Development of Sampling Technique for the Study on Fish Consumption Pattern among Tribal Communities in Wayanad District, Kerala

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Fish and fishery products are one of the most preferred diet supplements of majority of population in Kerala. The consistency in consumption trend might be due to abundance of fishery resources along 580 km of vast coastline; in addition to that, fish is regarded as the most affordable source of animal protein blended with a wide range of essential micronutrients and fatty acids. According to the latest census (GoI, 2011), in Kerala, the average fish consumption per month is 2.1 kg in rural areas and 1.9 kg in urban areas, compared with a dismal national average 0.269 kg and 0.238 kg of fish consumption per month in rural and urban India, respectively. Furthermore, as per national average, only 282 in 1000 households in rural and 209 in 1000 households in urban India consume fish. Conversely, Kerala has comparatively higher fish consumption, as 884 rural and 817 urban households in 1000 households consume fish. In terms of the rate of fish consumption, Kerala is almost 5-6 times higher than the national average, much higher than the Indian council of medical research (ICMR) recommended level of 12 kg per capita fish consumption of per annum.

Despite the trend in general fish consumption pattern in Kerala, still there is inconsistency in fish consumption patterns in the state, as evidenced by varying patterns of dietary diversity across coastal, plane and hill regions. Dietary diversity is influenced by different quantitative and qualitative attributes such as income, purchasing power, product price, market availability, supply-demand elasticity, food preference, variation in product quality, cultural diversity, subjective norms, beliefs, attitudes as well as various geographical, environmental, social and economic factors. Hence, the present study was undertaken by ICAR-Central Institute of Fisheries Technology (ICAR- CIFT), Cochin to assess the fish consumption pattern of tribal population in Wayanad district under the project, *"Value chain and Nutritional Research Outputs: Fish for nutrition and health of women and children"* to understand the dynamics of fish consumption behavior, and to ensure sustainable food and nutritional security through establishment of nutrition value chain in fisheries. The study is a prerequisite to implement and scale-up the value-added fish product interventions aimed at guaranteeing access to nutritious foods and breaking the intergenerational cycle of malnourishment among tribes. Currently, there are no real time qualitative or quantitative data available to explain the fish consumption pattern. Given this background, this research will delineate results, which explain the baseline status of fish consumption disaggregated by age, sex and location, level (quantity & frequency) of consumption in different areas, the preferences for fish and fish based products over other animal sourced foods, resource availability and the cultural acceptability for the fish based products. The location of the study has been selected on the basis of four criteria: (a) Prevalence of malnutrition, (b) Presence of fish eating population, (c) Existing extension mechanism

suitable for product intervention and (d) Extent of access for easy coordination.

Wayanad is one of the fourteen districts of Kerala situated in the North-East region of the state. The total area under Wayanad district is 2132 km^2, out of which 885.92 km^2 is coming under forest area. As per the 2011 census, the population of district is 817,420 constituting 2.45 % of state population with a population density of 383 per km^2. The district has three municipalities Kalpetta, Mananthavady and Sulthan Bathery with Kalpetta as its administrative headquarters. The entire population including indigenous tribal population is confined to these three municipalities. Wayanad district is inhabited by 11 different indigenous tribal groups (2011 Census) namely, Paniya, Kurichyan, Kuruman, Kattunaykkan, Adiyan, Vettakuruman, Thachanadanmoopan, Wayanadkadar, Mala arayan, Karimballan and Ulladan. The district Wayanad, one of the study locations, has been selected due to the reported prevalence of malnutrition as indicated by anemia in children under five years (54.6 %), anaemic pregnant women (15.5%), underweight children (27.2 %), stunted children (27.7 %), and wasted children (10.7 %) besides fulfilling other the three criteria.

The most critical component of any research programme is the generalization of research findings to a large population in real life situations. Hence, in quantitative research, it is imperative to select an appropriate sampling technique and sample size to represent the targeted population.

As part of developing a suitable sampling technique to study the fish consumption pattern in the tribal population, the secondary data (GoI, 2011) on tribal groups, tribal population and tribal colonies and number of households under each tribal group were collected from the District Collectorate, Wayanad. It was observed that a total of 151,443 tribal people settled in 3,169 colonies containing 36,136 households (HH) distributed among different tribal communities as shown in Table 1.

The study mainly concentrated on major populous of tribal communities due to accessibility, budget

Table 1. Community wise distribution of tribal population in Wayanad District, Kerala

Sr.No.	Tribal Community	Population	Number of Households (HH)
1.	Paniya	68516	15876
2.	Kurichyan	25006	5812
3.	Kuruman	20083	5139
4.	Kattunaykkan	17051	4369
5.	Adiyan	11196	2570
6.	Vettakuruman	6467	1700
7.	Thachanadanmoopan	1646	390
8.	Wayanadkadar	673	174
9.	Mala arayan	166	44
10.	Karimbalan	145	39
11.	Ulladan	94	23
	Total	**151443**	**36136**

Source: GoI (2011)

and other administrative reasons. The core part of the study was to conduct a survey among the households of different communities by using a structured, pre-tested questionnaire developed by ICAR- CIFT. To conduct smooth survey and to get an efficient estimate of different response variables, Stratified Probability Proportional sampling technique was used. Six different tribal communities with highest population were considered as six different strata or groups. Probability proportional to population size was computed from each stratum to calculate the number of households (HH) to be selected from each stratum as given in Table 2.

Let N be the population total of number of households from six tribal communities, that is 35466. Let Nj (j= 1,2, ----,N_i) be the population households in each of the six (i^{th}) tribal communities. This can be mathematically represented as

$$N= N_1+N_2+N_3+N_4+N_5+N_6$$

The assigned probability proportional to the j^{th} unit in the i^{th} tribal community is P_{ij}, which is obtained as

and

Let 'n' be the total number of sample households selected from the entire study population 'N'. In the present study n was fixed as 200 households by considering the feasibility of sampling and budget. Let 'n_j, (j=1,2,---,n_i)' be the sample size of households selected from the i^{th} tribal community.

This can be obtained as $n_{ij} = (N_{ij} / N) * n = P_{ij} * n = P_{ij} * 200$

The probability 'P_{ij}" and number of households selected from six different tribal communities are given in Table 2. As per the sampling plan, 88, 32, 28, 26, 16, and 8 numbers of households has to be selected from Paniya, Kurichyan, Kuruman, Kattunaykkan, Adiyan and Vettakuruman tribal communities.

Let y_{ij} be the j^{th} sample selected from i^{th} tribal community. The sample mean of i^{th} tribal community of proposed sampling technique is given in the equation below.

The unbiased estimator of population mean is obtained as

The sample variance of i^{th} tribal community is obtained as

and unbiased estimator of is obtained as

Thus in the present study, Stratified Probability Proportional Sampling technique has been aptly designed to estimate the fish consumption pattern of tribal communities in the Wayanad district of Kerala. This technique is based on the principle

Table 2. Sampling plan among tribal communities

Sr.No.	Tribal Groups	No. of HH (N_{ij})	Probability (P_{ij})	No. of HH (n_{ij})
1.	Paniya	15876	0.44	88
2.	Kurichyan	5812	0.16	32
3.	Kuruman	5139	0.14	28
4.	Kattunaykkan	4369	0.12	24
5.	Adiyan	2570	0.07	14
6.	Vettakuruman	1700	0.04	8
	Total	**N= 35466**	**1.00**	**n = 200**

that the sampling elements are homogeneous within the stratum and heterogeneous among the strata. Again the households were randomly selected from each of the strata with adequate representation of study population (Ackoff, 1953). The sampling frame of study population is given in Figure 1.

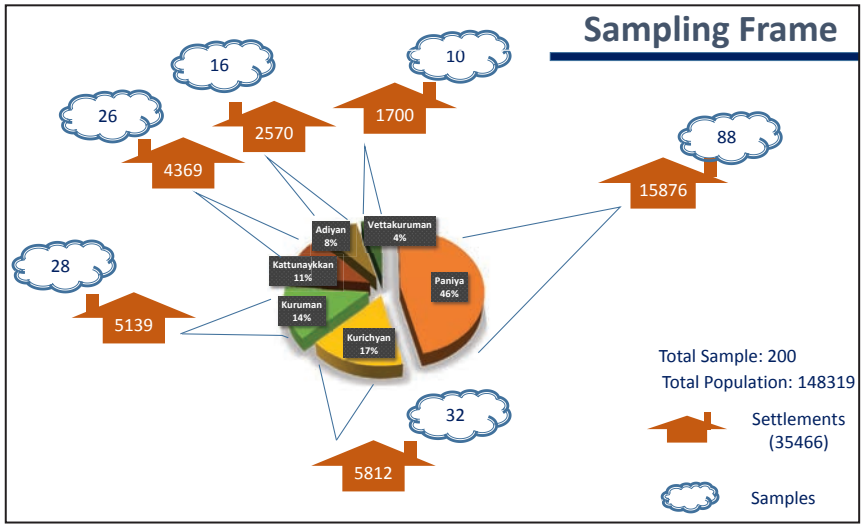

Figure 1. Sampling frame of the study population

The tribal communities with highest number of households were considered as different stratum on the basis of their socio-economic status, food habits, social customs and culture. The number households from each stratum was computed by Stratified Probability Proportional Sampling method. The proposed sampling technique facilitates the smooth survey of the sampling in the selected tribal communities and provides efficient estimates of fish consumption pattern in the tribal population of the district.

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