Dried Fish Consumption in Kerala: Patterns, Trends, and Preferences in the Indian Context

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Introduction

Fish and seafood have been essential sources of food for people with substantial social and economic importance (Tidwell & Allan, 2001). They provide significant health benefits such as proteins, minerals, vitamins, and unsaturated essential fatty acids, influencing people's metabolic health (Sidhu, 2003; Dale, Madsen & Lied, 2019). The per capita global consumption of fish and seafood per year has increased from 9 kilograms in 1961 to about 20.5 kilograms in 2018, at an average rate of 3.1 per cent annually (FAO, 2020). Globally, the highest fish and seafood consumers are in Maldives and Iceland, where the per capita consumption is more than 80 kilograms, and the lowest in Ethiopia and Afghanistan, where it is less than half a kilogram (Ritchie and Roser, 2021). Differences in the per capita fish consumption between developed and developing countries are also observed. According to Food and Agricultural Organisation (FAO, 2020), the per capita fish consumption in developed countries increased from 17.4 kilograms in 1961 to 26.4 kilograms by 2007, gradually decreasing to about 24.4 kilograms by 2017. At the same time, fish consumption in developing countries, although consistently increased from a mere 5.2 kilograms in 1961 to approximately 19.4 kilograms by 2017, is still significantly lower than that of developed countries. Globally, fish consumption accounted for about 7 per cent of the total protein intake and 17 per cent of the total animal intake in 2017 (FAO, 2020). It also reported that in some countries like Bangladesh, Cambodia, Gambia, Ghana, and several other small coastal developing countries, fish consumption accounted for more than 50 per cent of the total animal protein intake. Growing awareness of the health benefits of fish consumption, rising disposable incomes, urbanization, improved cold-chain and marketing infrastructure, changes in how food is traded, etc., seem to influence global fish consumption. Compared to this, India's per capita fish and seafood consumption, which was much lower, also increased from 1.87 kilograms to 7.89 kilograms between 1961 to 2020. It is much lower than the global average mentioned earlier (Ritchies & Roser, 2021). Regional differences in the consumption of fish are also observed in India. Using the data collected by the National Sample Survey Organisation (NSSO) for the periods 1983 and 2011-12, Anneboina and Kumar (2016) noted that Kerala and Goa reported the highest and Gujarat the lowest fish consumption in both rural and urban areas in India. The study also observes that despite an increase in fish production over time in India, there has been a decline in consumption during the reference period of the study, which the authors attribute to the role of trade.

The frequencies and preferences of fish and seafood consumption are influenced by consumers' geographic, social, and cultural characteristics (Pieniak et al., 2011; Can et al., 2015;). Among the significant drivers of fish consumption are availability, price perception,

health, convenience, self-efficacy, and eating habits (Carlucci et al., 2015). Moreover, fish intake is strongly related to past experiences and practices, indicating that cultural preferences also play a significant role in fish consumption (Scholderer & Trondsen, 2008; Thapa, Dey & Engle, 2015). Another critical factor influencing fish consumption is familiarity with it during childhood. Childhood familiarity creates favourable attitudes toward fish intake, and the patterns of childhood seafood consumption are strongly associated with patterns of adult seafood consumption (Birch & Lawley, 2023). Olsen (2004) identifies taste, distaste, nutrition, and freshness, of which taste plays a significant role in the purchase as major factors in the fish consumption decision. Also, sensory characteristics such as taste, smell, and texture are identified to be critical determinants of fish consumption across the world (Carlucci et al., 2015).

While fish is a significant item in the food basket of populations worldwide, specific information on dried fish consumption is scanty. Although dried fish consumption exists worldwide, each region or country has incorporated the processing of dried fish and its consumption in unique ways. Dried fish is a significant part of culinary traditions, especially in coastal regions or places with strong fishing traditions. It is known that countries in Asia, Africa, the Caribbean, Europe, and Latin America all have unique ways of consuming dried fish. Dried fish, which includes salted, sun-dried, fermented, or smoked fish, has an extended shelf life, is rich in concentrated proteins, and is a crucial ingredient in several dishes across countries. In India, too, dried fish seem to hold a unique position in coastal and other inland states, including northeastern states. It is used for direct consumption or as a condiment or side dish. However, there is a lack of data on the extent of dried fish consumption by households in India. This report focuses on the consumption of dried fish in Kerala, one of India's foremost fish consuming states, in terms of marine fish production and consumption in the country.

The study context

Kerala is situated between 8º8' and 18º48' north latitude and 74º4' to 77º50' east longitude on the southwest coast of India. It has an area of about 38,863 square km and a coastline of 589 km, which forms about 1.2 per cent of the total geographical area and 10 per cent of India's coastal line (GoK, 2017). According to the Census of India 2011, the population of Kerala was 33,406,061, constituting about 2.76 per cent of India's population. The state is divided into 14 districts, of which nine are along the coastline. A distinct asymmetrical topography characterizes Kerala (Figure 1).
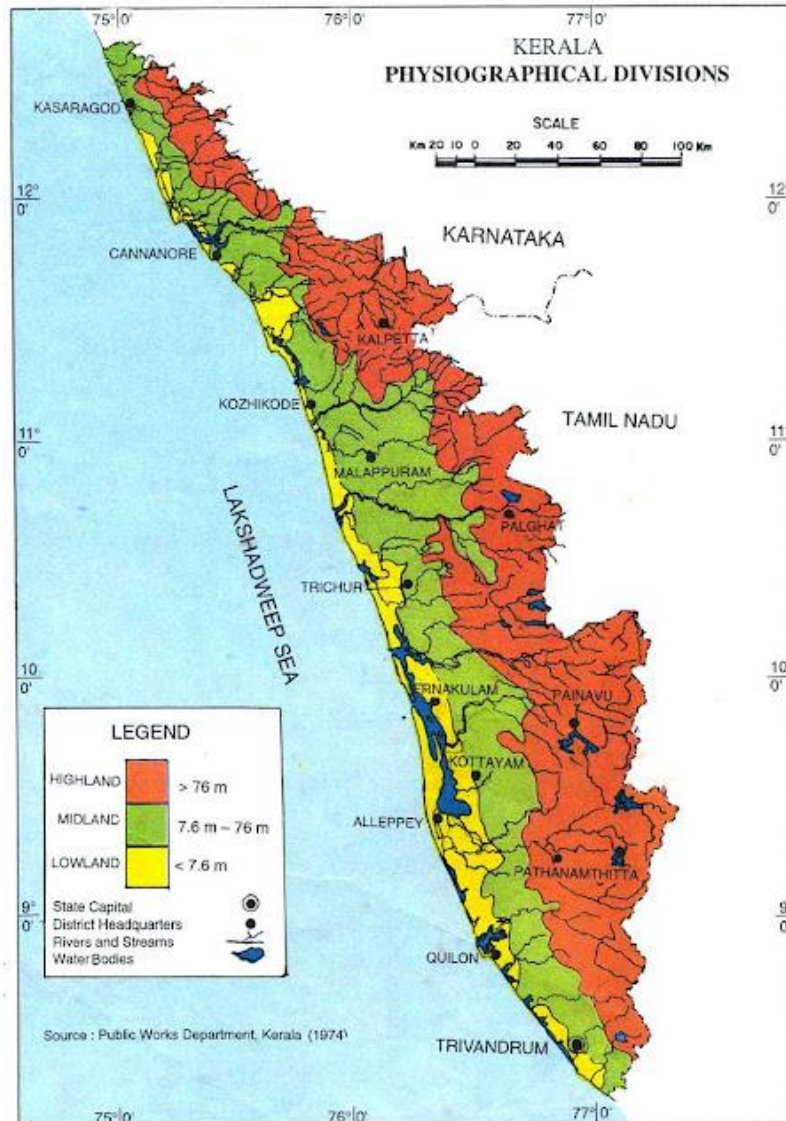
Figure 1. Physiographical Divisions of Kerala[1]

It has three elevation zones: lowland, midland, and highland/upland. The lowland region ranges from nearly level to a gently sloping strip along the coast bordering the Arabian Sea, occupying about 10 per cent of the total area. With altitudes ranging from 7.5 to 75 meters above mean sea level, the midland covers about 42 per cent of the area. The highland is about 75 to 750 meters above the mean sea level and comprises about 43 per cent of the total geographical area (George and Chattopadhyay, 2001).

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[1] Source: http://kerenvis.nic.in/Database/BIODIVERSITY_824.aspx. (Accessed on 29 January 2024)

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The authors observe that since 1901 the population shares of the lowland and midland regions have declined, and that of the highland has increased primarily due to interregional migration and deforestation. Two distinct patterns of interregional migration took place in Kerala, significantly impacting land use patterns. One is the migration from the districts of the princely state of Travancore to the district of Malabar[2], and the intra-district migration from the midland to highland regions of Travancore. Kozhikode and Wayanad were among the significant places where the population migrated in the Malabar region, and Idukki was a prominent place of intra-district migration in Travancore. Several studies have documented this migration and the cropping pattern change (Tharakan, 1978; Moench, 1991; Jeena, 1997; Sebastian 2001). In a study carried out in several villages in Idukki, Jeena (1997) observed that the migration and resultant changes in land use patterns between 1940 and 1990 occurred in two major stages. In the first stage, population movement resulted in deforestation, from expanding the cultivated area to the forestland fuelled by government policies in the 1940s.

In order to resolve the food crisis that emerged soon after the Second World War in the mid 1940s, the government opened up forest land through the ex-servicemen rehabilitation scheme. Under this scheme those who had rendered services in defence were granted accessibility to cultivate food grains in the forest lands. However, this tempted people in the nearby areas to encroach upon the forest land and start cultivation. This flow of migrants was accentuated during 1940-50 due to another policy adopted by the government known as *Kuthakapattam,* which was an occupation right unlike an ownership right (Moench, 1990). Under this, up to five acres of forest land were distributed to individuals for food crop cultivation on a short-term lease. This policy was suspended in 1953 and finally withdrawn in 1954 impacting migration in the subsequent years. The second stage of population movement occurred with the introduction of rubber cultivation to the area in the 1960s based on its high profitability and adequate incentives for commercial plantation crops provided by the government. These population movements greatly impacted the land use pattern and food habits. In the early years of migration to the highland regions, mountain rice, tapioca, and other root crops were the staples, and with the shift to the plantation crops market purchased rice became the staple food. Tharakan (1978) observes that among the migrants who migrated from Travancore to forest areas in the Western Ghats of Malabar were Syrian Christians. Similarly, over 78 per cent of those who migrated from lowlands and midlands to

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[2] Before independence Travancore and Cochin were two princely states and Malabar was part of the Madras Province under direct British administration. After independence Travancore and Cochin states were integrated to form Travancore-Cochin state on 1st July 1949. Later under the States Re-organization Act of 1956, Travancore-Cochin state was united with Malabar to form the State of Kerala on 1st November 1956.

the high ranges of Idukki were Christians (Jeena, 1997). They took their food habits with them of which fish and meat were indispensable items in their diet to these regions. However, lack of road infrastructure made food grains and fresh food items a luxury for them. Thus, migration and the altered cropping patterns in the highland regions in Kerala seem to have heightened the demand for preserved items, particularly dried meat and dried fish which they consumed along with tapioca and other root crops as rice was scarce. While they could source fresh meat from the wild before the forest laws became stringent and dry them for later use, fish and dried fish had to be obtained from the lowlands and mid lands. The older generations in these regions reminisce about how their parents or grandparents used to carry such food items during their travel. Over time, the difficult terrain, risk of diseases like malaria and wild animal attacks made their travels less frequent. This seems to have presented economic opportunities for those small traders who were ready to take risks to engage in the dried fish trade in the region due to its better shelf life compared to fresh fish.

Fresh and dried marine fish are deeply ingrained in the culture and tradition of the state and are thus an essential food item in the consumption basket of people in Kerala. The proximity of Kerala to the Arabian Sea, the backwaters and numerous rivers and waterbodies provided abundant access to various fishes historically. The people of Kerala seem to have a particular affinity for seafood, and each region and religion has delicacies and culinary traditions centred around fish. Fish is known as *'meen'* or *matsyam* (*malsyam*) in the local language Malayalam. Some popular fish varieties in the state are sardine (*Sardinella gibbosa*; *mathhi* or *chala*), mackerel (*Rastrelliger kanagurta; ayala*), pearl spot (*Green chromide; karimeen*), pink perch (*Nemipterus japonicus; kilimeen)* sole fish (*Cynolossus semifasciatus; manthal/kananku)* prawns (*Dendrobranchiata; chemmen*), seer fish (*Scomberomorus guttatus; nai meen*), anchovies (*Stolephorus indicus; netholi*) etc. *Meen curry*, *meen varuthathu* (fry), *meen peera (stir fry with coconut), meen achar* (pickle)*,* and *meen chammanthi* (chutney) are some dishes prepared using a flavourful blend of spices and coconuts, available in plenty in the state. Malabar tamarind (*Garcinia gummi-gutta)*, known locally as *kudampuli* with a tangy and slightly sour taste, is an indispensable ingredient in most fish preparations in the state. While fresh fish is identified as *pachha meen*, dried fish is known as *unakka meen* locally.

Most of the coastal towns or cities in the state have fish markets in the morning or evening, where locals prefer to buy directly when the fishermen return from their fishing trips. Various fishes are available in fresh condition and at competitive prices in these markets. In other places, delivery of multiple types of fresh and dried fish directly to consumers by small-scale

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traders, either daily in the case of fresh fish or weekly or biweekly in the case of dried fish, also has a long history in the state. Historically, these fish vendors were women from traditional fishing communities, but women and men from non-fishing communities joined the trade over time. Unsold fresh fish were later processed and dried for the lean season. However, with improvements in road and other infrastructure, including the availability of ice boxes, men on bicycles or motorcycles joined the door-to-door marketing of fish, especially in rural areas. The household members, especially women, waiting for these vendors for their daily purchase of fish is a common sight in the mornings in many rural areas of Kerala. Such vendors provided easy access to fish for the households without needing or struggling to purchase at the market. These vendors also provided fish on credit for those unable to make spot payments. It is based on the type and availability of fish that the households decide on the menu for the day. Each locality used to have some vendors supplying to a particular area, and the sale and purchase thrived on trust between the buyer and seller. Not only that, but the women also used the waiting time for the vendor for social interactions with the neighbours and for sharing their life stories and recipes. The seller also used to know a household's preferred species, and when the excellent quality of such fish was available, they used to reserve them for specific households. In this system, households' daily fish consumption was not constrained by the day-to-day cash availability of the households. In some ways, this practice ensured the nutritional security of the households.

Kerala witnessed further changes in fish marketing with the emergence of temporary stalls/carts at specified locations in smaller towns and villages, facilitating better availability and accessibility of various good quality fish at any time. In line with the fast-changing consumer habits and preferences, some started providing value-added services like cleaning, descaling, cutting, etc. With improved cold storage facilities, fresh fish e-retail in urban areas and smaller towns have been available recently. With all these changes happening, the role of women as purchasers of fish for the family also seems to have changed. Also, purchases became increasingly determined by their ability to pay on the spot, either in cash or electronic transfer. The role of a fish purchaser for the family seems to have been taken over by the male members who venture out to the market as women get themselves engaged with their daily household chores. Once the male household members went out to the market for purchase, they also had more choices of fish and other items such as chicken, beef, and other meat. Now the fish consumption decision of the household is also influenced by the availability and price of alternative animal protein options, unlike the previous times when the households had to make a limited choice of the type of fish alone. It often resulted in choosing between quantity versus quality or high-priced fish vs low-priced ones. While more fish like sardine or mackerel will be available at a lower price that might be

sufficient for a large household, items like seer fish would be available in limited quantity for the same price. It has implications for the per capita consumption of fish by the family. While the markets for fresh fish became more widespread and underwent considerable changes, little information is available on the status of dried fish consumption.

With the easy availability of fresh fish and other animal protein sources like broiler chicken and beef, the demand for dried fish consumption seems to have changed considerably. Consumers now have more choices than when fish consumption depended on local catch, and fish were dried for off-season consumption. In earlier days, the households purchased dried fish and prawns in bulk from the women vendors who used to do door-to-door marketing carrying headloads of dried fish. These women were mostly referred to as 'arayathi' as they belonged to the traditional fishing communities such as *araya* or *dheevara* in most parts of the state. The families had a basket made of bamboo or other reeds (Figure 2), which they used to hang above the traditional firewood cooking ovens (*aduppu).* The heat and smoke from the ovens kept the dried fish from getting spoiled and protected it from ants and other animals like rats, cats, etc. Because of the constant exposure to smoke, these baskets used to be black and were among the ordinary objects in most households' kitchens. However, with the construction of modern houses, the shift to LPG gas connections and the shortage of bamboo baskets and their replacement with plastic boxes, such storage practices have disappeared from most households.

Figure 2. Bamboo /reed basket used for storing dried fish
Photo courtesy: Chellappan

At present, the households seem to simultaneously perceive both the health benefits and risks of eating dried fish. While dried fish plays an essential role in providing food and nutrition security, the health concerns arising from the increased salt intake from dried fish consumption, preservatives, and often low-quality dried fish are substantial. The taste of dried fish with a strong flavour and smell seems acquired, varying across different age groups or generations, genders, and even culturally and regionally. Consumer preferences for dried fish in Kerala appear to be closely differentiated by their socioeconomic and demographic characteristics apart from other geographic and climatic factors.

Understanding the market for dried fish and consumers' behaviour is therefore vital for designing effective policies for hygienic and safe production and marketing of dried fish while ensuring the livelihood security of the producers and health and food safety. A study of dried fish consumption concerning the overall consumption of various animal protein sources would help understand the drivers and barriers to dried fish consumption in the state.

Against this backdrop, the present study analyses the trends and patterns in fish and meat consumption, focusing on dried fish consumption across different geographical regions in Kerala. The purpose is to explore consumers' preference for fish and dried fish products amongst other locally available non-vegetarian protein sources. It also investigates the interregional differences in the households' non-vegetarian food consumption habits before attempting to analyse the consumption of various fresh and dried fish items during two reference periods. The study also delves into how households undertake a quality assessment before they purchase fresh and dried fish items and their tastes and preferences in cooking and eating various species of dried and fresh fish across different geographies. It also looks at consumer tastes and preferences changes over time, assessed in terms of the frequency and quantity of their purchases. The study also investigates these issues, specifically whether dried fish matters in the consumption basket of households across different strata of the society (including community, religion, income group, and region) in Kerala.

Theoretical approach

The study draws insights from the Theory of Planned Behaviour developed by Ajzen (1985), which explains and predicts human behaviour. The theory is based on the premise that an individual's intentions are shaped by three determinants: attitudes, subjective norms, and perceived behavioural control. Here attitude refers to an individual's evaluation of a particular

behaviour or action and reflects their positive or negative feelings or beliefs about engaging in that behaviour. These are typically shaped by personal values, beliefs, experiences, and perception of outcomes associated with that behaviour etc. Subjective norms, on the other hand, represent the social pressure or influence to engage in a specific behaviour. Perceived behavioural control means an individual's belief in their ability to perform the behaviour successfully. These three factors are assumed to shape their decision-making process and ultimately determine their behaviour.

The Theory of Planned Behaviour is assumed to provide a valuable framework for understanding and predicting the consumption behaviour of households. It believes that when an individual or household makes a purchase decision, they are influenced by various factors like quality, price, personal preferences, etc. The subjective norms, such as recommendations from friends or peer influence and perceived behavioural control, such as affordability and availability, also play a crucial role in purchase decisions.

We assume that the consumer's behaviour or preference for any product, particularly dried fish consumption, is influenced by price and non-price factors, which can be analysed using the Theory of Planned Behaviour framework. As mentioned earlier, the decision to purchase fresh or dried fish is determined by the attitudes, which are individual's or households' evaluation and beliefs about a particular product, here, fish. Attributes of the product, quality, price, personal preferences, etc., shape attitudes. If an individual or household perceives that the fish is of high quality and aligned with their needs, they are more likely to have a positive attitude towards purchasing it. Similarly, social pressure or influence from friends, family or peers also influences purchase decisions. Recently, information shared by friends through social media apps like Facebook and WhatsApp about the quality of fish, etc., has been found to influence the purchase decisions of individuals.

Similarly, perceived behavioural control, which relates to an individual's belief about their ability to make a purchase successfully, is influenced by factors such as the resources they perceive to have, their knowledge, skills, and other situational constraints. For example, if the individual perceives that the price of fish is too high for the financial resources they perceive to have, then their intention to purchase will be weak. Therefore, adopting this framework is assumed to help us understand the consumer decision regarding purchasing fish and dried fish. The following variables are identified to understand consumer behaviour in our study context.

The variables identified for analysis within the above framework, apart from various socioeconomic, demographic, and geographical factors, include consumers' perceptions,

beliefs, and attitudes towards fish and dried consumption. The study also emphasises the 'sensory perceptions', such as the perceptions of taste, smell, texture, etc., in consumers' consumption decisions of fresh and dried fish. Consumers are assumed to use these to assess the freshness of the dried fish in their buying or consumption decisions. The study also focuses on the intra-household age and gender-specific preferences likely influencing the family's overall dried fish consumption. Moreover, the perception of health risks versus health benefits from dried fish consumption and the perception of 'quality' versus 'prices' of dried fish to fresh fish and other animal protein substitutes like chicken and beef are also explored. In the case of India, nutrition, tradition, availability, quality, accessibility, and affordability are the major factors determining fish consumption (Salim & Kumaran, 2022).

Selection of the sample households

We considered two significant aspects or criteria for selecting the study locations. One is the geographical or topographical factors influencing land use and consumption habits historically. The other is the economic status or the households' poverty levels that impact their spending on different items in their consumption basket. Therefore, we took into account the topographical characteristics for selecting sample districts in the first step. As mentioned earlier, Kerala has three distinct elevation zones: lowland, midland and highland/upland (George and Chattopadhyay, 2001). These regions have vastly different land use and cropping patterns due to topographical and historical reasons linked to the food scarcity situation following the Second World War, which seems to have influenced the consumption habits of people living in the region presently. As noted earlier, the population pressure in the lowlands led to farmers' movement from the land-scarce areas to places that offered tremendous potential for cultivation, that is, the midland and highland regions during the early to mid-1900s. Specifically, the land use and cropping patterns in the highland and midland regions intrinsically relate to the migrant population's food and cultural habits. Most of the migrants who were Syrian Christians, both in the Travancore and Malabar regions, were small cultivators who settled and planted paddy, tapioca, rubber and spice crops (Tharakan, 1978; Moench, 1991). Historically, the lowlands had a rice-based cropping pattern wherein people preferred fresh fish to dried ones regularly. As the migrant population established cultivation in the midlands and highlands, where paddy cultivation was difficult, tapioca and other root crops became their staple food. Tapioca is even said to have played a major role in averting famine during the post-World War period (Sebastian, 2001). This region preferred dried fish due to its shelf life and the unavailability of fresh fish. The dried tapioca-dried fish combination was their primary diet, especially in the early years of migration when rice and other food items were scant in the region due to a lack of proper

roads and other infrastructural facilities. Later with improvements in infrastructural facilities, and in line with the overall changes happening to the economy and society and the introduction of plantation crops and changes in the work profile, food habits and consumption habits seem to have changed across the regions in Kerala. Recently, fresh chicken and beef have become substitutes for fish as animal protein sources. All these factors are assumed to influence the consumption demand and pattern of dried fish in the state. Therefore, we classified districts based on these three topographical regions.

In the second step, we divided all 14 districts into two categories based on available poverty estimates or Head Count Ratios (HCR) prepared by Mohanty *et al.*, (2016) using the National Sample Survey Organisation's 68th-round survey data. Malappuram (11.10 per cent), Alappuzha (11.58 per cent), Wayanad (14.43 per cent), Kozhikode (15.47 per cent), Kannur (19.85 per cent), and Kasaragod (21.09 per cent) districts had HCRs above the state average of 10.48 per cent. Idukki (3.70 per cent), Thiruvananthapuram (3.92 per cent), Kottayam (4.95 per cent), Pathanamthitta (7.64 per cent), Kollam (8.50 per cent), Thrissur (8.50 per cent), Ernakulam (10.15 per cent), and Palakkad (10.24 per cent) had HCRs below the state average.

We selected one district from these two categories from all three physiographic regions. Thus Wayanad (highland), Malappuram (midland), and Alappuzha (lowland) from the first category and Idukki (highland), Kottayam (midland) and Thrissur (lowland) districts from the second category have been selected for the survey. We chose these districts so that they are also representative of various religions such as the Hindus, Christians and Muslims and social groups including the scheduled castes (SC, or the *Dalits*), scheduled tribes (STs, or the *Adivasis*) and other backward castes (OBC).[3]

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[3] The SC, ST and OBC are categories of disadvantaged or marginalised people or communities that are recognised by the Indian government for affirmative action in education and government jobs.

Table 1. Distribution of population and sample households.

Source: Census of India (2011) and field survey

District	Taluk	Village	Rural/ Urban	No. of households as per census 2011	Proportion	Sample Size	Proportion	Weights
Thrissur	Thrissur	Kolazhy	U	2952	0.41	35	0.5	0.8197
	Mukundapuram	Karalam	R	4251	0.59	35	0.5	1.1803
		Total		7203		70		
Kottayam	Kottayam	Puthupally	U	7652	0.51	35	0.5	1.0177
	Kanjirapally	Chirakkadavu	R	7386	0.49	35	0.5	0.9823
		Total		15038		70		
Alappuzha	Ambalapuzha	Mannacherry	U	7637	0.66	34	0.493	1.3483
	Kottanad	Thakazhy	R	3858	0.34	35	0.507	0.6617
		Total		11495		69		
Idukki	Devikulam	Velluthuval	R	3622	0.56	35	0.5	1.1287
	Udumbanchola	Udumbanchola	R	2796	0.44	35	0.5	0.8713
		Total		6418		70		
Wayanad	Sulthanbatheri	Purakkadi	R	5102	0.50	35	0.5	1.0041
	Vythiri	Muttil	R	5060	0.50	35	0.5	0.9959
		Total		10162		70		
Malappuram Thirurangadi	Urakam	U	5294	0.43	35	0.5	0.8590
	Ernad	Pookuttoor	R	7032	0.57	35	0.5	1.1410
		Total		12326		70		
All		Total		125284		**419**		

For selecting the sample households, at first, two sub-districts from where a village or municipality representing rural and urban areas were selected randomly. A village ward in rural areas and a municipal ward in urban areas have been chosen for the household surveys. Figure 3 shows the locations of the study. We surveyed about thirty-five households from each of these wards. In Wayanad and Idukki, which were predominantly rural, we had samples from only rural areas. Households were selected based on a systematic random walk procedure from an identified key starting or entry point at each village/ward. Every fifth household from the specified vital starting point was included based on their willingness to participate in the survey, and we covered 419 households (Table 1). Due to some logistical constraints, we covered one household less in Alappuzha.
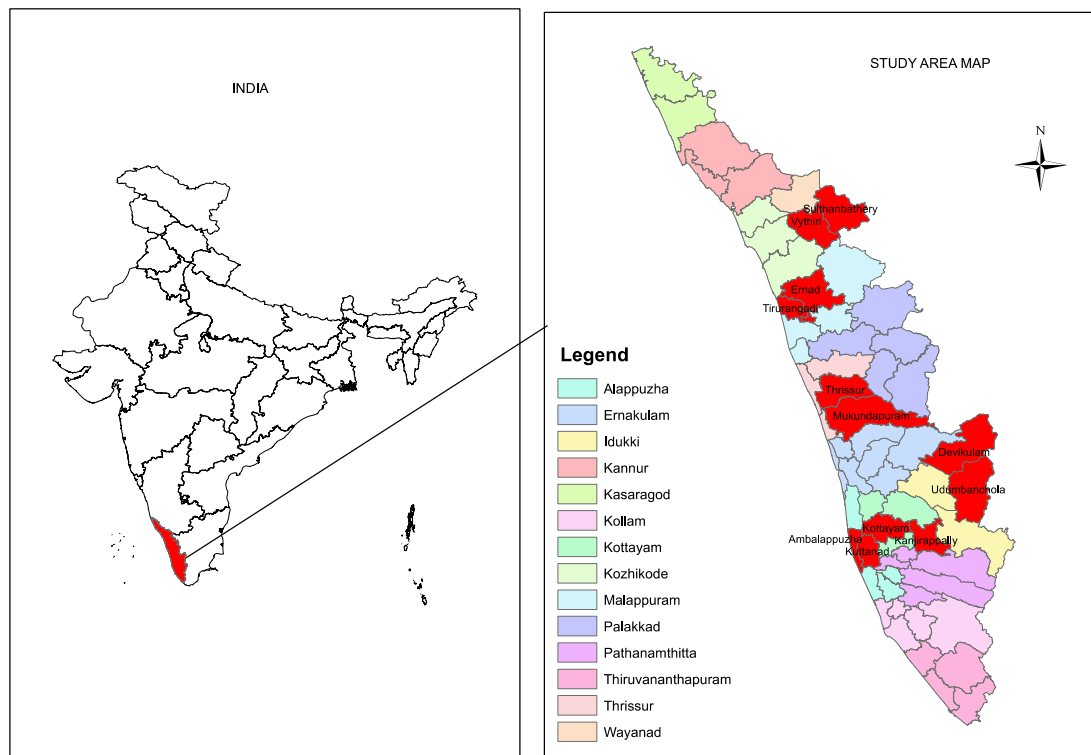
Figure 3. Location map of the study area

Tools and Methods of Data Collection and Analysis

Here we present an account of the data collection procedure adopted. Household surveys were carried out by investigators with a master's degree in development studies. They were recruited from Kerala and were given training for conducting field surveys. We used a structured interview schedule prepared in English[4]. The surveys were canvassed in Malayalam, as the investigators conversed in both languages during November 2022 to January 2023. Before starting the actual surveys, the interview schedules were field tested and revised. Interviews were carried out face-to-face by the investigators at the respondents' residences. The respondents of the study were either the head of the households or an adult family member who makes critical food purchase decisions and or primarily cooks and serves food for the family.

The survey instrument had both open-ended and closed-ended questions. It contained questions on households identification and social and demographic characteristics, purchase

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[4] The interview schedule is provided in the Appendix

and consumption of fresh and dried fish and other sources of animal protein, types, quantity, frequency of consumption, price and quality-related questions, sources of purchase or procurement and market-related issues, types and methods of preparation, the importance of fish and dried fish in the households diet, inquiries related to their tastes and preferences, knowledge and attitude towards dried fish and dried fish products, etc. We used two reference periods to capture the actual consumption of fresh fish, dried fish, and meat, which are the primary non-vegetarian sources of protein—the first reference period pertained to the seven days before the date of the survey, and the second one to 30 days before to that. The reasons for selecting these two reference periods are given later.

The questions included were also intended to capture any intra-household and gender-specific factors that might influence the consumption of dried fish by the families. There were also questions about the reasons or barriers for households not consuming fish or dried fish. The data were analysed using descriptive statistics and presented through charts and figures using SPSS, STATA and EXCEL software. Figures and tables presented in the report are weighted according to the Census of India 2011 proportion of urban and rural households. Since we did not find statistically significant urban and rural differences in the consumption figures except in the case of fresh fish, where urban areas reported a slightly higher consumption, we are presenting district aggregate figures only.

Impact of a Social Media Message on the Survey

Before we present the survey results, a few remarks on some of the issues we encountered during the execution of the surveys are in order. A few days before the start of the study, a voice message was circulated on social media, prominently in WhatsApp groups all over the state. The message warned that a group of fraudsters were on the prowl in the guise of field investigators to steal vital information about the households for a possible robbery. The voice message had cautioned that the investigators were carrying fake identity cards and letters supposedly issued by government sources and were not to be trusted and should not be entertained. Though this voice message's origin was unknown, it was circulated widely. Unaware of these messages circulating in the neighbourhood groups, our investigators went ahead with the surveys. However, in the second village in the Thrissur district, some investigators were interrupted, stopped, singled out and questioned by the local people in a rough manner which is when we came to know about the circulation of this voice message. The local people who believed the warning in the voice message were unwilling to trust the identity cards and the official letters our investigators had carried with them.

Finally, the investigators informed our office in Hyderabad, after which we contacted the relevant local government officials to clarify that our survey was genuine. We had already informed the local village officials before the start of the surveys but had to do it again due to the panic of the local people. Given the suspicion and volatility in some villages, we contacted the Grama Panchayat office or the local government. We requested them to circulate the information about our investigators' visits to the households from their official groups, which they did. The officials also cooperated well by giving their contact numbers for the investigators to contact from the field in case they faced any further problems from some people who were suspicious of the intentions of our survey. In most places, they also assigned a ward member to assist us in the villages. Once the households received information from the Gram Panchayat Office, the respondents were convinced of the genuineness of the survey and cooperated. Thus, while social media disrupted the study initially, it facilitated its smooth conduct later, substantiating the power of social media both as a disruptor and facilitator.

Profile of the sample households

In this section, we discuss the socioeconomic and demographic profile of the sample households. Sample households are headed mainly by male members (80.9 per cent) except in Wayanad, where 31 per cent were led by female members (Table 2). A significant difference exists in the marital status of the head of the household, indicating a difference in family structure and dynamics. Almost 75 per cent of the female heads were either widows, separated, or never married, as against 96 per cent of the male heads who were currently married. Thrissur reported the lowest number of female-headed households. The female heads are typically the sole decision-makers and providers for their families. They might face unique challenges navigating their primary caregivers and provider roles. In contrast, the currently married male heads might have additional support and shared responsibilities within the household.

The average age of the head of the households was 54.78 years which ranged from 50.28 years in Wayanad to about 58.12 years in the Thrissur district. The female heads (57.4 years) were slightly older than their male (54.16 years) counterparts, the difference which was statistically significant at a 5 per cent significance level. It might suggest that they assumed the role of the head of a household later in life due to life events like widowhood, divorce, or separation. Also, they might face unique economic and social challenges compared to their male counterparts, influencing their income and consumption decisions.

Table 2. Gender, age, and educational status of the head of the households.

Source: Field survey

	Male (%)	Female (%)	Average age (in years)	No formal education (%)	Primary (%)	Middle (%)	Secondary (%)	Higher Secondary (%)	Others (%)
Thrissur	88.6	11.4	58.12	2.82	14.1	18.3	35.2	11.3	18.33
Kottayam	82.9	17.1	55.75	1.43	10	25.7	41.4	8.6	12.89
Alappuzha	84.1	15.9	56.99	0	7.4	23.5	33.8	8.8	26.54
Idukki	81.4	18.6	53.40	25.35	9.9	18.3	25.4	14.1	7
Wayanad	68.6	31.4	50.28	20	20	24.3	24.3	4.3	7.1
Malappuram	80	20	54.19	7.14	15.7	22.9	40	2.9	11.43
Total	80.9	19.1	54.78	9.52	12.9	22.1	33.3	8.3	13.84

Note: Gender and Educational status in percentages

It is known that education levels play a significant role in creating knowledge and awareness, financial literacy, and thereby in food choices. According to Moreira and Padrao (2004), education was more frequently associated with food choices than income. While there was a higher proportion of household heads without formal education in Idukki and Wayanad districts, the majority had education levels of middle school or above across all other districts and overall, in the state. The education levels of female and male heads were comparable, except that a higher percentage of illiterates were reported among female heads (17.4 per cent) compared to males (6.4 per cent).

Regarding the religious composition, 68 per cent of the surveyed household were Hindus, followed by 18.5 per cent Muslims and 13.4 per cent Christians. Here some deviation from the religious composition of Kerala according to the 2011 Census of India figures is observed. In the 2011 Census, 54.73 per cent of the population was reported as Hindus, 26.56 per cent were Muslims, and 18.38 per cent were Christians. It means that our sample had a higher representation of Hindu households.

In our sample, as expected, more Christian and Muslim households were in Kottayam and Malappuram districts, respectively (Figure 4). In terms of the social category, as seen in Figure 5, about 53 per cent of the surveyed households belonged to Other Backward Castes (OBC), followed by 22.2 per cent of forward castes (FC), 16.3 per cent of Scheduled Tribes (ST), and the remaining 8.6 per cent from the Scheduled Castes (SC). Most surveyed households belonged to the ST communities, such as the *Mannan* in Idukki and *Paniya* and *Kuruma* in Wayanad.
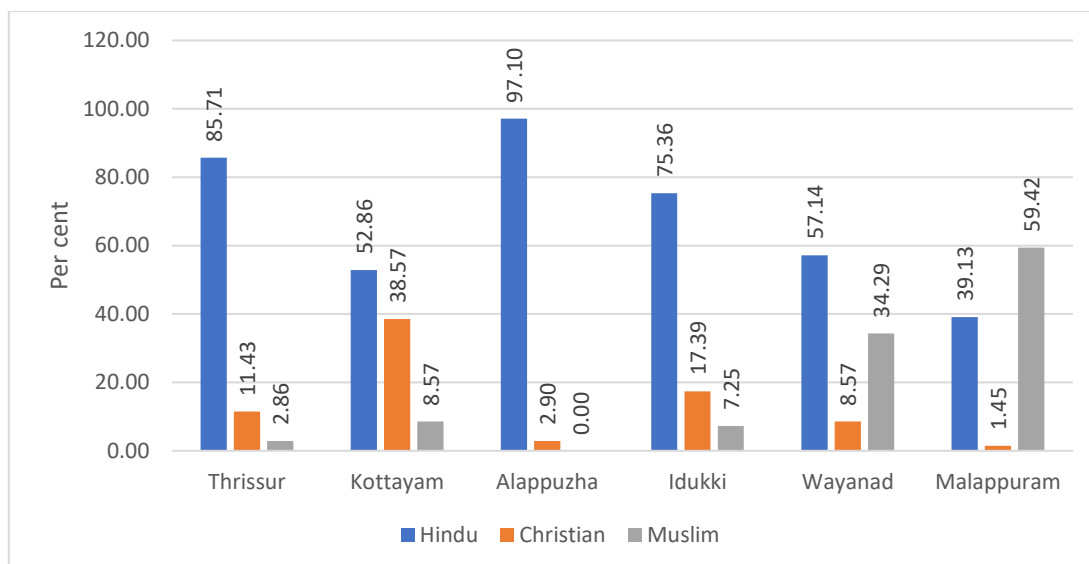
Figure 4. Distribution of sample households by religion

Source: Field survey
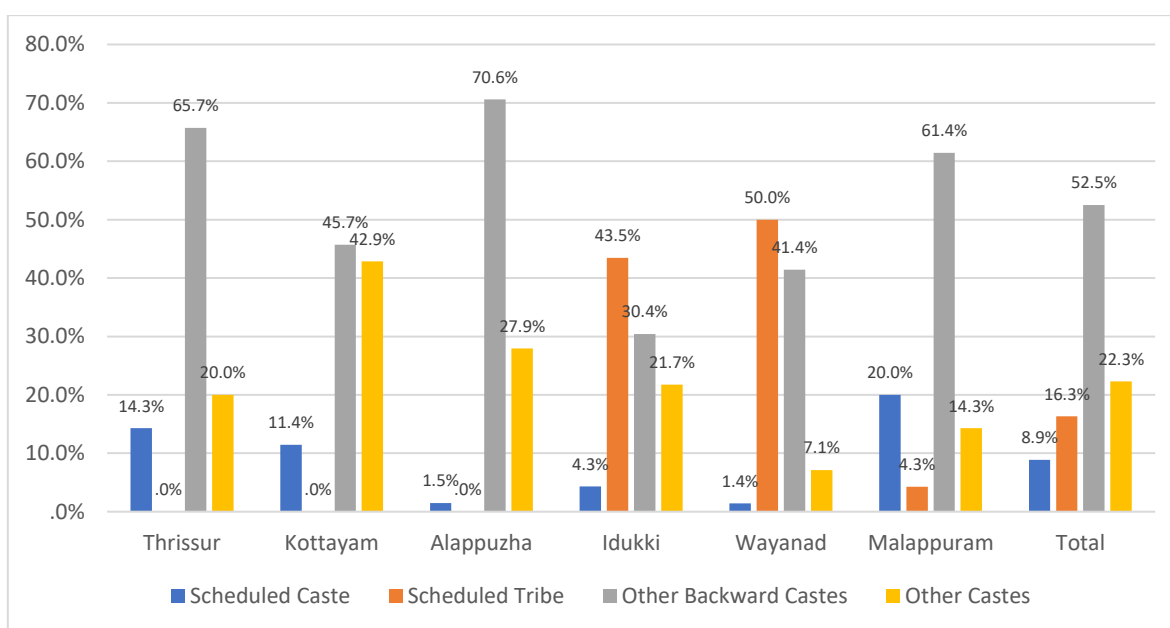
Figure 5. Distribution of sample households by social category

Source: Field survey

Our sample households belonged to as many as 39 different castes reported in the state. Some of the significant castes or communities reported were *Ezhava* (25.0 per cent), *Mappila* (10.9 per cent), Roman Catholic (9.4 per cent), *Mannan* (8.5 per cent), *Nair* (8.1 per cent), *Viswakarma* (6.1 per cent), and *Paniya* (5.3 per cent). It indicates that our sample households are socially and religiously heterogeneous. Most of whom live as nuclear families (73 per cent) too. However, the proportion of joint and extended families was higher in the Malappuram and Wayanad districts.

In the absence of data on income, the type of ration card owned by the households and their income category was taken as proxy variables to understand their economic status. It is seen that about 21.7 per cent of the households held yellow or the *Antyodaya Anna Yojana* card, which is given to the poorest of the poor to provide them with food security and other essentials at a subsidized rate (Figure 6). It was followed by most households (41.40 per cent) holding a pink card or the priority household ration card, followed by 20.20 per cent having a blue card or a non-priority (subsidy) card. Yet another 15.7 per cent of households held a non-priority (non-subsidy) white card. The remaining few households did not possess any ration cards.
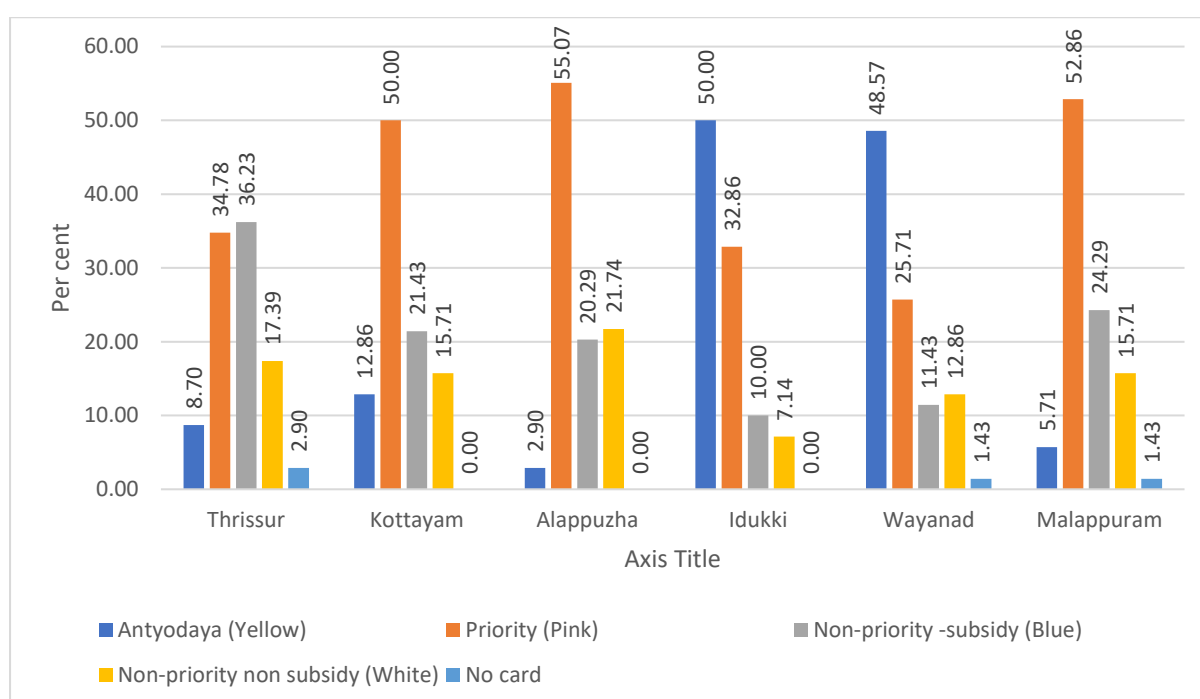
Figure 6. Distribution of sample households by type of ration cards owned
Source: Field survey

More than 75 per cent of the households in the Idukki and Wayanad districts had either the yellow or *Antyodaya Anna Yojana* household ration card or the priority pink ration card indicating their marginalized economic status (Figure 6). It may be noted that these two districts had primarily tribal populations that are socially and economically marginalised groups. Remarkably, nearly 90 per cent of all the sample households reported their incomes in the bracket of fewer than ₹ 1.8 lakhs per year. The employment status of the head of the households showed that over 45 per cent were either agricultural or non-agricultural labour and another 25 per cent in salaried jobs. The percentage of household heads with salaried

jobs was higher in Thrissur (38 per cent), Alappuzha (32 per cent), and Kottayam (30 per cent) districts as compared to 12, 14, and 21 per cent, respectively, in Idukki, Wayanad, and Malappuram districts.

The living standards of the households reveal that most of them had pucca (67.9 per cent) or semi-pucca (30.9 per cent) houses; however, the percentage of households having pucca houses was relatively less in Idukki (44.9 per cent) and Wayanad (57.1 per cent) districts. All these indicate that our sample households from the different geographical regions of the state also belonged to heterogeneous social and economic strata. Overall, Idukki and Wayanad districts were socially and economically marginalised compared to other places.

Land ownership and cropping pattern

Land is a scarce resource in Kerala, as reflected in the amount of land owned by the sample households. Apart from the three per cent of the sample households who were landless, 63.7 per cent held less than 10 cents[5], and another 18.6 per cent owned about 10 to 25 cents, mainly as homestead gardens (Figure 7). A few households in the Idukki and Wayanad districts owned 50 cents or more land. Only about 3 per cent of the sample households owned more than one acre of land, and the maximum amount of land held, approximately 2.5 acres, was reported in the Idukki and Wayanad districts in the highlands of Kerala. In these homestead gardens owned by the households, mostly banana, coconut, and tapioca were cultivated in Thrissur, Kottayam, Alappuzha, and Malappuram districts, whereas Cardamom, pepper, and banana in Idukki and Wayanad districts. A few households in the Thrissur, Alappuzha, and Wayanad districts reported paddy cultivation and a few reported coffee cultivation in Wayanad. It may be pointed out that no significant changes in the crops cultivated in the past ten years have been reported in the study area.

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[5] Ten cents is equal to one tenth of an acre.
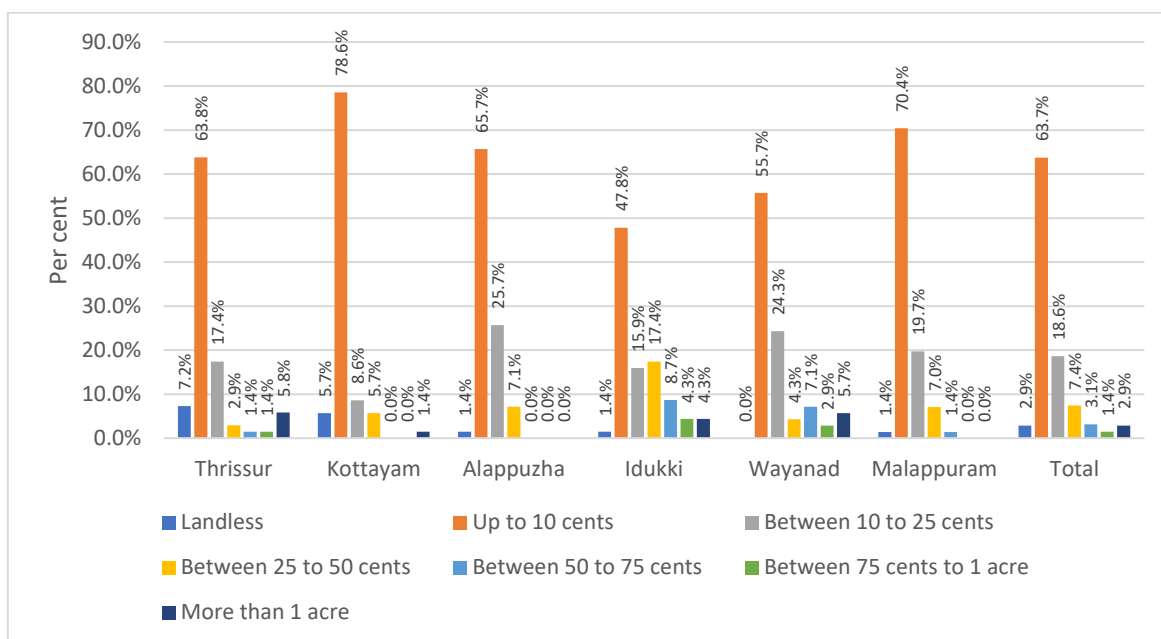
Figure 7. Distribution of sample households by the size of total land owned.

Source: Field survey

Consumption Frequencies and Preferences of Fish and Meat by the Consumers

In this survey, we asked about the household consumption preferences or habits of various non-vegetarian food items during the last year of the survey. We inquired how often or at what frequency they consumed food items like fresh and dried fish, fresh and dried prawns, eggs, chicken, beef, goat or mutton, pork, etc., in their households. We also probed why they did not consume these items during the last year if they reported no consumption. Interestingly, fresh fish is the most consumed item by the surveyed households, almost every day or more than once a week, followed by eggs and chicken. Not much difference has been observed in the frequency of consumption of eggs and fresh fish reported by the households. The households that never consumed fresh fish, eggs, and chicken were negligible. However, many families reported never consuming pork, goat or mutton, beef, fresh and dried prawn, followed by dried fish.

The number of households that reported non-consumption of dried fish was around 62 (15 per cent) only as compared to 265 (63 per cent), 243 (58 per cent), and 140 (33 per cent) households that reported non-consumption of pork, goat, or mutton and beef respectively (Figure 8).

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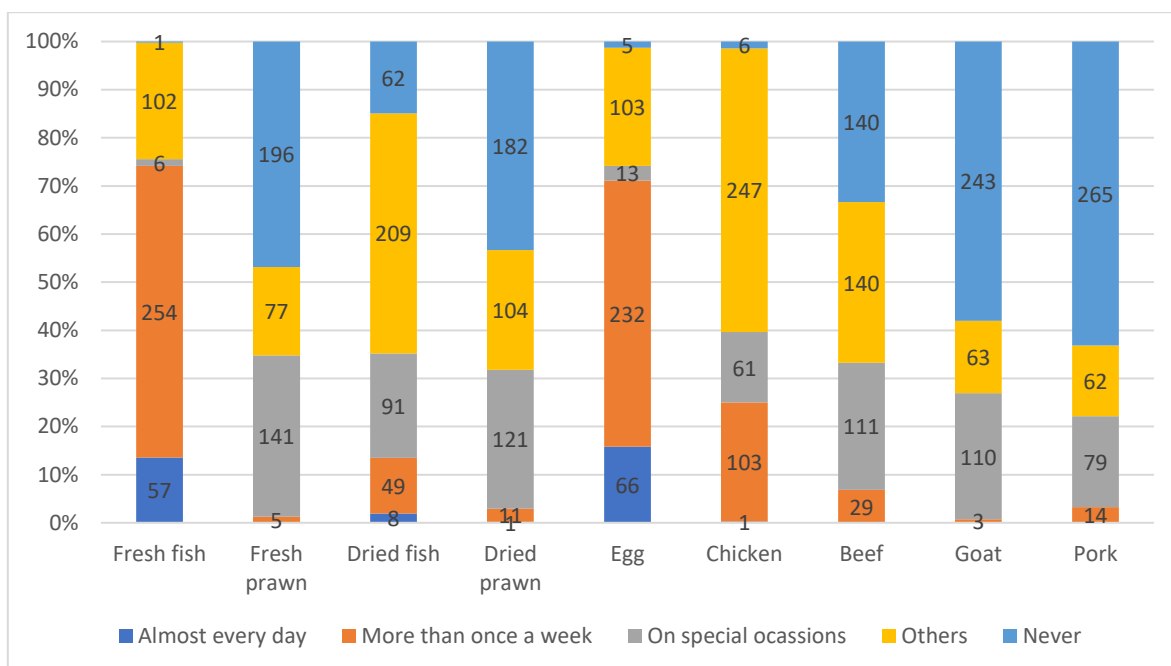
Figure 8. Frequency of consumption of various non-vegetarian food items reported by the households in Kerala.

Source: Field survey

The reasons for the non-consumption of these products also varied across different products. For example, a significant reason for not consuming fresh prawns or goat/mutton by the households was that it was costly or due to its lack of availability. A few households also reported their dislike of the taste of these items. Religion and health were crucial reasons for some homes to abstain from consuming beef and pork. The Mannan community abstained from beef consumption for religious reasons, and Muslims did not consume pork for the same reason. However, no religious taboos regarding fish and meat consumption were observed among others, though some households abstained from its consumption on certain occasions.

The households that abstained from consuming dried fish, including dried prawns, were primarily due to health reasons. The presence of high salt content, their suspicion of the products being dried under unhygienic conditions, and even their dislike for its pungent taste and smell seemed to discourage their consumption of dried fish.

We also tried to examine if there are any intra-household differences in the eating habits of these items. In the survey, we collected information on the eating habits of meat, fresh, and

dried fish-eating habits of each member of the household. The following figures 9a, b, and c summarise the data. It is seen that the average family size in the study districts ranged from 3.59 in the Idukki district to 5.08 in Malappuram. Interestingly, the average number of members who reported never eating meat and fresh fish is almost negligible across all districts. The average number of members who reported eating fresh fish and meat was high in the study districts. The proportion of household members reporting more frequent meat consumption was significantly higher in Malappuram, Wayanad, and Kottayam districts. Alappuzha also reported more frequent fresh fish consumption by most members.
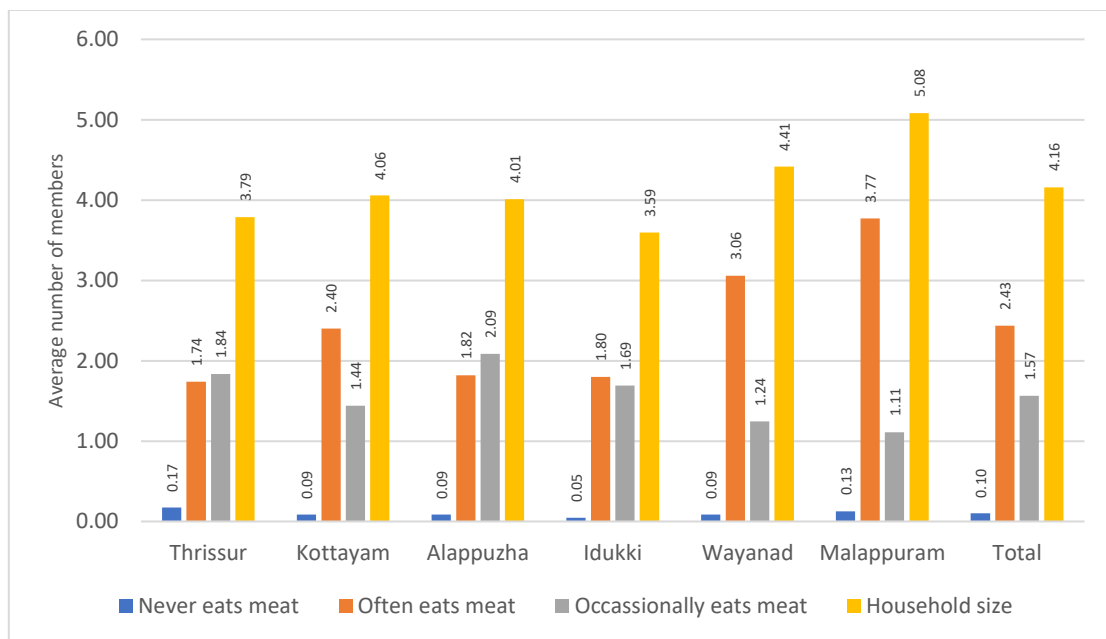
Figure 9a. Meat consumption habits of sample households across districts in Kerala
Source: Field survey
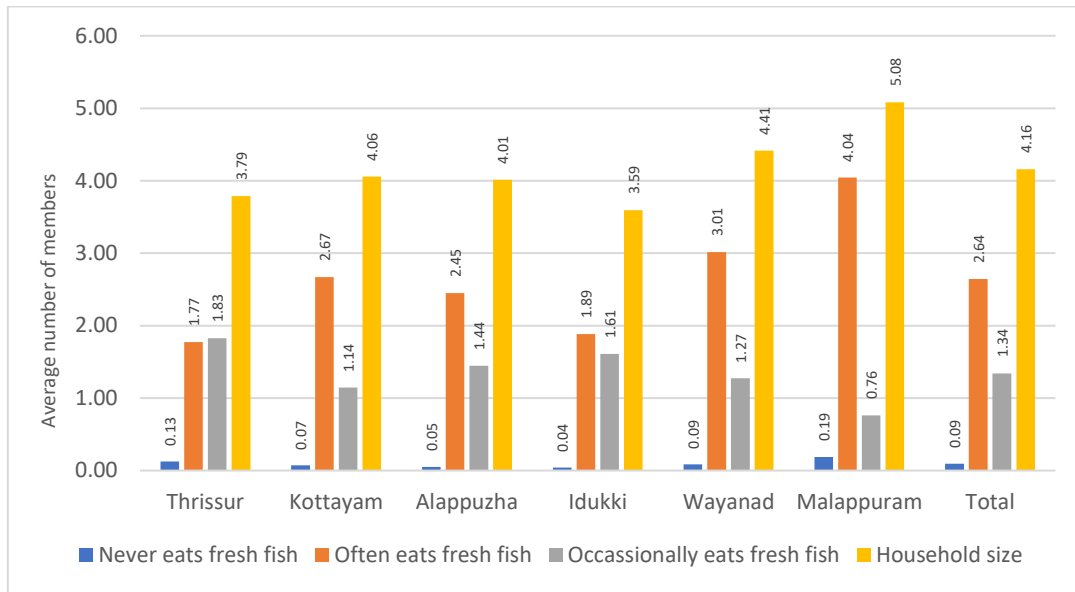
Figure 9b. Fresh fish consumption habits of sample households across districts in Kerala

Source: Field survey
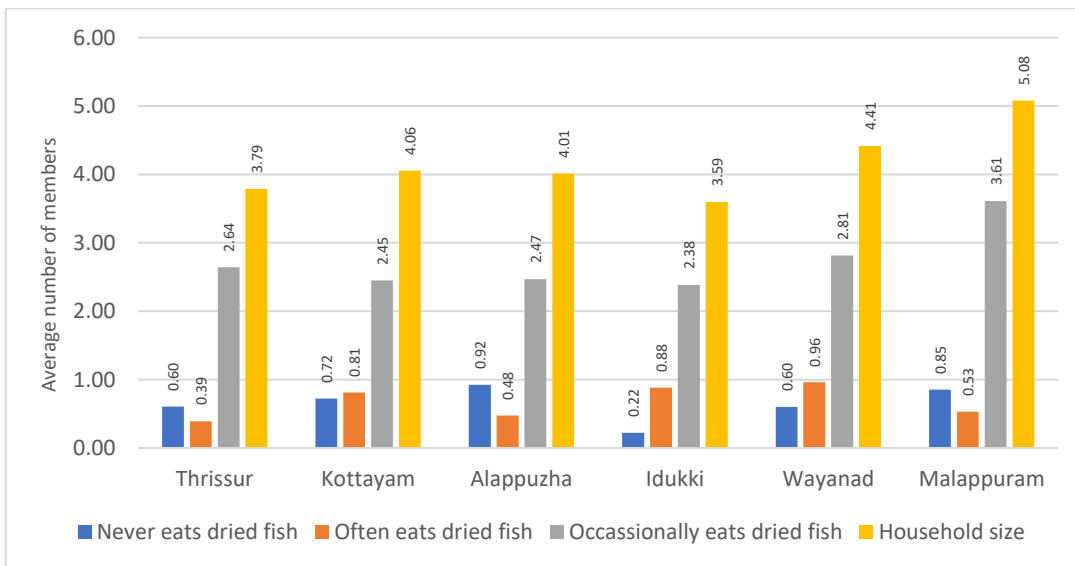
Figure 9c. Dried fish consumption habits of sample households across districts in Kerala

Source: Field survey

In contrast, when it came to the consumption of dried fish, most of the household members were only occasional eaters. Moreover, the number of members who reported never eating dried fish within a household was relatively higher in all the districts than those who never consumed fresh fish or meat. The households generally believed it was alright to eat fish

almost every day, chicken more often but less than the frequency of fish, beef, or pork once a week, and if none of these items was available, they ate dried fish.

Household's consumption of fish and meat during the last seven days of the survey

While the above analysis gave an overall idea about the consumption preferences and frequencies of the household, it was not sufficient to have a clear understanding of the actual consumption of these items by the families. Therefore, to fill this gap in our knowledge of the consumption habits and the importance of fish and dried fish in the households' consumption basket, we collected detailed information about their actual fish and meat consumption during two reference periods. The first period referred to the previous seven days of the survey, and the second reference period was 30 days before that. The first reference period gave more accurate estimations as the recall period was short; the respondents could provide more details on specific purchases, food preparation, etc., and more up-to-date insights into consumption patterns. There were also fewer chances for omissions or memory lapses. However, the seven-day period was also short, as many members and households reported that they were occasional fish and meat eaters, and this variation over time cannot be captured in the first reference period. Drawing conclusions based on the seven days might not accurately estimate the households' actual fish and meat consumption. Therefore, to accommodate occasional or less frequent but significant consumption of these items by the families, we also used a second reference period of thirty days. A more extended reference period provides a more comprehensive view of the household's consumption habits, captures variations over time, and provides a more stable and reliable consumption estimate, minimizing the impact of short-term fluctuations. The second reference period also helps us to broadly compare the estimates reported from the 68th round of the nationwide Consumer Expenditure Surveys conducted by the National Sample Survey Organisation (NSSO) in 2011.

However, it should also be noted that a more extended reference period of 30 days might pose recall challenges or biases and might not reflect the current consumption trends or capture day-to-day variations making generalization difficult. We collected data for both reference periods, considering the advantages and disadvantages.

Here, we first examine the household's consumption of major non-vegetarian food items during the previous seven days of the survey. The analysis has been carried out regarding the percentage of households reporting consumption, the quantity consumed, and the number of days these items were consumed in a week.
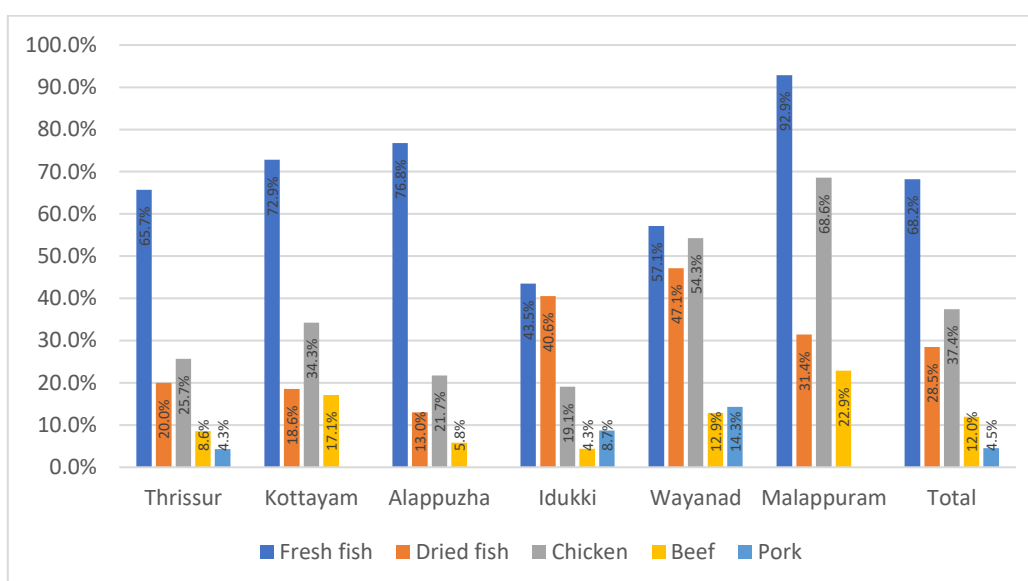
Figure 10. Percentage of households reporting consumption of various items during the previous seven days of the survey in Kerala

Source: Field survey

With 68 per cent of the sample households reporting its consumption at least once, fresh fish was seen as the most consumed non-vegetarian food during the previous seven days of the survey in Kerala. The districts that reported the highest levels of fresh fish consumption were Malappuram (92.9 per cent), Alappuzha (76.8 per cent), and Kottayam (72.9 per cent) (Figure 10). In contrast, districts like Idukki (43.5 per cent), followed by Wayanad (57.1 per cent), in the highland regions of Kerala reported the lowest levels of fresh fish consumption where the availability of fresh fish was not comparable with that of the other districts. Strikingly, these two districts reported the highest percentage of dried fish consumption by the households, indicating that the households might be substituting dried fish for fresh ones. While the overall consumption of dried fish in the state was 28.5 per cent during the first reference period, it was 47 and 40 per cent, respectively, in these two districts. The level of dried fish consumption was lowest in the Alappuzha district, which had better availability of fresh fish due to its long coastal line. In other words, fresh fish consumption seems constrained by the lack of availability and higher prices in the highland districts, where they substitute it with dried fish.

Chicken is the second most consumed non-vegetarian food by households in Kerala as it has no specific religious taboos associated with its consumption, unlike beef and pork. Overall, 37.4 per cent of the families in the state reported chicken consumption during the

last seven days of the survey. It was highest in Malappuram (68.6 per cent) and Wayanad (54.3 per cent) districts. Idukki and Alappuzha districts reported the lowest level of consumption of chicken. On average, the households reported chicken consumption for about two days in the past week.

Beef consumption was reported more in Malappuram (22.3 per cent), Kottayam (17.1 per cent), and Wayanad (12.9 per cent) districts. In contrast, pork consumption was more in Wayanad (14.3 per cent) and Idukki (8.7 per cent) districts. The number of days a household reported beef consumption per week was highest in Kottayam (3.24 days) and lowest in Thrissur (1.84 days). However, the number of days the households consumed pork in a week was around 1.83 days, and no considerable differences have been observed across the districts reporting pork consumption.

Before analysing the quantity of fish and meat consumption, a brief overview of the number of different types of non-vegetarian items consumed by the households in a week is given below (Figure 11). The types of non-vegetarian foods included here are fresh and dried fish, fresh and dried prawns, chicken, beef, and pork. It is seen that while around 14.6 per cent of the households did not consume any non-vegetarian items, 35 per cent and 31 per cent of the households consumed one or two things, such as fresh fish or chicken, in a week, respectively. Another 15 per cent of the families have reported consumption of three items in a week.
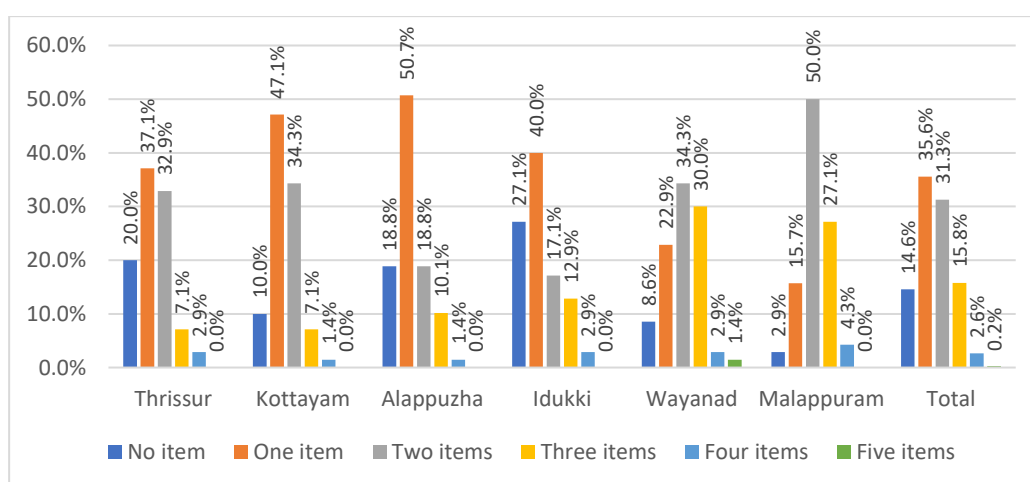
Figure 11. Number of different types of non-vegetarian items consumed by households in a week

Source: Field survey

There are also inter-district variations in the number of non-vegetarian items consumed by the households in the state. In most districts, households reported consuming one non-

vegetarian item, fish, chicken, or beef; however, in districts like Malappuram and Wayanad, most households consumed at least two items. The consumption of three items was reported more in the same Wayanad and Malappuram districts than in others. Interestingly, the Idukki district had the maximum number of households reporting no consumption of non-vegetarian food during the past seven days of the survey, probably because of the lack of availability of fresh fish in the highland regions at an affordable price and quality during the Hindu pilgrimage season when the survey was carried out.
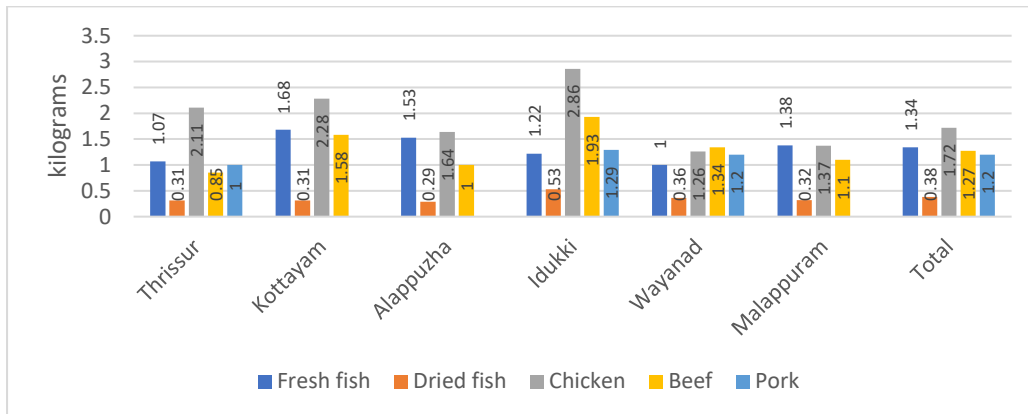
Figure 12. Average consumption of fish and meat by sample households during the past seven days of the survey

Source: Field survey

When it comes to the actual quantity of consumption of these items by the households' marginal differences, have been observed. It is seen in Figure 12 that the highest amount of chicken consumption per household was reported in Idukki (2.86 kgs), followed by Kottayam (2.28 kgs) and Thrissur districts (2.11 kgs). Compared to these districts, the chicken consumption in Malappuram district, which had reported a higher percentage of households consuming the same, was lower at 1.37 kgs per household. However, here, most households in Malappuram and Wayanad consumed two or more items in a week. In contrast, in other districts, most households reported only consumption of one or two things. The average chicken consumption in other districts ranged from 1.26 kgs to 1.64 kgs per household during the past seven days of the survey. The average quantity of beef consumption per household was highest in Idukki (1.93 kgs), followed by Kottayam (1.58 kgs) and Wayanad (1.34 kgs). However, according to the religious beliefs of the Mannan community in Idukki, consumption of beef went against their religious belief and invited the wrath of gods. They generally preferred dried and fresh tapioca with fish although they also ate rice with it.

The average pork consumption was about 1.2 kgs per household and was limited to the Wayanad, Idukki, and Thrissur districts during this reference consumption period. In places where households reported consumption of more non-vegetarian items, the average quantity of each item consumed was relatively less.

Fish consumption, on average, was somewhat higher in Kottayam (1.68 kg) and Alappuzha (1.53 kg) districts. Among the consumption of all non-vegetarian food considered here, the average consumption of dried fish was among the lowest at 0.380 grams per household per week. A marginally higher amount of dried fish consumption was reported from Idukki (0.53 kgs) and Wayanad districts (0.36 kgs).

Another important aspect is the average amount of consumption expenditure[6] incurred on these items by households (Figure 13). Here some inter-district differences are observed, with households in Kottayam (₹ 536), Wayanad (₹ 344), and Malappuram (₹ 312) spending higher amounts on beef. In contrast, the households in Idukki spent higher amounts on pork consumption (₹ 327) during the previous seven days of the survey. The households paid nearly ₹ 200 and ₹ 73 for fresh and dried fish consumption, respectively.
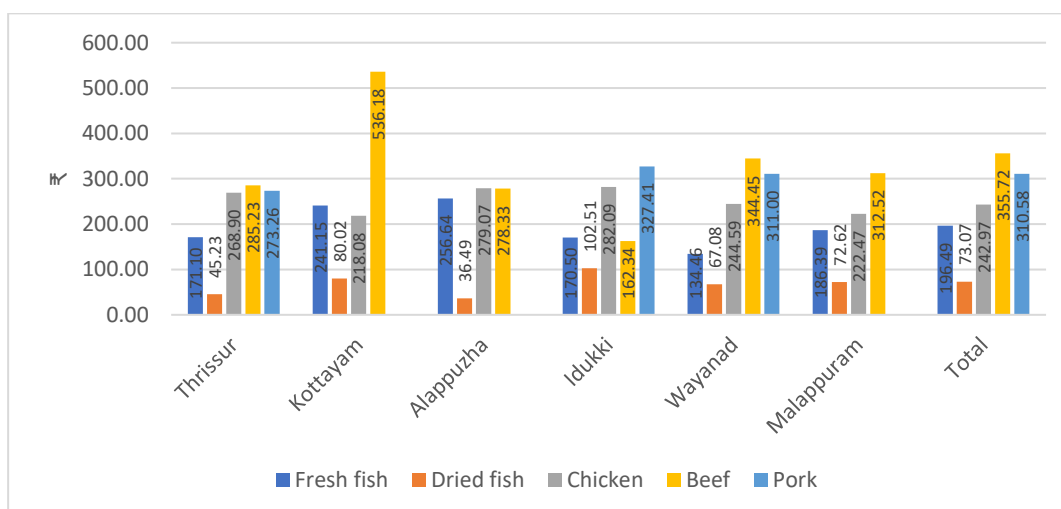
Figure 13. The average amount of money spent by the households on the consumption of non-vegetarian food during the previous seven days of the survey
Source: Field survey

Households in Alappuzha (₹ 256) and Kottayam (₹241) reported relatively higher spending on fresh fish consumption in a week. There was little difference in the amount spent on chicken consumption across districts. Similarly, a higher expenditure on dried fish consumption was found in Idukki (₹103), followed by Malappuram (₹67) and Wayanad (₹67)

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[6] 1 CAD = approx. ₹ 61.27 (Indian Rupee) in May 2023

districts. Households in Alappuzha and Thrissur districts spent the lowest amounts on the consumption of dried fish across all the survey districts.

Household's consumption of non-vegetarian food during the past 30 days of the survey and its nutritional value

This section analyses households' consumption of non-vegetarian food items for the second reference period, the last 30 days. Compared to the consumption of fresh fish during the past seven days of the survey, here we see that the percentage of households reporting fresh fish consumption is over 95 per cent in most districts (Figure 14). The lowest rate was reported from Idukki, which was as high as 90 per cent. Almost 97 per cent of the households in Alappuzha and Malappuram reported consumption of fresh fish, which is the highest among consumption of all non-vegetarian items reported by the households in the state. The consumption of fish surpassed even egg consumption reported by the households, except in Wayanad, which incidentally reported the highest consumption of eggs across all districts. The percentage of households reporting chicken consumption was 85 to 90 per cent across most districts compared to 37 per cent during the past seven days' consumption.
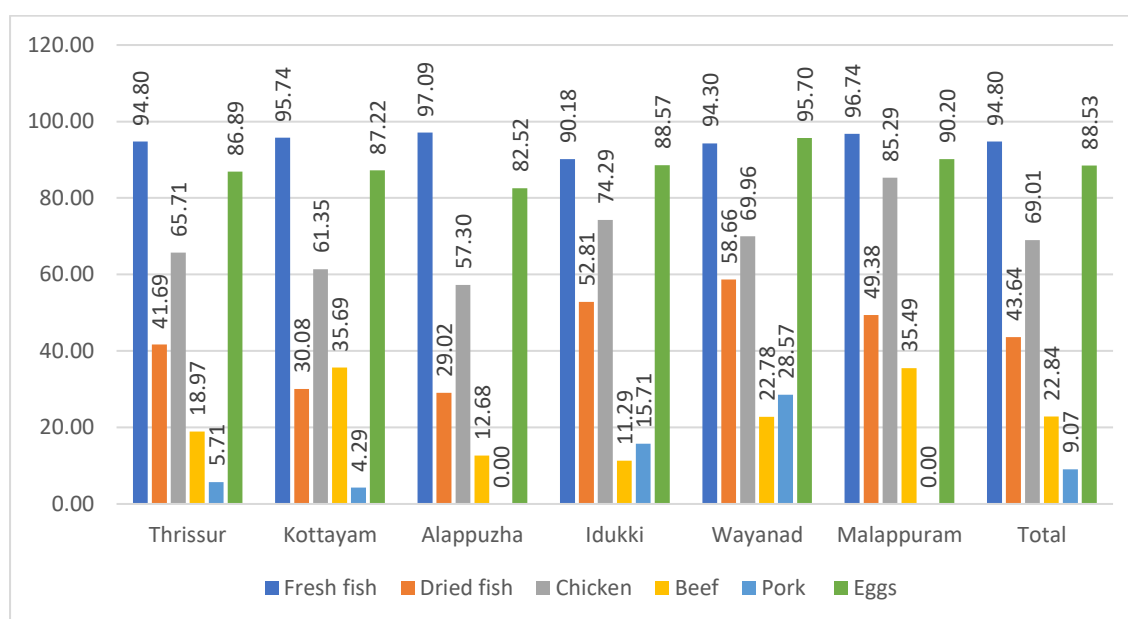
Figure 14. Percentage of households reporting consumption of non-vegetarian items during the last 30 days of the survey

Source: Primary survey

The consumption of chicken was slightly lower in Alappuzha at 82.5 per cent. Interestingly, as many as 43.64 per cent of the households surveyed reported dried fish consumption in

the last 30 days. It is much higher than the consumption of 28 per cent reported during the past week of the survey. Wayanad (58.66 per cent), Idukki (52.81 per cent) and Malappuram (49.38 per cent) reported the highest percentage of consumption of dried fish. In comparison, the share of households' consumption of dried fish was less in Alappuzha and Kottayam districts, whereas the consumption was at higher levels in Thrissur.
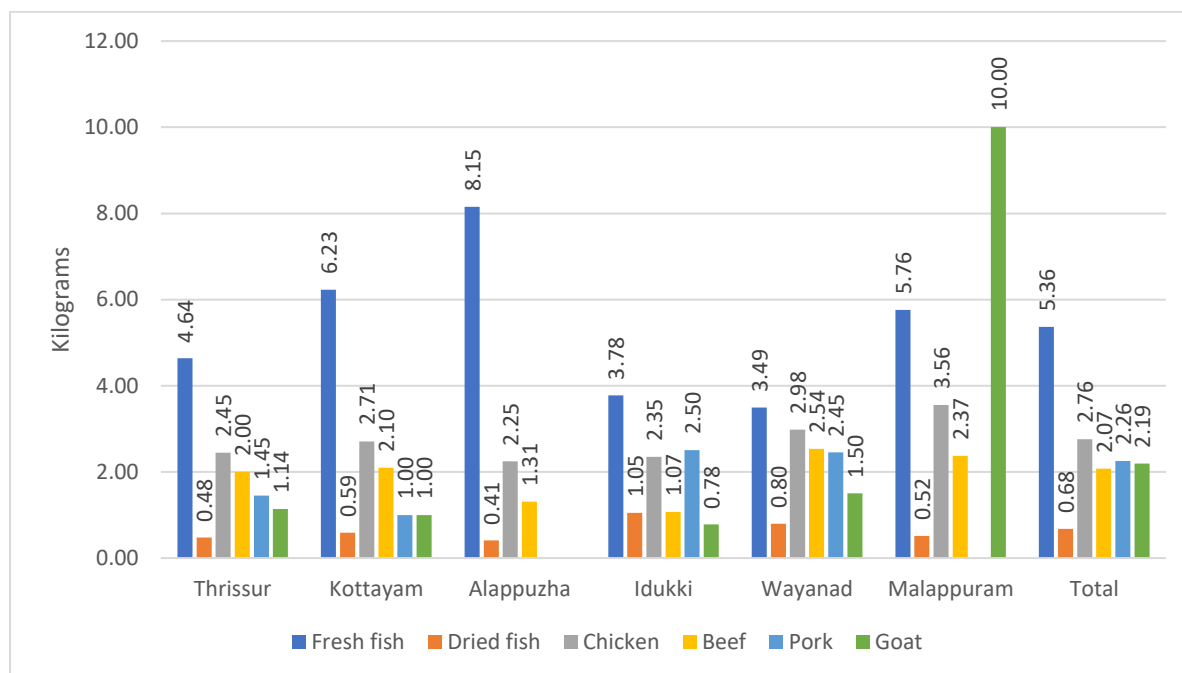
Figure 15. Average consumption of various non-vegetarian food reported by households during the last 30 days of the survey

Source: Primary survey

Alappuzha district reported the highest amount of fresh fish consumption at 8.15 kgs, followed by Kottayam at 6.23 kgs per household. The average fresh fish consumed in the state was about 5.36 kgs; the lowest was consumed in the Wayanad and Idukki districts. On the other hand, Malappuram reported the highest consumption of chicken (3.56 kg per household) and goat or mutton (10 kg per household). The consumption of goats was exceptionally high in some households. On inquiry, it was revealed that large quantities were purchased for preparing some medicines using goat meat. Goat meat is used to prepare several ayurveda medicines (traditional medicines) like *ajamamsa rasayana* in India. However, the number of households reporting mutton or goat consumption was negligible in the survey. It was due to the high price of mutton in the state. No considerable differences in chicken consumption have been observed across the other districts, ranging from 2.25 kgs in Alappuzha to 2.98 kgs per household in Wayanad. Notably, Wayanad (2.54 kgs) and Malappuram (2.37 kgs) reported the highest beef consumption per household during this

period. Beef consumption was comparable in Thrissur and Kottayam districts and somewhat lower in Alappuzha and Idukki districts. It is significant to observe that an average household in Kerala consumed about 0.68 kgs of dried fish in a month. Idukki district reported the highest quantity of over 1 kg. It might be equivalent to about 1.5 to 2 kgs of fresh fish, considering that an average of 3 to 4 kgs is required to produce one kilogram of dried fish as per information collected from dried fish processors in Andhra Pradesh, India. However, the conversion ratio varies by species and method of processing.

The average amount of consumption expenditure incurred by the households has been estimated as ₹ 662 on fresh fish, ₹ 615 on beef, ₹ 587 on pork, ₹402 on chicken, and ₹ 156 on dried fish for 30 days (Figure 16). As expected, households in Alappuzha and Kottayam were found to spend the maximum amount of money on fresh fish, whereas Idukki, Wayanad, and Malappuram districts spent on dried fish. The spending on dried fish was the lowest among the lowland districts of Alappuzha and Thrissur.
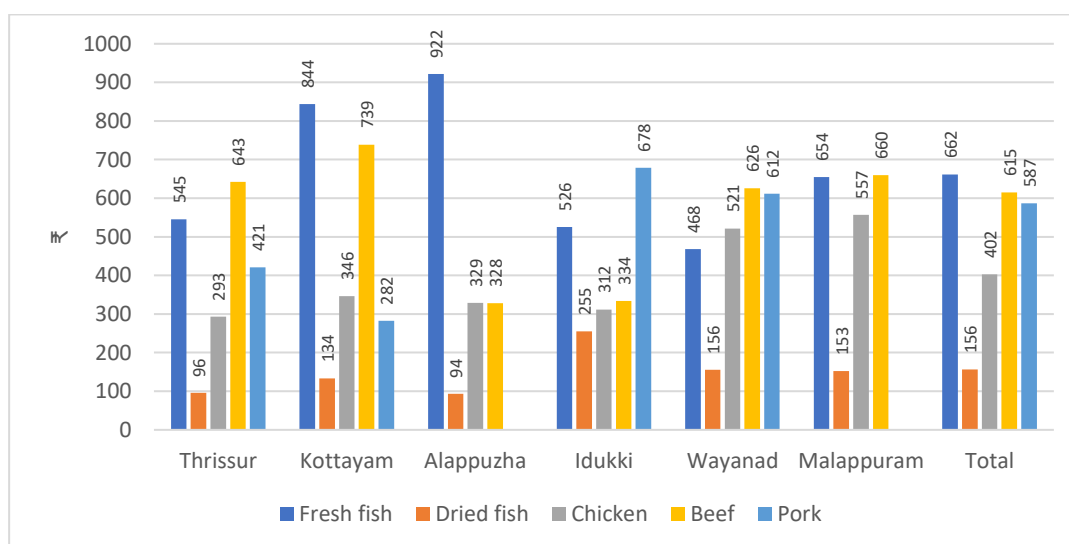
Figure 16. The average consumption expenditure on fish and meat by sample households during the previous 30 days of the survey

Source: Primary survey

The household's second highest expenditure was on beef consumption across most districts, and the consumption expenditure on chicken was highest in Malappuram and Wayanad districts. These point to the differences in the regional preferences of the households in the consumption of non-vegetarian food items.
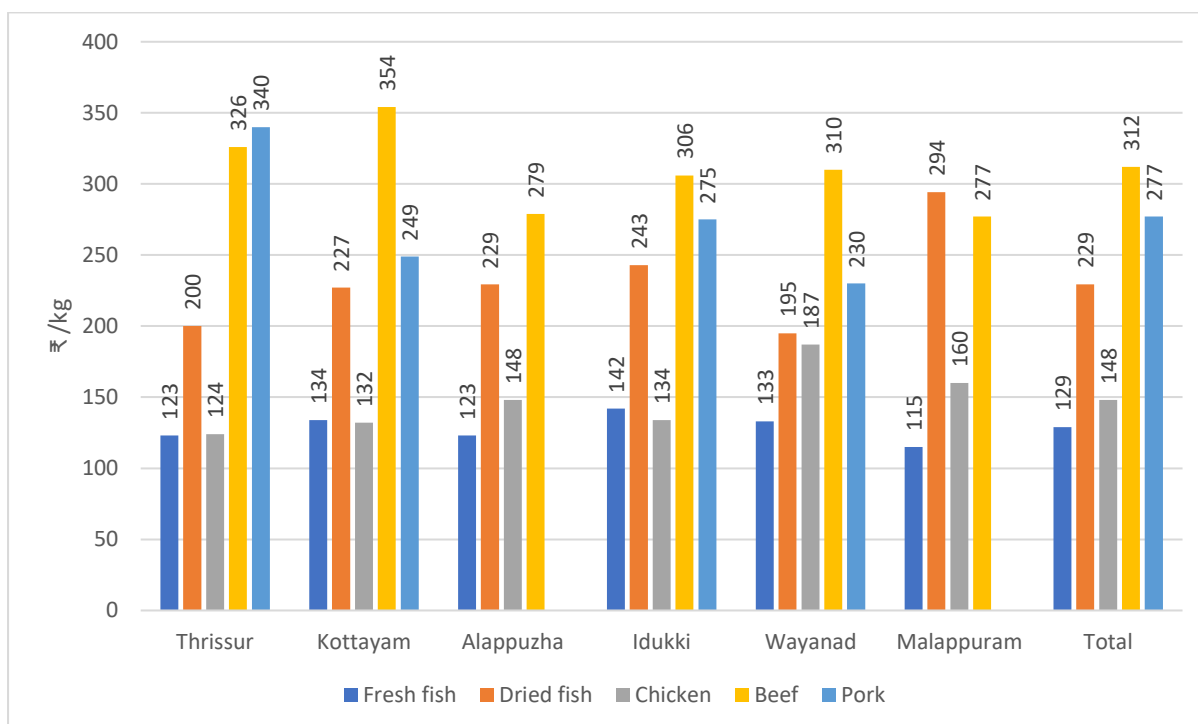
Figure 17. The average consumption expenditure incurred per kilogram of fish and meat by the sample households

Source: Primary survey

Regarding the consumption expenditure on fish and meat per kilogram, it seems fresh fish is the cheapest, followed by chicken and dried fish (Figure 17). At the same time, the unit cost of dried fish is costlier than fresh fish and chicken. However, the lower quantity required for consumption makes it economical for households. The lower prices of fish and chicken make them more affordable and the preferred items of non-vegetarian food across all households. Somewhat higher prices for fresh fish were reported in the Idukki district as their supply was relatively scarce. Kottayam district recorded the highest per unit price for beef and Thrissur district for pork.

The following Table 3 gives a broad comparative scenario of the nutritional value of the major non-vegetarian items consumed in the state. Though the exact nutritional content of each item may vary according to the type, species, and preparation, the following table indicates the overall trend in the nutritional value. It is seen that dried fish stands out in terms of its protein content, sodium, and potassium and has lower levels of fats compared to other items.

Table 3. Nutrition facts of major non-vegetarian food items consumed in Kerala.

Source: Compiled from Fat Secret Platform[7]

Nutrition Facts (per 100 gms)					
Nutrition Facts	**Fish**	**Dried fish**	**Chicken**	**Beef**	**Pork**
Energy (kj)	351	1213	992	1205	1134
Calories (kacl)	84	290	237	288	271
Fat (g)	0.92	2.37	13.49	19.54	17.04
Saturated Fat (g)	0.195	0.462	3.758	7.731	6.168
Monounsaturated Fat (g)	0.16	0.342	5.296	8.353	7.576
Polyunsaturated Fat (g)	0.364	0.804	2.945	0.708	1.438
Carbohydrates (g)	0	0	0	0	0
Sugar (g)	0	0	0	0	0
Fibre (g)	0	0	0	0	0
Protein (g)	17.76	62.82	27.07	26.33	27.34
Sodium (mg)	81	7027	404	384	384
Cholesterol (mg)	58	152	87	87	90
Potassium (g)	351	1458	1221	315	351

In this context, it is interesting to see the ratio of the cost incurred on various items and the amount of nutrition, especially protein, obtained by the households. We arrived at this ratio using data on the total expenditure incurred on each item, the quantity purchased, and the estimated protein received per 100 grams of each item. While estimating the amount of protein obtained, we considered only 80 per cent of the quantity of items consumed accounting the remaining part for wastage. The results given in Figure 18 show that overall, for every unit of money spent, the households receive 1.15 units of protein from fresh fish, 1.49 units from chicken, 0.71 units from beef, 0.84 units from pork and the highest of 2.19 units from dried fish. This means that dried fish is the most economical source of protein for households.

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[7] API (https://platform.fatsecret.com/platform-api accessed 2nd February 2024)
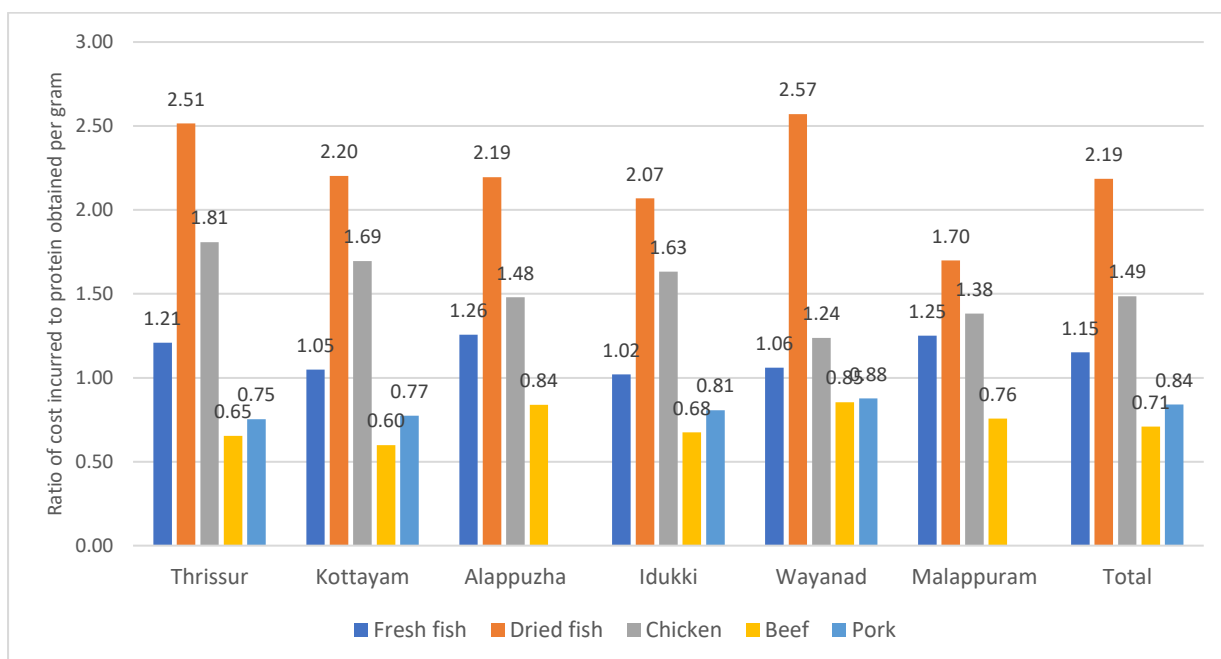
Figure 18. The ratio of the cost incurred and the protein obtained per unit of non-vegetarian food item consumed by the households in Kerala

Source: Primary survey

Regional differences in consumption of fish and meat

As mentioned, Kerala has distinct physical and geographical regions, such as the lowland, midland, and highland. Therefore, it is imperative to see if the consumption preferences are uniform across these distinct regions during the last 30 days of the survey. It is clear from Figure 15 that the number of households reporting consumption of fish and meat shows that fresh fish consumption is at higher levels across all the regions and that the second most consumed item is chicken. However, what is more, striking is that dried fish is the third most preferred item, excluding eggs across all regions based on the consumption figures for the second reference period. The percentage is as high as 55.74 per cent compared to about 17 and 22 per cent of the households reporting beef and pork consumption in the highland region (Figure 19).
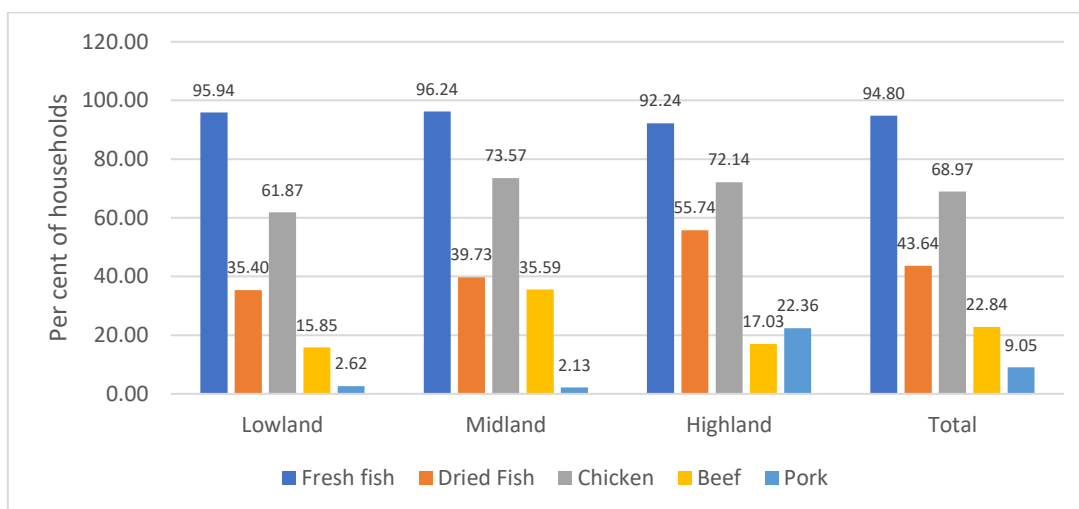
Figure 19. Region-wise consumption of fish and meat in Kerala during the last 30 days of the survey

Source: Primary survey

Figure 20 shows higher levels of fresh fish consumption among the households in the lowland region, followed by the midland area, and a higher level of dried fish consumption among the households in the highland regions than the others. In quantitative terms, households in the lowland (6.40 kg) and midlands (5.99 kg) reported consumption of fresh fish that was roughly twice that of the quantity consumed in the highland (3.63 kg) region. Such stark differences were not observed in the case of other fish and meat products. The dried fish consumption in the highland was almost twice that of the lowland region. While the midland region reported the highest amount of chicken consumption per household, pork consumption was also somewhat higher in the highland region.
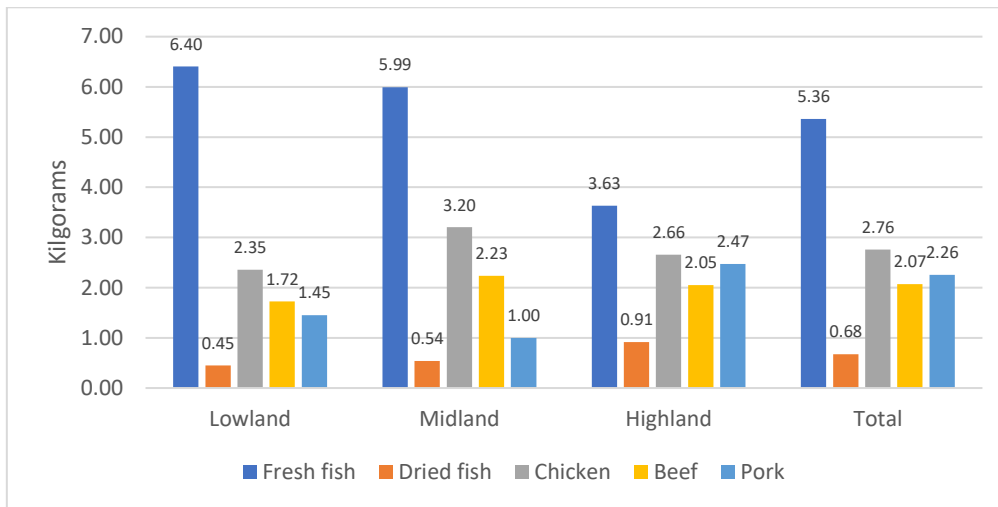
Figure 20. The average quantity of fish and meat consumed by the households during the last 30 days of the survey

Source: Primary survey

An analysis of variance (ANOVA) showed that these differences are statistically significant at a one per cent significance level. Similarly, a higher amount of chicken consumption was observed among the households in the midland region, which was also statistically significant at 10 per cent significance levels. However, beef and pork consumption differences across the regions were not statistically significant.

The price of fresh fish and chicken per unit was higher in the highland region (Figure 21). Similarly, beef was relatively more expensive in the midland and pork in the lowland region. The per unit price of fresh fish and chicken are close to each other, making them perfect substitutes for consumption. The price per unit of dried fish is higher than fresh fish and chicken but lower than red meat like beef or pork. The differences in the cost observed per kilogram of chicken, fresh fish and beef across different regions were statistically significant at less than 5 per cent significance levels. In contrast, that of dried fish and pork was not significant.
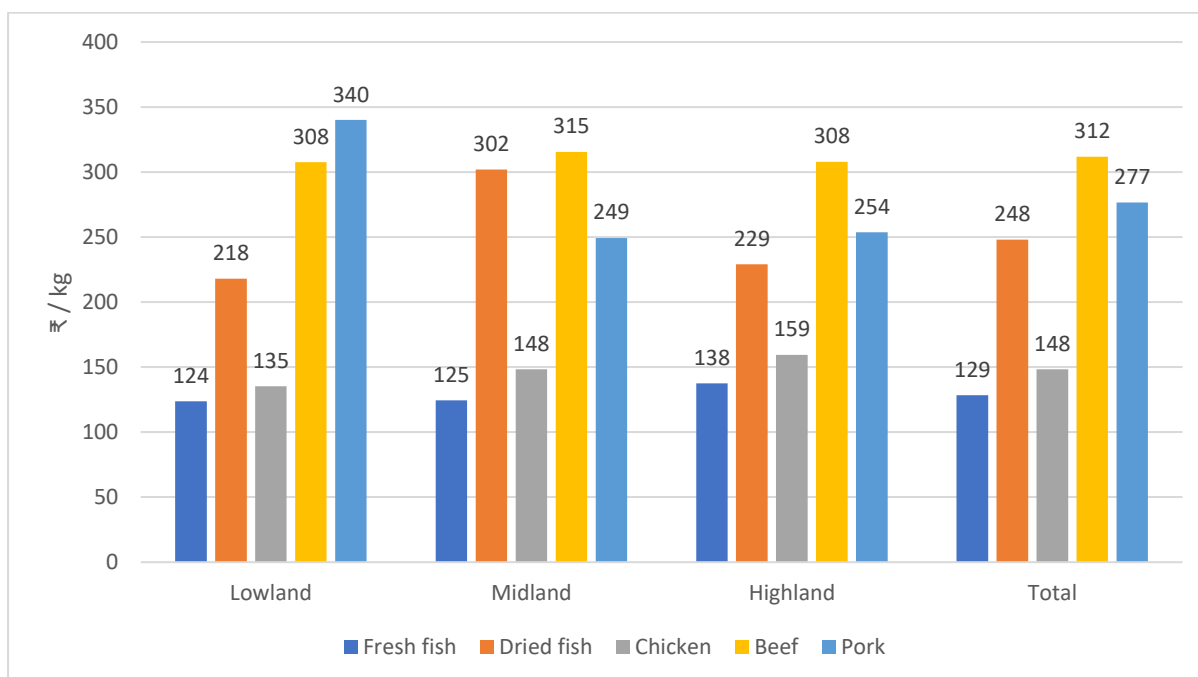
Figure 21. Consumption expenditure incurred per kilogram of fish and meat by the sample households across regions.

Source: Primary survey

Table 4. Per capita consumption of various non-vegetarian items in kilograms during last 30 days of the survey. Source: Primary survey

		Fresh fish	Dried fish	Chicken	Beef	Pork
Lowland (N= 139)	Mean	1.745	0.115	0.695	0.461	0.457
	SD	1.614	0.105	0.572	0.485	0.184
	N	133	49	86	22	4
Midland (N= 140)	Mean	1.518	0.143	0.735	0.521	0.278
	SD	1.355	0..228	0.686	0.485	0.048
	N	135	56	103	50	3
Highland (N=140)	Mean	1.002	0.248	0.712	0.571	0.673
	SD	0.708	0.180	0.555	0.785	0.602
	N	129	183	101	24	31
Total (N= 419)	Mean	1.423	0.180	0.715	0.520	0.624
	SD	1.322	0.232	0.607	0.563	0.560
	N	397	183	289	96	38

SD= Standard Deviation

Regarding per capita consumption, fresh fish is the most consumed item in the state. While the highest quantity of fresh fish per capita consumption is recorded in the lowland regions, in the case of fresh fish, it is the highland regions. An ANOVA test showed the difference in the per capita consumption of fresh fish and dried fish was statistically significant at a one per cent level across regions; in the case of chicken, beef and pork, the differences were not statistically significant.

Per capita consumption of fish, meat, and eggs: Estimates based on NSSO 68th round vi-a-vis the present survey data

Before we proceed to a more detailed analysis of the taste and preference of fresh fish and dried fish among the study households, we briefly examine the estimates of per capita consumption of fish and meat per month from our household survey to that of the estimates of the larger NSSO 68th round of all India consumption expenditure survey. We are not directly comparing the figures as the NSSO estimates are based on a more extensive sample survey than our limited household survey. Despite these limitations, it is hoped to give a broader consumption trend of these items in Kerala. Table 5 below provides the per capita egg, fish, and meat consumption estimated from the NSSO data and our sample survey.

Table 5. Estimated per capita consumption of egg, fish and meat in Kerala
Source: Primary survey and NSSO (2011-12)

	NSSO (2011-12) Qty				Sample survey			
	Eggs Nos	Fish, prawn Kg	Beaf/buffalo meat	Chicken	Eggs Nos	Fish, prawn Kg	Beaf/buffalo meat	Chicken
Kasaragod	1.79	1.47	0.03	0.12	-	-	-	-
Kannur	2.03	2.57	0.06	0.19	-	-	-	-
Wayanad	2.09	2.50	0.05	0.26	7.74	1.08	0.69	0.69
Kozhikode	2.32	2.43	0.07	0.23	-	-	-	-
Malappuram	2.39	2.36	0.15	0.33	5.37	1.42	0.49	0.73
Palakkad	2.20	1.18	0.14	0.35	-	-	-	-
Thrissur	2.91	1.82	0.12	0.32	7.63	1.32	0.58	0.73
Ernakulam	2.90	1.77	0.21	0.32	-	-	-	-
Idukki	4.47	0.97	0.25	0.33	6.87	1.28	0.34	0.73
Kottayam	3.80	1.67	0.22	0.28	8.53	1.74	0.56	0.73
Alappuzha	2.35	1.97	0.09	0.16	10.56	2.25	0.28	0.65
Pathanamthitta	2.59	2.12	0.05	0.27	-	-	-	-
Kollam	2.58	2.18	0.09	0.12	-	-	-	-
Thiruvananthapuram	3.48	1.96	0.04	0.30	-	-	-	-
Kerala	2.70	1.97	0.12	0.26	7.53	1.51	0.52	0.72

It is seen that the per capita consumption of egg, beef, and chicken has considerably increased as per the estimates available for our sample districts as compared to the NSSO estimates. However, there has been a marginal decline in the per capita fish consumption in the state as compared to the NSSO estimates. However, caution may be applied as the present survey has covered only six of the 14 districts in the state. Fish consumption increased in Alappuzha, Kottayam, and Idukki, whereas it decreased in Thrissur, Malappuram, and Wayanad. This trend was also substantiated by the qualitative data we collected during our surveys. The households had reported a drastic increase in the consumption of eggs, especially after the Covid 19 pandemic. There was a general perception that the consumption of eggs during the pandemic boosted immunity levels, thereby leading to an increase in the consumption of eggs. During this period, several rural households also started raising chickens, increasing the supply of eggs and meat. The improved chicken and beef consumption is also substantiated in the qualitative interviews. Our respondents reported that the younger generation prefers chicken or beef to fish as they feel the dishes made out of meat are more versatile to go with different combinations of foods.

Moreover, we have seen that the per unit price of fish and chicken are very close, making them perfect substitutes. Chicken and beef are also available in a cut and clean, ready-to-cook form, whereas fish are rarely available in a similar manner. The above table shows a considerable increase in the households consuming per capita chicken and beef. The household surveys were carried out in the post-pandemic period. As the pandemic has still impacted the household's income, these figures should be interpreted cautiously compared to NSSO estimates.

Species-wise preference in the consumption of fresh and dried fish during the last 30 days

Among the different types of fresh fish consumption reported, sardine (*mathhi or chaala*) and mackerel (*ayala*) are the most preferred regarding the number of households reporting their consumption and the average quantity consumed across all districts (Figure 22). Other significant species reported are tuna (*chura*), anchovies (*netholi*), trevally (*vatta*), sole fish (*manthal*), and pink perch (*kili meen*), with some differences in their relative preferences across districts. For example, tuna was a preferred fresh fish in Kottayam, Alappuzha and Malappuram districts. Pink perch was another preferable fish in Kottayam, while it was trevally in Alappuzha and the sole fish in Malappuram districts.
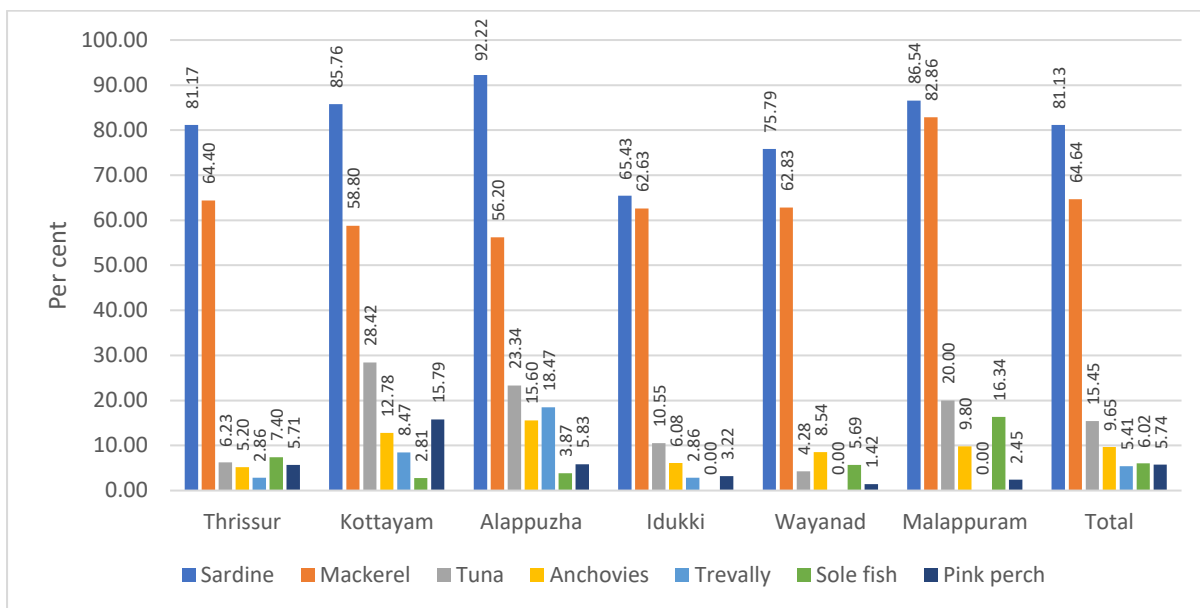
Figure 22. Household's preference for fresh fish for consumption across districts in Kerala

Source: Primary survey

Figure 23. Sardine, mackerel and pink perch in a local pushcart for sales

Photo courtesy: Nimmy Rajesh

The average quantity of anchovies consumed per household was higher in the Thrissur district, whereas it was sardine followed by mackerel in most other districts **(Figure 24).**
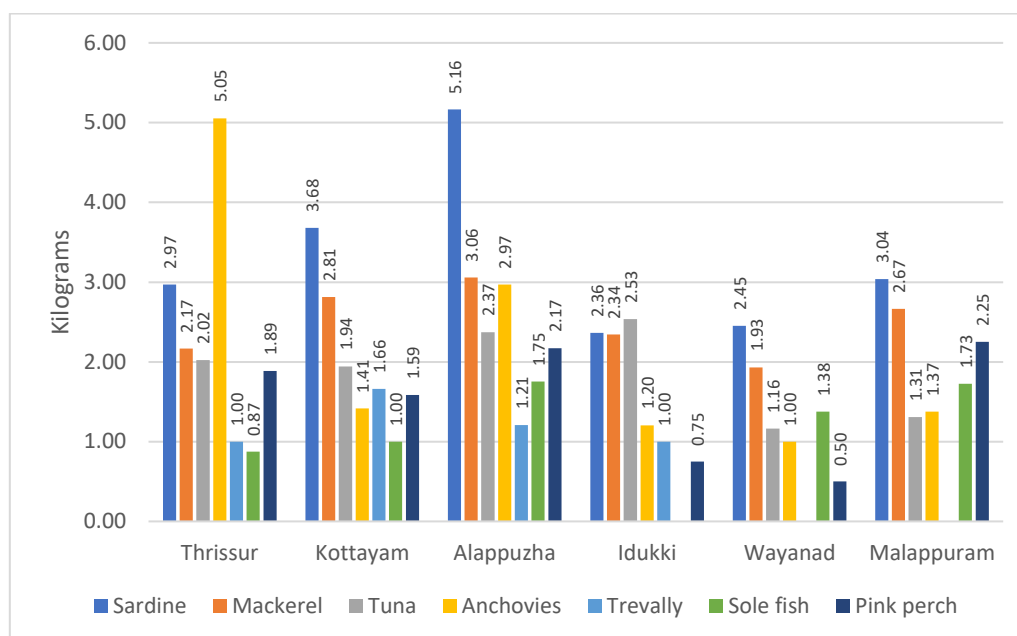
Figure 24. The average quantity of different types of fresh fish consumed by households across districts in Kerala

Source: Primary survey

As seen in Figure 24, the average consumption expenditure on fresh fish consumption for the second reference period was higher in Alappuzha (₹ 922), Kottayam (₹ 844), and Malappuram (₹654) districts. No sharp differences in the consumption expenditure on fresh fish were observed in the other districts. Interestingly, the households, on average, spent about ₹100-500 on different varieties of fresh fish in a month.
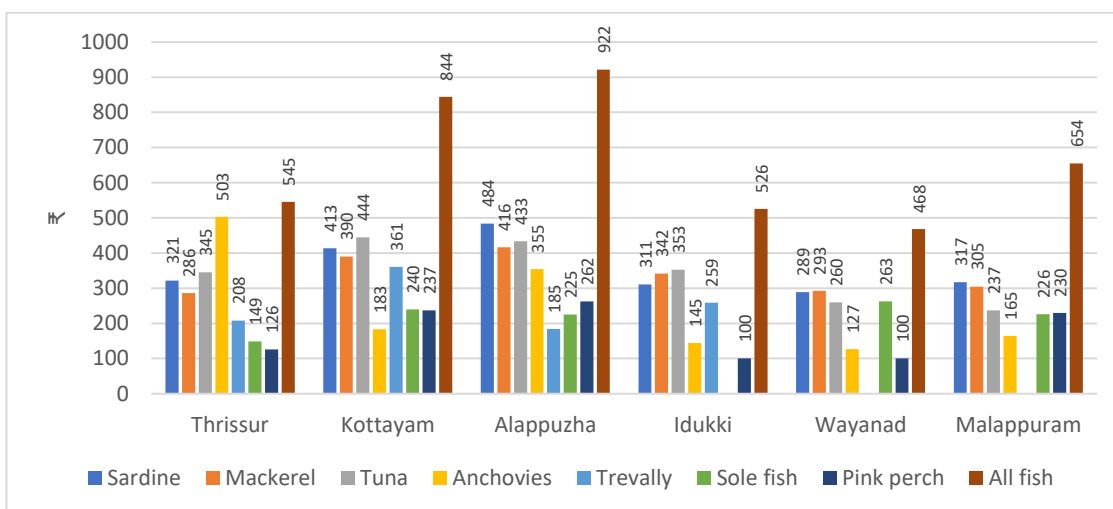
Figure 25. The average amount of expenditure incurred by the households for the consumption of fresh fish during the previous 30 days of the survey

Source: Primary survey

There seems to exist a clear regional preference for different types of dried fish across the state (Figure 25). It may be recalled that the maximum number of households reporting dried fish consumption was from Wayanad, Idukki, and Malappuram districts. In Thrissur, Malappuram, Kottayam, and Wayanad districts, sole fish, regionally known as *Manthal* is the most preferred item, whereas mackerel (*ayala)* in Idukki and Alappuzha districts. Ribbon fish was found to be a desired item in Malappuram, and silver bellies in Alappuzha. In Alappuzha, Wayanad and Idukki districts, consumption of a mixture of different species was also reported
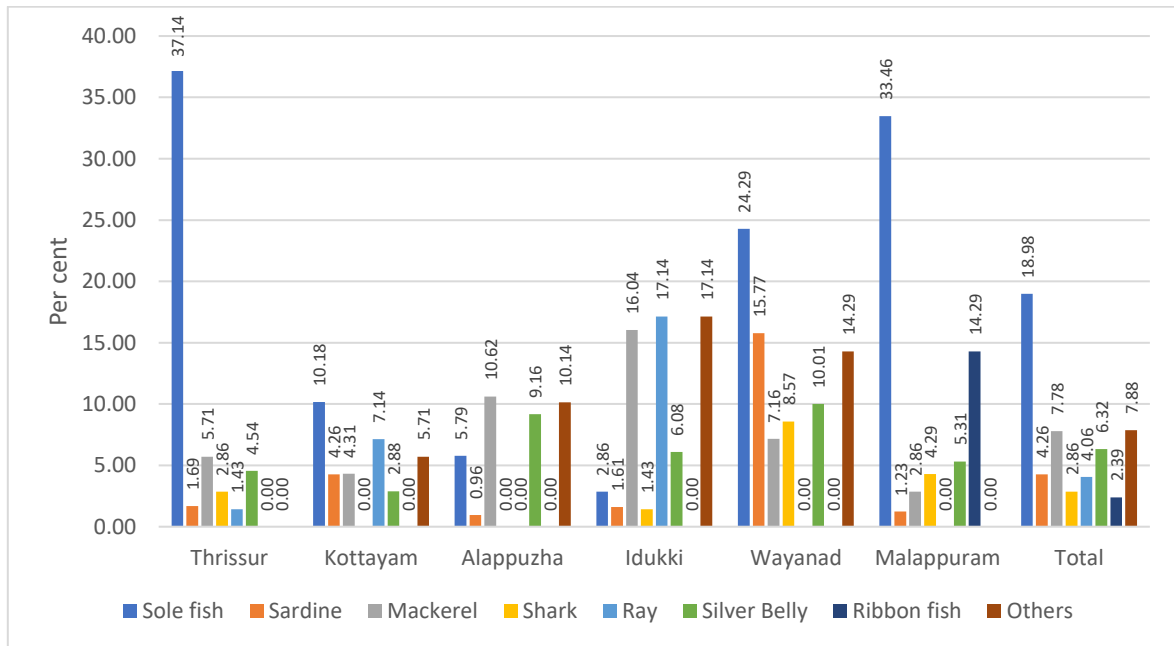
Figure 26. Household's preference of dried fish for consumption across districts in Kerala during the last 30 days of the survey

Source: Primary survey

Since dried fish are consumed in smaller quantities than fresh fish, it is challenging to observe discernible differences in the consumption of different varieties of dried fish. The dried fish consumed varied from 300 gm to about one kilogram per household for 30 days (Figure 27).
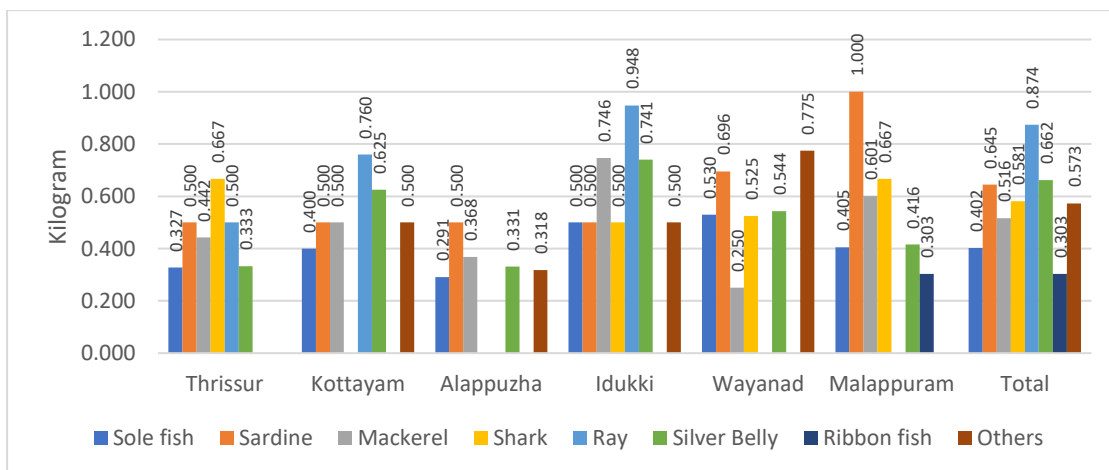
Figure 27. The average quantity of different types of dried fish consumed by households across districts in Kerala during the last 30 days of the survey

Source: Primary survey

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The quantity consumed also seems to vary according to the species type, size, and weight. For example, a small amount of sole fish would be sufficient for serving many household members because of its small size and flavour. In contrast, more dried shark would be needed to feed the same number of people. There was significantly higher spending on dried fish consumption in the Idukki district than in others (Figure 28). As expected, much lower expenditure on dried fish consumption was observed in the lowland districts of Alappuzha and Thrissur.
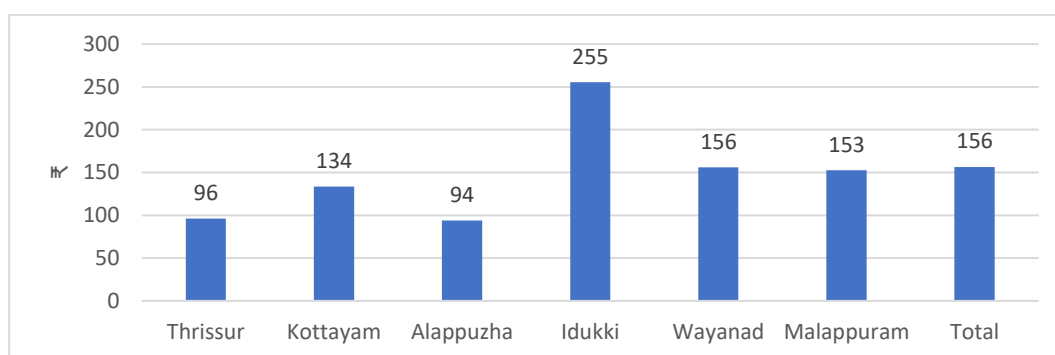
Figure 28. The average amount of money spent by the households for the consumption of dried fish during the last 30 days of the survey

Source: Primary survey

Fish consumption: Quality assessment and preparation by the households

Our survey shows that households use multiple parameters to assess the quality of fish before purchasing. It includes parameters like colour, smell, presence of dust or dirt, the smell of pesticides, texture, appearance, eyes in the case of fresh fish, etc. As noted earlier, sensory perception about the product is essential to consumption decisions. The households considered multiple factors to decide whether to buy fish, but the purchased quantity almost entirely depended on the price. A second important factor for determining the amount of consumption was the requirement based on the number of members in the family. More than half of the households preferred eating fresh fish during dinner, while 37.3 per cent picked it for lunch. Dinner time preference was found more in Malappuram (64.3) and Kottayam (53 per cent) districts. Most households preferred a combination of fresh fish with plain rice, followed by fresh fish with tapioca. Families in the Alappuzha and Thrissur mainly chose fresh fish preparations with coconut. In Kottayam and Malappuram, there seems to be a preference for fish preparations without coconut.

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Figure 29. Mackerel curry prepared with coconut milk

Photo courtesy: Nimmy Rajesh

Figure 30. Frying fish with spices in a traditional cast iron pan

Photo courtesy: Jeena Srinivasan

Similar observations were made in the case of dried fish as well. However, households mostly preferred fried dried fish over curry, except in Wayanad, where they liked dried fish curry without coconut. Fried dried fish was also used for making dry chutney power with or without coconuts and chillies. The local variety of green chilli, known as bird's eye chilli or *kantari mulagu* locally, was predominantly used for making dried fish chutney powders. Dinner was the preferred time to eat dried fish with plain rice or rice porridge in most districts and fresh tapioca in Kottayam, Alappuzha, and Idukki districts. Although we had expected seasonality with more dried fish consumption occurring during the rainy season, the survey did not confirm it.

Figure 31a. Small quantities of sole fish, mackerel, and silver bellies kept in plastic bags for sale in a local shop.

Photo courtesy: Jeena Srinivasan

Figure 31b. A street cart selling dried fish in Thrissur (Dried fish available here)
Photo courtesy: Jeena Srinivasan

Households' perception regarding changes in fish and meat consumption

In this study, we tried to assess the changes in the frequency and the quantity of fish and meat purchased by households now compared to five years ago. Interestingly, 60 per cent of the homes reported decreased frequency and quantity of dried fish they bought. Roughly 20 per cent also said no changes in consumption. Over 75 per cent of the households who reported a decrease in dried fish consumption attributed it to changes in the family's taste preference and health concerns. The other notable reasons were low quality and poor availability of dried fish in their areas, especially in Wayanad and Idukki districts. For around 30 per cent of the households who reported an increase in dried fish consumption, it was because of a liking for dried fish and better local availability.

In contrast to the case of dried fish, the number of households reporting increased fresh fish consumption was more. They attributed this change to their taste and preference changes and better availability. Households in almost all the districts reported increased availability as a factor driving the increased frequency of fresh fish consumption. About 25 per cent of the homes reported a decrease in fresh fish consumption because the price was not affordable and changes in the family's taste preference.

Similar changes are also observed, with one-fourth of the total households reporting an increase in chicken consumption mainly due to the increased availability and the family members' preference towards it. Those who reported a decreased chicken consumption attributed the price as not affordable. However, only less than 5 per cent of the households said an increase in beef consumption during the past five years. The increase was mainly due to better availability and family preference for it. The primary reasons for a decrease in the consumption of beef reported by about 26 per cent of the households have been the unaffordable price of beef, changes in taste preference, and health reasons. Similar is the case with a decrease in the consumption of pork. A lack of availability of good quality pork was also a significant reason.

More than 80 per cent of the households did not report any seasonal preference for the consumption of dried fish. Only about 8 per cent of the homes said the rainy season was their most preferred season for dried fish consumption as they found the weather suitable for its consumption. In Kerala, children are typically given fish and meat from a young age. We have already seen that early exposure to fish influences adult-consuming behaviour. More than 80 per cent of the households reported that they provide fish and meat to the children after the '*annaprasam'* function, which is when they start feeding rice to the babies for the first time. Children get introduced to the taste of fish and meat soon after this function, and they continue to provide them if they like the taste and show interest in eating fish or meat. Only during the death of a family member or on specific festivals did the families refrain from consuming fish and meat in Kerala.

Figure 32. A dish prepared out of dried prawn, coconut and spices.
Photo courtesy: Jeena Srinivasan

While 84 per cent of the households surveyed were aware of the media reports highlighting concerns about the quality of fresh fish in the market, 60 per cent were satisfied with the quality of fresh fish available to them. Recently, some information circulated through WhatsApp messages and YouTube influenced households' consumption decisions. It was mainly related to the unhygienic processing of dried fish in the neighbouring states and using chemicals to extend the shelf life. Several videos showed that the water used for cleaning fish was contaminated, and the drying fields were unclean. We came across an incident in the Thrissur district where several households were refraining from consuming dried fish under the influence of a video circulated in the neighbourhood WhatsApp group showing the unhygienic conditions and the high salt content under which dried fish is made. However, these households seem to have substituted dried fish with fried items like *pappad*. Finding it strange that several families responded similarly, we also surveyed the local shops that supply provisions. The shopkeepers explained that they stopped stocking dried fish as there was no demand and showed us the unsold packets in the shop. Instead, they reported

increased sales of *pappad*, which has high salt content and is also a product which is often identified as suffering adulteration and not meeting standards of food preparation.

However, the households had no problem consuming *pappads* despite their high salt content and health concerns as they believed it was locally produced and the producer was known to them. They thought it was safe to consume, unlike dried fish which, according to them, was processed under unhygienic conditions and imported from other states. Thus, the substitution of dried fish with products other than fresh fish is also observed in some places. This substitution is taking place not essentially due to a change in taste and preference but due to the changes in the attitude and concerns about the quality of the products due to the influence of friends and media. Thus, as explained using the theory of planned behaviour, attitudes, subjective norms, and behavioural control influence the consumption decisions of households. However, we also observed that many households were unaware of the quality of dried fish and did not have the knowledge to assess the quality of dried fish. It was seen that if any member in the household had health problems like hypertension, which prevented them from consuming food that is high in salt content, the entire household stopped the consumption of dried fish which is the most suspected product with high salt content. It was not true in the case of *pappad* or other market-purchased chips, fried items, pickles, etc., that often have high salt content. Households were well informed about the nutritious value of fresh fish but were unaware of the same about dried fish. Some households seem to have a bad feeling about eating dried fish and label it as an emergency food for use during times of poverty when they were not afford other vegetables or meat. The salt content and the strong flavour of dried fish enabled people in those days to consume carbohydrate-rich food like rice and tapioca with minimum cost while meeting their calorie needs. However, with improved incomes and standard of living compared to a few decades ago, the household has substituted dried fish with other types of food, making it an *inferior good* in economic terms. The taste some of the households have acquired for dried fish is the only other primary reason for some of the households to consume dried fish in the current times, which is again constrained by the quality of the product.

Major observations and conclusion

This study attempted to understand the importance of dried fish within the non-vegetarian food basket of household consumption in Kerala, a coastal state in India where, traditionally, marine fish consumption has been high. It specifically examined the preferences and patterns of fish and dried fish consumption among the various non-vegetarian protein sources available for consumers across different geographical regions within the state. A

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survey carried out in rural and urban areas of six of the 14 districts showed valuable insights into the consumption pattern in the state. The districts were selected considering the topographical division of the state into lowland, midland, and highland and classifying the districts in terms of available poverty estimates. If we leave aside egg consumption, fresh fish is the major non-vegetarian item in terms of the number of households consuming them and the quantity of consumption in the state, irrespective of the reference periods used in the study, which were consumed during the which I past 7 and 30 days of the survey. The percentage of households reporting fresh fish consumption increased from 68 per cent during the last seven days of the survey to over 95 per cent for 30 days. Inter-district variations in the consumption of fresh fish have been observed. During the same reference period, consumption of dried fish increased from 28.5 per cent to 43.64 per cent. It is a significant result given that the households have a wide range of non-vegetarian protein sources like fresh fish, chicken and beef in their consumption basket. The consumption of fresh fish was seen more in the lowland districts.

In contrast, dried fish consumption was higher in the highland regions where the availability of fresh fish had constraints and where topographically households are dispersed over a large area, making door-to-door marketing challenging. The per capita consumption of fresh fish was considerably lower in the highland region, where the dried fish consumption was more than twice that of the lowland region. The lowland regions also had lower per capita consumption of other items such as chicken and beef, confirming that fresh fish is their most preferred item among all the non-vegetarian items facilitated by cultural factors, availability, and more choices compared to midland and highland regions. In terms of price, taste and preferences of the consumers, chicken is emerging as a close substitute for fresh fish, but dried fish holds a special place in the food basket of the highland region. Considering that most of the surveyed households in the highland areas belonged to the socially and economically marginalised scheduled tribes, higher consumption of dried fish in the region is a significant pointer towards the role of dried fish in their food and nutritional security. While the per capita consumption of all types of fish of 1.5 kilograms per month or 18.1 kilograms per year in Kerala is higher than the all-Indian average of 7.89 kilograms, it is much lower than the average fish intake of 19.4 kilograms in developing countries and 24.4 kilograms in developed countries. The average consumption of 0.68 kilograms of dried fish which is approximately equivalent to 1.5 to 2.0 kilograms of fresh fish, especially in the highland regions, during the past 30 days reference period is very significant. Compared to other items like chicken, beef and pork, dried fish is a more accessible and affordable source of nutrition for the population in the highland regions. The shelf life of dried fish is also a relevant factor in facilitating its consumption in remote areas. Dried fish is the major nutrition

item in terms of affordability for the populations in the highland regions. Regarding nutrition, we have seen in Table 3 that 100 grams of dried fish provides approximately 63 grams of protein, whereas fresh fish provides 18 grams and chicken, beef and pork around 26-27 grams. It also contains less fat, but the high sodium content is a cause of health concern among the people. However, the estimated cost to protein ratio which is the amount of protein obtained per unit of money spent, shows that the ratio is highest at 2.19 for dried fish, as compared to 1.49 for chicken, 1.15 for fresh fish, 0.84 for pork and 0.71 for beef, making dried fish the most economical source of protein for the households.

However, there seems to be some barriers to consumption of dried fish besides the concern of high salt content. In the highland region where consumption is greater, supply-related barriers, uncertainties, and quality issues were apparent. Sometimes, the products that arrive in the market are not well dried and contain moisture. Earlier, the heat and smoke from the traditional ovens preserved dried fish. Now such ovens have almost disappeared with the arrival of modernised kitchens. The low quality of dried fish reaching the hinterlands, together with the lack of knowledge or facilities to preserve them, prevents households from bulk purchase of dried fish. These factors have a major impact on consumption. As the quantity of dried fish needed for one serving is small, the households tend to avoid making greater efforts for its purchase and preservation and possibly avoid its consumption totally or substitute it with *pappad* or other fried items. However, substitution of other foodstuffs for dried fish likely results in a significant loss of affordable nutrition for households.

While improved cold storage facilities and local availability of fresh fish have facilitated the consumption of fresh fish across all districts and regions, similar improvements in the supply of dried fish are not observed. Although there is a general belief among the population that fresh fish is nutritious and healthy, as noted earlier because of the high salt content, households believe that dried fish is not healthy and hygienic, and its consumption should be avoided or reduced. Moreover, some households reported a lack of availability of good quality, hygienically packed dried fish as an important reason for those who would like to consume dried fish to refrain from its consumption or substitute it with fresh fish, chicken, or eggs. It is also observed that if a household member is diagnosed with hypertension and is advised against consumption of high salt-content food, the entire household was found to stop consumption of dried fish. However, this is not true for consuming other high salt content items like *pappad* or chips. Overall, high salt content, the presumption that dried fish are unhygienically processed, and the fish used for drying are rotten or discarded fresh fish are among the major constraints for dried fish consumption in the state in recent years.

Limitations

The survey was carried out during October -December. It was a Hindu pilgrimage season when several households refrained from consuming non-vegetarian items or reduced the frequency and quantity of consumption. Household incomes also seem to have been impacted by the COVID-19 pandemic, and many preferred vegetarian foods to fish and meat. The estimates of consumption could be on a lower side than normal times. Since most households were culturally inclined to eat fish, they could not exclude it from their food but had reported a reduction in the quantity of consumption.

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Survey Instruments

Dried Fish Matters: Mapping the Social Economy of dried fish in South and Southeast Asia for enhanced well-being and nutrition: A Study on the Consumption of Dried Fish in Kerala

1. Identification of the sample household

1.1	District	
1.2	Taluk	
1.3	Village/town	
1.4	Ward/block	
1.5	Household No	

2. Details of the household

2.1	Name of the head of the household	
2.2	Gender	1=Male; 2= Female; 3= Transgender
2.3	Age (in completed years)	
2.4	Education	*1= Illiterate; 2= Literate without formal schooling; 3= Primary; 4= Middle; 5=Secondary; 6= Higher secondary; 7=Diploma/Certificate courses; 8=Graduate; 9 =Post Graduate; 10=Professional Degree, 99=NA*
2.5	Religion	*1= Hindu; 2=Christian, 3= Muslim; 4= Jain, 5= Buddhist; 6=Others*
2.6	Social category:	*1= Scheduled Caste; 2=Scheduled Tribe 3=Other Backward Castes; 4= Other Castes*
2.7	Sub-Caste (specify):	
2.8	Type of Family	*1=Nuclear, 2=Joint family, 3=Extended, 4=Single member, 5=Any Other (specify)*
2.9	Household's Ration Card type	*1= Antyodaya household – Yellow card**; 2**= Priority Household – Pink card; 3**= Non-priority (subsidy) – Blue card; 4**= Non-priority (non- subsidy) – White; 5= No card*
2.10	Type of house	*1= Pucca; 2= Semi pucca; 3= Kuccha*
2.11	Ownership of house	*1= Owned; 2= Rented; 3=Neither owned nor rented but occupied otherwise; 4= others*
2.12	Since when you are living here? (specify year)	
2.13	If you have migrated from outside of the district, when did you or your family come to this place?	
2.14	From where did you migrate? (specify state and district) (specify year)	a. *State:…………………………………… b. District:…………………………………..*

				c.	*Year :………………………………………*
	2.15	Name of the respondent, if different from the head of the household			
	2.16	Contact number of the HH or respondent, if any			

3. Demographic details and food habits of the household members
(Start with the head of the household)

Mem ber ID	Name of household member	Relation to head (Code1)	Age(years) Below 1 yr put " 00"	Gender (Code 2)	Marital status (Code 3)	Education (Code 4)	Occupation (Code 5)	Does this member eat any non-veg items? (Code 6)	Does this member eat fresh fish? (Code	Does this member eat dried fish? (Code 6)
	1	*2*	*3*	*4*	*5*	*5*	*6*	*7*	*8*	*9*
3.1										
3.2										
3.3										
3.4										
3.5										
3.6										
3.7										
3.8										
3.9										
3.10										
3.11										
3.12										

Code 1: 1**=**Head; 2= Spouse of head; 3=Daughter / Son; 4=Grandchild, 5=Mother/Father, 6= Sister/ Brother; 7=Mother in law/father in law; 8= Sister in law/brother in law; 9= Son in law/Daughter in law; 10= any other

Code 2= 1= Male; 2= Female= 3= Transgender

Code 3: 1= Never Married; 2=currently married; 3=Widowed; 4=Separated/Divorced, 5= Underage

Code 4: 1= Illiterate; 2= Literate without formal schooling; 3= Primary; 4= Middle; 5=Secondary; 6= Higher secondary; 7=Diploma/Certificate courses; 8=Graduate; 9 =Post Graduate; 10=Professional Degree, 99=NA

Code 5: 1= Own-farm agriculture; 2= Agriculture labour; 3= Non-Agrl labour; 4= Self owned small business; 5=Salaried in private enterprise; 6=Salaried in Govt enterprise, 7= Livestock maintenance; 8= Old/disabled; 9=Student; 10=Dependent/ not working; 11=Home maker, 12= MNREGS work; 13=other (specify_____, 88=NA,

Code 6: 1= Never eats; 2= Eats often; 3= Eats occasionally; 4=Particular to have this item for most meals; 99= Not applicable

4. Land ownership and cultivation

4.1	Do you own any land? 1=Yes; 2= No.		
4.2	Type of land owned; *(1= homestead only; 2= homestead and other land; 3= other land only)*	Acres	Cents
4.3	Land owned		
4.4	Leased-in land		
4.5	Otherwise possessed land (neither owned nor leased-in)		
4.6	Leased-out land		
4.7	Total possessed land (Owned + leased-in + otherwise possessed – leased-out)		
4.8	Land cultivated		
4.9	Land irrigated		
4.10	If land is cultivated, what are the major crops grown now? *(List up to **5 major crops** in the order of importance)* Crop 1:………..………, Crop 2: ………..………., Crop 3: ………..……., Crop 4: …………………, Crop 5: ………………………		
4.11	If land is cultivated, what were the major crops grown 10 years ago? (*List up to **5 major crops** in the order of importance*) Crop 1:………..………, Crop 2: ………..………., Crop 3: ………..……., Crop 4: …………………, Crop 5: ………………………		

5. Food Habits of the Household

Please provide the following details related to the consumption or not of the following items in your family during the last one year.

S.No	Item	How many times or in what frequency did your family consume the following items in the past 12 months (last year)? *(Code 1)*	If you did not consume the item, reasons for not consuming (Write all the reasons that applies**)** *(Code 2)*
5.1	Fresh Fish		
5.2	Prawn (Fresh)		
5.3	Dried Fish		
5.4	Prawn (Dried)		

5.5	Eggs		
5.6	Chicken		
5.7	Beef/buffalo meat		
5.8	Goat meat/mutton		
5.9	Pork		
5.10	Other animal meat		
5.11	other birds (quails, ducks etc)		
5.12	Others aquatic species (crab, oysters, etc)		

Code 1: *1= Almost every day; 2= Twice a week; 3= Three or more days a week; 4= Once in a week; 5= Once every 2 weeks; 6= Once a month; 7= Only on special occasions; 8=Consume only from restaurants or for outside functions; 9= Never; 10 = Others (Specify)………..*

Code 2: *1= Religious reasons; 2= Health reasons; 3= Too expensive; 4= Do not like it; 5= Not used to eating it; 6= No specific reason; 7= Neighbors' objection due to smell of cooking; 8 = Due to the hassles in purchasing and cleaning the item; 9=Due to death of a family member; 10= Non availability of the product, 11= Available products are low quality, 12= others (Specify)………*

6. Household's consumption of non-vegetarian items

Type of the fish	During last 7 days					During last 30 days			
	Quantity consumed			No. of days consumed	Source of procurement	Quantity consumed			No. of days consumed
Name of the Fresh Fish* **(Codes)**	Qty	Unit Code	Value			Qty	Unit Code	Value	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
1.Prawn (Fresh)									
2.									
3.									
4.									
5.									
6.									
7.									
8									
9									
Name of the Dried Fish* **(Codes)**									
1.									
2.									
3.									
4.									
5.									

6									
Prawn (Dried)									
Eggs (in nos)									
Chicken									
Beef/buffalo meat									
Goat meat/mutton									
Pork									
Other animal meat									
other birds (quails, ducks etc)									
Others aquatic species (crab, oysters, etc)									

***Fish codes**: 1= Sardine (Mathi); 2= Mackerel (ayala); 3=pomfret (avoli); 4= seer fish (naimeen or aykura); 5=Tuna (Chura); 6=shark (Sravu); 7=Ray (Therandi); 8=Anchovi (Netholi); 9= Bluefin trevally (vatta); 10= Sole Fish (Kanaku/manthal); 11= False trevally(parava); 12= Malabar thryssa (managu); 13= Blacktip sea catfish (etta); 14= White sardine (veloori); 15= Pickhandle barracuda (Shilavu); 16= Pink perch (kili meen); 17=mullet (kanambu); 18= pear spot (karimeen); 19=rohu; 20=katla; 21= Silver Belly (Mullan); 22=Other river/freshwater fishes; 23=Other backwater fishes; 24=Other marine fishes (specify), 25= Mixed fishes*

Unit code 1: *1= Grams, 2= Kilograms; 3= Numbers; 4= Others (specify)*

Source of procurement: 1= Home produced; 2= purchased from local shops; 3= purchased from door to door vendors; 4=online purchase; 5=gift; 6= Own fishing, 7=Marine fishing, 8= others (specify)

7. Details regarding household's quality assessment, preparation and consumption of fish*

Name of the fresh fish consumed during last 7 days (from above table)	How did you assess the quality of this item before purchase? (Code 1)	How did you decide the quantity of purchase? (Code 2)	How did you prepare this item? (Code 3)	What is your most preferred way of cooking this item? (Code 3)	During which meal did you eat this? (Code 4)	What combination of food you had with this? (Code 5)
1	2	3	4	5	6	7
1.						
2.						
3.						
4.						
5.						
6.						
Prawn (Fresh)						
1						
2						

Name of the dried fish consumed during last 7 days (from the above table						
1.						
2.						
3.						
4.						
5.						
6.						
7.						
Prawn (Dried)						

(*Note: Multiple responses possible. Mark maximum three most important ones)

Code 1. Quality assessment: *1= color; 2= smell; 3= moisture content; 4= presence of dust and other dirt; 5= smell of pesticides or preservatives; 6= texture; 7= appearance; 8= packaging; 9= all of the above; 10=no specific considerations*

Code 2. Quantity of purchase: *1= based on price; 2= based quality; 3= according to the number of members in the family; 4=to keep for few days; 5= no specific considerations; 6= others (specify)*

Code 3. Preparation/cooking: *1= Curry with coconut; 2= Curry without coconut; 3= Fried; 4= Grilled; 5= Cooked with other vegetables; 6= cooked with rice (biriyani); 7= fried and made into chutney with coconut and chilly; 8= fried and ground without coconut; 9= Cooked using firewood in traditional Chula; 10= pickles/sauces; 11=others (Specify)…………..*

Code 4. Meal time: *1= Dinner; 2= Lunch; 3=Breakfast; 4= snack time; 5 for more than one meal; 6= others (Specify)……….)*

Code 5. Combination food: *1= with fresh tapioca; 2= with dry tapioca (vatu kappa); 3= with plain rice; 4=with rice porridge (kanji); 5= As biriyani; 6= With cooked jackfruit or bread fruit etc; 7= With other root crops like yam (chena), colocasia (chembu), kachil, sweet potato (madhura kizangu) etc; 8 = With chapathi/porotta etc; 9 = Others (specify)*

8. **Household's perception regarding changes in the consumption of fish and other non-veg items over the years**

S.No	Particulars	*Changes (see codes below)*	*Reason (see codes below)*
8.1	Do you think the *number of times* you purchase dried fish in a typical month now changed as compared to 5 years ago?		
8.2	Do you think the *quantity of dried fish* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.3	Do you think the *number of times* you purchase fresh fish in a typical month now changed as compared to 5 years ago?		

8.4	Do you think the *quantity of fresh fish* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.5	Do you think there has been a change in the *total quantity of fish* (fresh and dried including prawns) consumed by your family now as compared to 5 years before?		
8.6	Do you think the *number of times* you purchase chicken in a typical month now changed as compared to 5 years ago?		
8.7	Do you think the *quantity of chicken* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.8	Do you think the *number of times* you purchase beef/buffalo meat in a typical month now changed as compared to 5 years ago?		
8.9	Do you think the *quantity of beef/buffalo* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.10	Do you think the *number of times* you purchase goat/mutton meat in a typical month now changed as compared to 5 years ago?		
8.11	Do you think the *quantity of goat/mutton* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.12	Do you think the *number of times* you purchase pork meat in a typical month now changed as compared to 5 years ago?		
8.13	Do you think the *quantity of pork* consumed by your family in a typical month now changed as compared to 5 years ago?		
8.14	Do you think the *number of times* you purchase eggs in a typical month now changed as compared to 5 years ago?		
8.15	Do you think the *quantity of eggs* consumed in a typical month now changed as compared to 5 years ago?		

Changes codes: *1= No Changes; 2= Increased: 3= Decreased; 4=Cannot say; 5=Not applicable*

Reasons codes: *1= Price not affordable; 2=Price more affordable; 3=Availability is better; 4=Availability is not good; 5=Due to change in family's taste preference; 6= Health reasons; 7=No*

Specific reason; 8 = less/low quality, 9= Others (specify)

9. Household's consumption of dried fish over the years

9.1	What are the major types of **dried fish** that was consumed more frequently by your household within *last one year? *Fish codes:* Type 1:……………………………., Type 2: …………………………………* *Type 3: ………………….….., Type 4: ………………………………..., Type 5: …………………………….*

9.2	What are the major types of dried fish that you used to consume more frequently, say **about 5 years ago**? *(*Fish codes: Type 1:……………………………., Type 2: …………………………….………* *Type 3: …………………….., Type 4: ……………………………..., Type 5: …………………………..*		
9.3	During which season/months do you consume more of dried fish?	*1= Summer; 2= Rainy season;* *3= Winter; 4= No seasonal variation*	
9.4	Why do you prefer more of dried fish in this season? *1= availability is better; 2= price is cheaper, 3=suitable weather to eat, 4=other combination food available in this season, 5= it tastes better in this season, 6=not able to afford other food items in this season, 7= due to health reasons, 8= no specific reason*		

***Fish codes**: 1= Sardine (Mathi); 2= Mackerel (ayala); 3=pomfret (avoli); 4= seer fish (naimeen or aykura); 5=Tuna (Chura); 6=shark (Sravu); 7=Ray (Therandi); 8=Anchovi (Netholi); 9= Bluefin trevally (vatta); 10= Sole Fish (Kanaku/manthal); 11= False trevally(parava); 12= Malabar thryssa (managu); 13= Blacktip sea catfish (etta); 14= White sardine (veloori); 15= Pickhandle barracuda (Shilavu); 16= Pink perch (kili meen); 17=mullet (kanambu); 18= pear spot (karimeen); 19=rohu; 20=katla; 21= Silver Belly (Mullan); 22=Other river/freshwater fishes; 23=Other backwater fishes; 24=Other marine fishes (specify),25= Mixed fishes.*

10. Other particulars regarding consumption of non-veg items by the households

S.No	Item	Fresh Fish	*Dried Fish*	Chicken	Other meat	Eggs
10.1	Do you give the following items to children below 5 years of age?*					
10.2	From what age onwards do you start giving this item to children? **(see codes)**					
10.3	Did the family eat or prepare special dishes of these items on special occasions/celebrations at your household during last year? **(see codes)**					
10.3.1	Quantity used in Kgs					
10.3.2	Total value of the above item. (In Rs/-)					
10.4	Does the family refrain from eating or prepare special dishes of these items on these occasions? (see codes)					

****Codes (Q no.10.1):** 1= Yes; 2= No; 3= Not applicable

***Codes for the age of starting to eat the item (10.2):** 1= as soon as they start eating semi-solid and solid food, 2= when they seem to express their liking to eat the item when they see other family members eating; 3= After Chorun, 4= 1-5 years; 5= Between 5-10 years of age; 6= After 10 years of age; 7=When we think they are fit to digest the item 8=Not applicable; 9=Other (specify)*

***Codes for occasions of eating (10.3):** 1= On birthdays or anniversaries; 2=Marriages/Engagement, 3= During family get togethers/guests; 4=On holidays; 5=On busy days when in short of time for elaborate cooking; 6=Whenever feel like; 7= When good*

quality or special variety of item is available; 8=for festivals; 9= No specific occasion celebrated/ NA

Codes for occasions of refraining from eating (10.4) *1= On birthdays or anniversaries; 2= During family get togethers/guests;   3=In the event of a death in the family; 4= Death anniversaries; 5=During festivals and other auspicious occasions; 6=Do not refrain from eating at any time*

11. Others details

11.1	Are you aware of any media reports about the quality of fresh fish products available in the market?	*1= Yes; 2= No; 3= Do not know*
11.2	Are you satisfied with the quality of fresh fish available in the market?	*1= Yes; 2= No; 3= Cannot Say*
11.3	Are you satisfied with the quality of dried fish available in the market?	*1= Yes; 2= No; 3= Cannot Say*
11.4	From where do you think is the major part of the dried fish available in your local markets coming from?	*1= Locally produced* *2= Coming from other parts of Kerala* *3= Coming from other states* *4= Don't know*
11.5	From where do you think is the major part of the fresh fish available in your local markets coming from?	*1= Locally produced* *2= Coming from other parts of Kerala* *3= Coming from other states* *4= Don't know*
11.6	What do you think about the nutrition status of dried fish?	*1= Very nutritious* *2= Not very nutritious* *3=Do not know*
11.7	What do you think about the nutrition status of fresh fish?	*1= Very nutritious* *2= Not very nutritious* *3=Do not know*
11.8	Do you think eating dried fish is good for health?	*1= Yes; 2= No; 3= Do not know*
11.9	Do you think eating fresh fish is good for health?	*1= Yes; 2= No; 3= Do not know*
11.10	What is your approximate household annual income?	*1= Less than Rs 1.8 lakh;* *2= Between Rs 1.8 to 2.5 lakhs;* *3=Rs 2.5 to 5 lakhs; 4=Rs 5-10 lakhs;* *6 = Above Rs 10 lakhs*

Name of the investigator:……………………………………. Date of interview:

………………………

Start time of the interview:…………………….……End time of the interview:…………………..………

Remarks, if any: