur district. *J. Vet. Anim. Sci.* **49**: 17-23.
- Sunitha, W. 2019. Consumption pattern and consumer behaviour of meat consumption in rural consumer households in Vilavancode taluk. *Think India J.* **22**: 105-112.
- Suresh, A. 2016. Consumers attitude towards meat consumption in India: insights from a survey in two metropolitan cities. *Livestock Res. for Rural Dev.* **28**: 1-7.
- Talukder, S., Mendiratta, S.K., Kumar, R.R., Soni, A. and Bardhan, D. 2020. Evaluation of meat consumption pattern and meat quality in north Indian cities. *J. Anim. Res.* **10**: 65-373.
- Testa, M.L., Grigioni, G., Panea, B. and Pavan, E. 2021. Color and marbling as predictors of meat quality perception of Argentinian consumers. *Foods.* **10**: 1-21.

- Tschanz, L., Kaelin, I., Wróbel, A., Rohrmann, S. and Sych, J. 2022. Characterisation of meat consumption across socio-demographic, lifestyle and anthropometric groups in Switzerland: results from the National Nutrition survey menuCH. *Public Hlth. Nutr.* **25**: 3096-3106.
- Unusan, N. 2007. Consumer food safety knowledge and practices in the home in Turkey. *Food control.* 18: 45-51.
- Waghamare, R.N., Popalghat, H.K., Londhe, S.V., Deshmukh, V.V. and Khobe, V.V. 2021. An online survey of consumers of Maharashtra concerning the expected change in the meat and meat product business. *J. Anim. Res.* **11**:137-141.
- Waltz, C.F. and Bausell, R.B. 1981. *Nursing research: Design, statistics, and computer analysis.* FA Davis company. Philadelphia. 362p.
- Waltz, C.F., Strickland, O.L. and Lenz, E.R. 2005. *Measurement in nursing and health research.* (3rd Ed.). Springer Publishing Company. New York. 448p.

Abstract

**CONSUMER PREFERENCES AND AWARENESS ABOUT
SAFETY AND QUALITY OF MEAT AND MEAT PRODUCTS**

**ASWATHY CHANDRAN
(21-MVM-36)**

ABSTRACT OF THE THESIS

Submitted in partial fulfillment of the requirement for the degree of

**MASTER OF VETERINARY SCIENCE
(Veterinary Extension Education)**

2023

**Faculty of Veterinary and Animal Sciences
Kerala Veterinary and Animal Sciences University**



**DEPARTMENT OF
VETERINARY AND ANIMAL HUSBANDRY EXTENSION
COLLEGE OF VETERINARY AND ANIMAL SCIENCES
MANNUTHY, THRISSUR – 680 651
KERALA, INDIA**

ABSTRACT

The objectives of the study were to understand the preference of consumers towards meat and meat products and extent of awareness of consumers about safety and quality of meat and meat products in Thrissur corporation area. The interview schedules were developed and data were collected by personal interview method from 150 consumers selected using multistage sampling procedure.

Majority of the respondents were above 30 years of age and had education of higher secondary and above, more than half of the respondents were female and most of them had a nuclear family of up to four members. Majority of the consumers worked in private and business sectors and their reported annual income was between one to ten lakh.

More than half of the respondents consumed meat once or twice a week and they assessed the quality of meat by colour, tenderness, flavour, juiciness and smell. All the respondents preferred to purchase meat from the local meat stall because of the quality and freshness of meat available. It was noticed that respondents consumed chicken, beef, chevon, pork and rabbit in the descending order of preference. Most of the consumers preferred meat puffs and cutlets among the ready to eat meat products. There was a significant association observed between annual income and the frequency of meat consumption ($p < 0.05$).

Among the eight domains studied for assessing the extent of awareness, majority of the consumers had high level of awareness about hygiene of the meat handler and hygiene cooking practice, medium level of awareness regarding hygiene at the meat shop, packed meat and meat products, and post buying hygienic meat handling practices and low level of awareness for meat quality, optimum storage conditions, consumption period and meat storage practices. The present study identified that majority of the consumers had medium level of awareness regarding safety and quality of meat and meat products. There was a significant association noticed between consumers education level and awareness of consumers about the hygiene of meat handlers ($p < 0.01$).

Appendices

Appendix- 1

Informed consent

This interview schedule is part of post-graduate research on Consumer preference and awareness about the safety and quality of meat and meat products. You will be required to answer all questions based on your understanding your answer will kept confidential. These answers will never be used to identify you

Your participation in this survey is valued. Before proceeding to complete the questionnaire, please indicate below your consent to participate by checking the appropriate option

- Yes, I have read this consent paper thoroughly and take part in this study willingly and I do consent.
- No, I do not consent.

Participant signature

Thanking you,

Yours faithfully,
Dr. Aswathy Chandran
MVSc. Scholar
Dept. of Veterinary and AH Extension,
CVAS, Mannuthy, Thrissur

Kerala Veterinary and Animal Sciences University
College of Veterinary and Animal Sciences, Mannuthy
Department of Veterinary and Animal Husbandry Extension
Interview schedule as part of Post Graduate Research of Dr. Aswathy Chandran, M.V.Sc Scholar

Title: Consumer preferences and awareness about safety and quality of meat and meat products

❖ **Kindly tick the appropriate answer suitable to you**

Date:.....

1. Name : -----

2. Address : -----

3. House number:-----

4. Mobile number:-----

a) Background variable

Age : -----

Education : Illiterate/ Primary& Secondary/ Higher Secondary/ Graduate
and above

Gender : Male / Female

Marital status : Married / Unmarried

Type of family: Joint family/ Nuclear family

Household size: Up to 4/ 5-7 / More than 7

Annual income: Up to one lakh/ 1-10 lakh/ >10 lakh

Occupation : Govt. job/ Private job/ Business/ Others

❖ Please tick mark your response (Yes/ No) to each question

PART I

I) Factors pertaining to consumption of meat and meat products

1. Consumer methods to assess meat quality

Which among the following factors do you consider a indicators of meat quality?	Yes	No
Colour		
Juciness		
Tenderness		
Flavour		
Smell		

2. How frequently do you eat meat?

Frequency	Yes	No
Daily		
1-2 times/week		
3-4 times/week		
Once a month		

3. Where do you prefer to purchase meat from?

Place	Yes	No
University sales outlet		
Supermarkets		
Local meat stall		
Online purchase		
Branded retail outlets		

4. What are the reason for your preference?

Reason	Yes	No
Price of meat		
Availability of the meat desired		
Storage facilities		
Quality and freshness of meat available		
Cleanliness of meat shop		
Packaging		
Proximity of shop		
Previous acquaintance with the shop		

5. What type of meat do you prefer

Preferred meat type	Preferred form	Yes	No
Poultry	Fresh		
	Frozen		
	Chilled		
Chevon	Fresh		
	Frozen		
	Chilled		
Beef	Fresh		
	Frozen		
	Chilled		
Pork	Fresh		
	Frozen		
	Chilled		
Rabbit	Fresh		
	Frozen		
	Chilled		

❖ Please tick mark your response (Yes/ No) to each question

PART II

II) Extent of awareness of consumers about safety and quality of meat and meat products		YES	NO
Hygiene at the meat shop			
1	Buying meat only from shops having updated FSSAI safety license registration		
2	It is not necessary to display FSSAI license at a prominent location in a meat shop *		
3	Meat shop should be located in an area that is free from objectionable odour, smoke, dust, and other contaminants		
4	The consumer need not be aware of the minimum standard of quality guidelines issued by FSSAI *		
5	Buying meat from shops that have an adequate light source, ventilation, clean water, and proper disposal of slaughter waste		
6	It is fine to buy chicken from a chicken stall don't have Separate areas for processing and stocking chicken *		
7	It is preferable to buying meat from a meat shop which hangs the carcass in the open area (in front of a stall) *		
8	Meat sold in meat shops should be kept chilled (0- 4°C) *		
9	Buying meat from a shop without refrigerators or other chilling facilities *		
10	Buying meat from a meat shop where there is blood on the wall and slaughter waste on the floor *		
11	Meat stall should have an insectocutor		

Hygiene of the meat handler			
12	Cleanliness of the meat handlers dress will not affect the meat quality*		
13	Annual medical examination and inoculation of meat handlers against the enteric group of diseases should be done as per recommended schedule		
14	Persons suffering from a disease or illness or with open wounds or burns can be involved in the handling of meat *		
15	It is not necessary that meat handlers maintain personal cleanliness and hygiene (hand washing, no watch, no loose jewellery, no smoking, no spitting, trimmed nails) *		
16	There is no requirement for meat handlers to wear with suitable aprons, gloves, headgear wherever necessary *		
17	All equipments, implements, tables, utensils including knives, saws, mechanical instruments and containers should be cleaned and sanitized at the start and end of each work day and whenever required		
18	All utensils and tables coming in contact with the meat should be stainless steel		
Meat quality			
19	Meat quality depends on its composition		
20	When purchasing meat, give little consideration to the meat's quality *		
21	Lean to-fat ratio is a compositional quality of meat		
22	Marbling is one of the most important traits determining the quality of meat		
23	Always make sure that meat is firm to touch, has no yellow or green discolorations, stickiness/sliminess, and off-odours, fungal formation		

24	Which among the following sensory characteristics can be used to judge the quality of meat products Colour		
	Smell		
	Texture		
	Taste		
	All		
25	The safety of meat is not impacted by adulteration with lower-quality meat *		
26	The safety of meat is not impacted by chemical residue in meat with contaminants such as pesticides, and hormones *		
27	Meat that has been properly bled is healthier than meat that has not been properly bled		
28	In slaughterhouse, rubbing of fresh blood on the meat surface leads to contamination of the meat		
29	The meat is still edible if it has blood spots and blemishes *		
Packed meat and meat products			
30	Fresh/wet meat is safer to consume than frozen/chilled packed meat *		
31	When purchasing meat, one should read the label to know the nutritional factors and handling of the package		
32	There is no need to check the manufacturing and expiry date before buying meat *		
33	All packaged meat and meat products must carry the FSSAI labelling requirement and contain requisite information as per regulations		
34	It is acceptable that the meat package with tears holes or excessive amounts of fluid *		
35	It is not necessary to use tongs and gloves when handling meat items that are ready to consume *		
36	It is a good practice to ensure that the meat package is completely sealed before purchase		

37	It is fine to buy meat that is wrapped in newspaper or any ordinary paper *		
38	Coloured/ recycled plastic bags can be used for carrying meat *		
39	Only virgin (75 microns) packing materials should be used to pack meat		
Post-buying hygienic meat handling practices for consumers			
40	Always wash hands with soap and warm water for 20 seconds before and after handling meat/meat products		
41	After cutting raw meat, cleaning of cutting board, knife, and countertops with hot, soapy water is not necessary *		
42	It's safe to keep raw meat with other foods in your grocery shopping cart, grocery bags, and refrigerator*		
43	Using the same cutting board and knife for raw meat and vegetable is not harmful to our health*		
44	Never place cooked food on a plate that previously held raw meat unless the plate has been washed in hot, soapy water		
Meat storage practice for consumer			
45	Ideally while storing meat at home it should be kept,		
	In deep freezer		
	In refrigerator		
	Marinated		
46	At room temperature		
	Which techniques are used to defrost meat at home?		
	In the refrigerator		
	In cold water		
47	In the microwave.		
	At room temperature		
48	Defrosting meat at room temperature won't result in any microbial contamination *		
49	Defrost meat should be cooked immediately		
49	The quality of meat does not change by frequent freezing and thawing *		

50	Holding meat and meat products at room temperature for a long duration is not a good practice		
51	Cooked meat kept at room temperature for more than 2 hours should be discarded		
52	Simply immerse the frozen meat directly in the water for defrost without putting it in a proper bag or container *		
Optimum storage conditions and consumption period for meat			
53	Chilled meat must be stored at 0-4°C for short term storage		
54	Frozen Meat must be stored -18°C or below for long term storage		
55	Chilled meat should be consumed within 2 to 4 days of storage under normal chilling conditions (0-4°C)		
56	Frozen meat can be consumed within a few months (10-12 months)		
Hygiene cooking practice			
57	Cooked meat can be kept overnight and reheated the next day for consumption *		
58	Meat must be cooked to a safe minimum internal temperature of 72-75°C to destroy any harmful bacteria		
59	Zoonotic diseases can be transmitted by consuming improperly cooked meat and meat products		

*negative statement



KERALA VETERINARY AND ANIMAL SCIENCES UNIVERSITY
Faculty of Veterinary and Animal Sciences
PROGRAMME OF RESEARCH WORK FOR THESIS FOR MASTERS DEGREE

1. Title of thesis

Consumer preferences and awareness about safety and quality of meat and meat products

2. a. Title of the departmental/ KVASU research project of which this forms a part

Nil

b. Code No. if any, and order by which the departmental/ KVASU research project is approved

Not applicable

3. a. Name of student

Aswathy Chandran

b. Admission No.

21-MVM-36

c. Name of the discipline

Veterinary Extension Education

4. a. Name of Major advisor

Dr. Anu George

b. Designation

Assistant Professor

Department of Veterinary and Animal Husbandry Extension

College of Veterinary and Animal Sciences, Mannuthy, Thrissur- 680 651

5. Objectives of the study

1. Study the preference of consumers towards meat and meat products
2. Assess the extent of awareness of consumers about safety and quality of meat and meat products

6. Practical / Scientific utility

Meat and meat products are crucial sources of protein in human diets. Meat consumption depends on many criteria such as socioeconomic factors, ethnic or religious beliefs and tradition. Meeting the expectations of consumers, the last link in the production chain, is a vital step in ensuring their satisfaction as well as their purchase behaviour. An understanding of consumer preference would provide valuable information to the marketer based on which marketing mix strategies can be designed or modified. It is also important to ensure that consumers are aware of the indicators of fresh and wholesome meat so that they can make informed choices in this regard. Awareness of consumers about basic steps in safe



and 2018–19, average daily meat consumption decreased by approximately 17.4 g per capita per day, with individuals consuming less red and processed meat, more white meat.

8. Outline of technical programme

Selection of the locale

The study will be conducted among consumers of meat and meat products in Thrissur corporation.

Sampling design

Randomised samples will be selected using a multistage random sampling design. There are 55 divisions in Thrissur Corporation. For the purpose of this study, the divisions in Thrissur Corporation will be arbitrarily grouped into three contiguous zones based on physical proximity, viz. the eastern cluster of 18 divisions, central cluster of 18 divisions and the western cluster containing 19 divisions. In the first stage of sampling, the division will be considered as the sampling unit. The list of divisions in each cluster will be prepared and five divisions will be selected at random from each cluster so that a total of 15 divisions are selected for the study. In the second stage of sampling, the household will be considered as the sampling unit. The list of households in the selected division will be accessed and 10 households each that consume meat and meat products will be selected randomly from each division using a selection and elimination method. Thus, a total of 150 households spread over 15 divisions of Thrissur Corporation would form the final sample of the study.

Variables

Sl. No.	Variable	Assessment method
a) Background variables		
i	Age	Structured schedule
ii	Education	-do-
iii	Gender	-do-
iv	Marital status	-do-
v	Type of family	-do-
vi	Household size	-do-
vii	Annual income	-do-
b) Other variables		
I	Factors pertaining to consumption of meat and meat products a. Consumer methods to assess meat quality b. Frequency of consumption of meat c. Preferred place of purchase of meat d. Reasons for preference e. Preferred meat type	-do-
II	Extent of awareness of consumers about	Scale will be developed

safety and quality of meat and meat products

Tools of data collection

Data will be collected using a pretested interview schedule that would contain the variables under study. Data will be analysed using SPSS version 24.0.

9. Main items of observations to be made

1. Socio demographic characteristics of respondents
2. Factors pertaining to consumption of meat and meat products
 - a. Consumer assessment methods of meat quality
 - b. Frequency of consumption of meat
 - c. Preferences of meat consumers regarding place of purchase and type of meat
3. Relationship between demographic characteristics and meat consumption
4. Extent of consumer awareness about safety and quality of meat and meat products

10. Facilities

a. Existing

Facilities available in the Department of Veterinary and Animal Husbandry Extension, College of Veterinary and Animal Sciences, Mannuthy will be utilised.

b. Additional facilities required

Travel, documentation

11. Duration of study


Four semesters

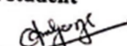
12. Financial estimate

Pilot study	: Rs. 5000
Interview schedule preparation	: Rs. 5000
Contingencies and documentation	: Rs. 10000
Travel	: Rs. 5000
Total	: Rs. 25000

Project coordination group proposed:

Extension Economics and Statistics


Signature of student


Signature of the Major advisor

Place: Mannuthy

Date: 23.12.2022

Name, address and signature of other members of the Advisory Committee

1. Dr. Jiji R. S.
Professor and Head
Department of Veterinary and Animal Husbandry Extension
College of Veterinary and Animal Sciences, Mannuthy
2. Dr. Reeja George P.

2. Preparation and submission of thesis



CERTIFICATE

Certified that the research project has been formulated observing the stipulations laid down under the Prevention of Cruelty to Animals Act (Amendment, 1998).

Place: Mannuthy

Date: 23.12.2022


Dr. Anu George
Major Advisor

CERTIFICATE

Certified that the research project has been formulated observing the stipulation laid down under the Prevention of Cruelty to Animals Act (Amendment, 1998).

Place: Mannuthy

Date:

Dr. Anu George

Major Advisor

CURRICULUM VITAE

- 1 Name of candidate : Aswathy Chandran
- 2 Date of birth : 15-10-1994
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- 4 Marital status : Single
- 5 Permanent address : Veliyathuparmbil (H)
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- 6 Major field of specialisation : Veterinary Extension Education
- 7 Educational status : B.V.Sc. & A.H.
- 8 Professional experience : Nil
- 9 Publications made
Papers/ abstracts published in : 3
Seminars/Symposia/Conference
- 10 Membership in : Tamil Nadu State Veterinary
professional bodies Council