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Food Consumption Pattern and Dietary Diversity among the Farmers in Kanyakumari and Perambalur Districts of Tamil Nadu

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Authors' contributions

This work was carried out in collaboration among all authors. Author YM designed the study, performing the statistical analysis and wrote the first of the manuscript. Author KRA helping the title and design of the study, contributed data and analytical tools, giving more ideas related to this study. Author AV helped the statistical analysis, interpretation of results and finalizing the manuscripts. Author SK helping the data collection and managed the literature searches. Author PV helping the data collection and managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To study the consumption pattern and dietary diversity among the farmers in rural areas.
Study Design: Random Sampling.
Place and Duration of Study: Primary data were collected from the Kanyakumari and Perambalur districts of marginal and small farmers between July and August 2020.

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Methodology: The study was conducted in Kanyakumari and Perambalur districts based on Tamil Nadu state planning commission report 2017.The Simpson index of dietary diversity was calculated to score the quantity and consumption of food items were consumed. The multiple linear regressions were used to understand the variation of socio-economic and demographic features of the household members.
Results: The overall result of the SIDD score for Kanyakumari district was 0.73 and 0.72 for Perambalur district. When compared to Perambalur district, the results clearly showed that Kanyakumari district farmers had a higher dietary diversity. Because the food habits of Kanyakumari district farmers differ significantly from those of Perambalur district farmers, owing to a higher intake of nutritious foods in Kanyakumari district farmers.
Conclusion: The factors like monthly income and education most influence the household dietary pattern and nutrition status of Kanyakumari district rather than the Perambalur district.

Keywords: Consumption pattern; dietary diversity; food and nutrition security; Simpson index; multiple linear regressions.

1. INTRODUCTION

Food and nutrition security (FNS) is a critical priority that requires attention and action at all stages of development. For a long time, ensuring FNS has been the worlds and India's top priority. As the Millennium development goals (MDGs) came to an end in the year 2015, the member countries of the United Nations (U.N.) continue with a new ambitious set of Sustainable Development Goals (SDGs) for a better world. This SDGs is most precious to achieving zero hunger it includes ending hunger, ensuring universal access to safe and nutritious foods by 2030, and eliminating all forms of malnutrition by 2025 [1]. Recent estimates of FAO found that undernourished people in the Asia-Pacific region was 350.6 million. The number is very high, accounting for about 51 per cent of the global total of 687.8 million. In 2019, Southern Asia had the highest number of undernourished people, 257.3 million, followed by South-Eastern Asia was 64.7 million. However, the undernourished trend of the Asia Pacific region has made significant progress in reducing the total number of undernourished people.

Agriculture remains an important source of income for most rural people in developing countries such as India. Agriculture can influence nutrition through various channels, including increased food intake from own production, increased income from crop diversification, livestock rearing and lower accurate food prices [2,3,4,5]. It is experiencing one of the fastest economic growth rates globally, with a much slower decline in undernutrition. Despite the importance and potential of agriculture in improving the nutrition of farming households, understanding the linkages between agriculture and nutrition in India is extremely limited. Food consumption is closely linked to on-farm agricultural production in rural India (particularly in less developed regions) [6]. As a result, understanding household dietary diversity may be a more straightforward and less time-consuming way to assess household food security [7,8].

People's dietary diversity in a region is determined by several factors, including production diversity, household income/ expenditure levels, and demographic and socio-economic characteristics [9]. This study is a contribution in this direction, focusing on rural pockets in Kanyakumari and Perambalur districts. Specifically, the current study uses household-level data to examine food consumption patterns and dietary diversity.

2. METHODOLOGY

The primary data was collected with a well-structured interview schedule using the personal interview method. The data on general information, household size, age, education, income, expenditure, the quantity of food prepared and consumed by each individual, and other details were recorded using the 7-days recall period. To compare the Kanyakuamri and Perambalur district consumption pattern was the aim of ethical principle of this study. According to Tamil Nadu state planning commission report 2017, from the top five and bottom five districts of the food security index randomly Kanyakumari and Perambalur districts were selected to analyzing the dietary diversity. In the second stage, 4 blocks (2 from each district) were selected purposively. In the third stage, four villages (one from each block) were chosen. Two

villages were selected randomly from each district. In using a random sampling method, 120 farmers were selected (60 marginal farmers + 60 small farmers). Thus, 480 respondents (240 marginal farmers+ 240 small farmers) were chosen from Kanyakumari and Perambalur districts.

2.1 Simpson Index of Dietary Diversity (SIDD)

Edward H. Simpson proposed the Simpson index in a paper Nature in 1949. It is used to determine the degree of concentration of different food items in a food basket. Dietary diversity was traditionally measured by adding or counting the number of food groups consumed over time [10]. It can be defined as various foods across and within food groups that ensure adequate intake of essential nutrients that promote good health [11]. They included foods prepared and consumed in the home and food consumed outside the home such as processed foods, beverages, and other items. Aspects of food intake include the proportion of various food items in total expenditure, per capita intake, and the proportion of home-produced items in total consumption of each food group [12].

Measuring dietary diversity is difficult such as selecting food items to be counted; numbers, grouping, and quantity of food items are still being developed. Simpson Index of Dietary Diversity (SIDD) method has been used in the study to analyze diversity in respondents consumption baskets. In 2013, Food and Agricultural Organization (FAO) were grouped the food into 12 groups. This study considers only eight groups to determine the Simpson Index of Dietary Diversity (SIDD) based on these groups. The eight food groups including cereals, pulses, milk, oil, meat, fruits and vegetables, spices, and other food.

SIDD was used to estimate the diversity of sample households' consumption baskets using the following formula:

$$SIDD = 1 - \sum_{i=1}^{n} P_i^2$$

Where P_i denotes the proportion of the i^{th} food item consumed concerning the total number of food items consumed by household members, the weekly estimates were then averaged to produce the final SIDD. SIDD index values range from 0 to 1, with ""0""indicating complete specialization and ""1""indicating greater diversity. SIDD scores were obtained separately for each village's household.

A multiple linear regression model was used to understand further the variation in diversity scores across different groups of households and to attribute their variation to different household-specific socio-economic and demographic determinants.

$$\mathrm{SIDD_i} = \alpha + \beta \mathrm{Z_i} + \gamma \mathrm{E_i} + \delta \mathrm{O_i} + \varepsilon_i$$

Where,

$SIDD_i$ – dietary score is represented by dependent variables (ranges 0 to 1)

Z_i - vector based on sociological and demographic characteristics [e.g., family head's age (Years), gender (Male=1, Female= 0), and education (Primary1, secondary-2, Higher secondary-3 and Illiterate-5), household size (Numbers) and food consumption habits (Non-vegetarian-1, Vegetarian-0)]

E_i - is a vector of economic states of households such as per capita farm income and monthly expenditure (Rs/ Month).

O_i - vector of household ownership [ie. ownership of land (ha) and livestock (Numbers)].

ε_i - error term

3. RESULTS AND DISCUSSION

3.1 Dietary Diversity across Marginal and Small Farmers

Dietary diversity can be used as a proxy for nutritional sufficiency [13]. There was a positive relationship among household dietary diversity observed. Higher household expenditure levels are used for greater access to more food groups, resulting in greater dietary diversity. Table 1 showed the SIDD scores for marginal and small farmers. In Kanyakumari, the overall SIDD score was 0.73, while in Perambalur, it was 0.72. The number of food items consumed by small farmer households was higher than that of marginal farmers. When comparing the two districts, Kanyakumari district farmers consume more range food items than Perambalur district

farmers. In Kanyakumari district, the SIDD score of food groups constituted different food items was 0.73 marginal farmers and 0.74 for small farmers. In Perambalur district, 0.72 marginal farmers and 0.73 for small farmers. However, there was little variation in dietary diversity scores among marginal and small farmers. It concluded that the farmers of Kanyakumari district consumed more food items than the farmers of Perambalur district. Because Kanyakumari district farmers' food habits differ significantly from those of Perambalur district farmers, owing to Kanyakumari district farmers' higher intake of nutritious foods.

3.2 Factors Influencing the Dietary Diversity

The SIDD score was used as the dependent variable in this study. The independent variables used socio-demographic factors such as age, gender, education, household size, food habit, monthly farm income, farm size, livestock ownership, and monthly expenditure. Multiple linear regression models were used to estimate the dietary diversity in the Kanyakumari and Perambalur districts. The outcome of the multiple linear regression model is shown in Table 2.

Table 1. Calculated scores of SIDD across marginal and small farmers

District/Farmer	Marginal farmer	Small farmer
Kanyakumari	0.73	0.74
Perambalur	0.72	0.73
Z-test	1.546*	2.652**

*Note: ** and * denote significance at 5% and 10 % respectively*

Table 2. Factors influencing the dietary diversity of household of Kanyakumari district

Variable name	Marginal Farmer	Small Farmer
Age of the household head (Years)	0.0002 (0.000)	0.00007 (0.000)
Gender of the household head (Male=1, Female=0)	-0.003 (0.006)	0.0001 (0.004)
Education of the household head (Primary1, secondary-2, Higher secondary-3 and Illiterate-5)	0.006* (0.003)	0.004** (0.002)
Household size (Numbers)	-0.006* (0.003)	-0.002 (0.002)
Food habit (non-vegetarian – 1, vegetarian-0)	0.062*** (0.009)	0.051*** (0.006)
Farm income (Rs./ month)	0.0002* (0.000)	0.00004* (0.000)
Farm size (ha)	0.013* (0.007)	0.020*** (0.004)
Ownership of cattle (Numbers)	0.008 (0.008)	0.017*** (0.003)
Food Expenditure (Rs./Month)	0.002* (0.000)	0.038 (0.000)
Constant	0.607*** (0.021)	0.586*** (0.016)
R^2	0.74	0.84
No of Observation	120	120

*Note: ***, ** and * denote significance at 1%, 5% and 10 % respectively*
Figures in parenthesis are standard errors

Table 3. Factors influencing the dietary diversity of household of Perambalur district

Variable name	Marginal Farmer	Small Farmer
Age of the household head (Years)	0.00004	0.0002
	(0.000)	(0.000)
Gender of the household head (Male=1,	-0.004*	-0.001
Female=0)	(0.002)	(0.002)
Education of the household head (Years)	-0.001	-0.001
	(0.001)	(0.002)
Household size (Numbers)	0.029***	0.014**
	(0.004)	(0.004)
Food habit (non-vegetarian – 1, vegetarian-	-0.002**	-0.002*
0)	(0.001)	(0.001)
Farm income (Rs./ month)	0.018***	0.00002***
	(0.001)	(0.000)
Farm size (ha)	0.008***	0.012***
	(0.002)	(0.003)
Ownership of cattle (Numbers)	0.005***	-0.001
	(0.001)	(0.002)
Food Expenditure (Rs./Month)	0.00004	0.00002
	(0.000)	(0.000)
Constant	0.646***	0.641***
	(0.011)	(0.014)
R^2	85	85
No of Observation	120	120

*Note: ***, ** and * denote significance at 1%, 5% and 10 % respectively*
Figures in parenthesis are standard errors

The variation in the dietary diversity of Kanyakumari district was explained by R2 values of 0.74 marginal farmers and 0.84 for small farmers, as shown in Table 2. The model was shown to explain more variations, and it was statistically significant with the model. It was revealed that education, food habits, and farm size of the house all had a positive and significant influence on the dietary diversity of marginal and small farmers' households. It was demonstrated that farmers in Kanyakumari districts would have access to a wider range of items in their consumption basket. This means that increasing the education of household members by one unit raises the SIDD score of 0.006 marginal farmers and 0.004 for small farmers. [14,15,16] it was observed that education improves knowledge of health and nutrition and lowers the cognitive cost associated with obesity. If the farming household's education was good, they could spend more on food baskets and increase their commodity expenditure. However, food habits indicated that non-vegetarian households would have a greater variety of foods than vegetarian households. Households spent substantially more of their consumption as farm size increased.

Similarly, marginal farmers' monthly expenditure on dietary diversity was positively significant. It was stated that both farm and non-farm income sources would increase dietary diversity by 0.002 units for every rupee spent on food items. Household size was associated with lower dietary diversity and had a negative and significant coefficient associated with this variable. It was realized that small farmers were both positive and statistically influenced by monthly farm income and cattle number. Similar results were found in [17,18] it referred that cattle ownership has a positive and significant effect on household food consumption with a significant level of 1 per cent.

The R^2 for marginal and small farming households is 0.85, explaining the Perambalur district's dietary diversity variation. The model's overall fit was excellent. The SIDD score had a positive and significant influence on variables such as household size, monthly farm income, and farm size, with larger farms indicating greater dietary diversity in households. This means that increasing the number of households by one unit would result in a 1 to 5 percentage increase in SIDD scores. The monthly farm income had a positive influence because it is the primary source of income. The result is consistent with similar findings of [14]. The farm size of households is positive, supporting [19] previous findings of the relationship between

dietary diversity and household agricultural productivity.

There was a significant reduction in dietary diversity due to gender and food habits in the household. It was suggested that vegetarian households would have fewer food options than non-vegetarian households.

4. CONCLUSION

The research examined the food consumption patterns as well as dietary diversity in two districts of Tamil Nadu. There was a significant disparity across the sample districts regarding different food items and their intake level. The overall SIDD score for Kanyakumari district was 0.73, and 0.72 for Perambalur district. Compared to Perambalur district, the results clearly showed that Kanyakumari district farmers had a higher dietary diversity. The socio-economic characteristics of the study area revealed that monthly farm income and education are major factors influencing household dietary patterns and nutritional status. The food habits of Kanyakumari district farmers differ significantly from those of Perambalur district farmers, owing to a higher intake of nutritious foods in Kanyakumari district farmers. A diverse food basket would provide food security while also improving quality of life by increasing nutritional security. From a policy standpoint, it is critical to focus interventions on improving dietary diversity and nutrition security while having a thorough understanding of the target area's socio-economic context and population.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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