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An Economic Analysis of Food Security, Household Income and Nutritional Status among Rural Households in Kancheepuram District, Tamil Nadu, India

Dr E Kandeepan

Assistant Professor in Economics, Government Arts and Science College, Idappadi, Salem, Tamil Nadu, kandeepan11@gmail.com

Abstract

Introduction: Food security and nutritional status are critical indicators of household welfare and socio-economic development. This study investigates the relationship between household income, food expenditure, food security, and nutritional status among rural households in Kancheepuram District, Tamil Nadu, India. Objectives: analyzing socio-economic characteristics, assessing food security status, examining income and expenditure patterns, and identifying factors influencing nutritional well-being. Methods: A sample of 250 rural households will be surveyed using structured questionnaires, with data analyzed through percentage analysis, chi-square tests, correlation, and logistic regression. Findings: reveal that 69.6% of households are food secure, with household income significantly associated with food security. Additionally, income and food expenditure show a strong positive correlation, while family size and dietary diversity also contribute to food security. Conclusion: The study emphasizes enhancing rural income opportunities, improving food distribution programs, and promoting dietary diversity. An integrated approach involving agriculture, healthcare, and nutrition programs is recommended to foster better food security and quality of life for rural households.

Keywords: Food Security, Household Income, Nutritional Status, Food Expenditure, Dietary Diversity, Rural Households, Kancheepuram District, Tamil Nadu.

Introduction

Food is one of the needs of human life. It helps people stay healthy improves quality of life and supports growth. Having nutritious food is essential for both physical and mental growth. Because of this food security is seen as a sign of social well-being and progress especially in developing countries like India. India has made strides in farming, food distribution and economic growth. Making sure every household gets enough and healthy food is still a major challenge. Food security is not about having enough food grains. It also includes the ability of families to buy food, access types of food and the quality of the food they eat. Experts usually look at food security through four parts: availability, accessibility, utilization and stability. Availability means there is food produced and supplied. Accessibility refers to whether families can get food both financially. Utilization is about how the body can use the food and whether it supports good health. Stability means food is available and accessible all the time without disruptions.

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In India families make their income from many sources. These include farming, farm work, small businesses, self-employment and other jobs. Income levels vary a lot between households. Some families get income. Others depend on work or farming which can be unpredictable. These differences in income and job opportunities affect how much families can spend on food. Poorer households often struggle to afford a diet because most of their money goes to basic food items. Household income plays a role in what people eat. Families with income can afford more kinds of food—like cereals, pulses, vegetables, fruits, milk, eggs and other protein-rich foods. Poorer families usually rely on staple foods. This limits their diet. May lead to missing out on important nutrients so studying how income affects nutrition is a focus in food and nutrition economics. Food spending is another sign of a household's economic situation. How much money is used for food shows what families consider important and how much they can afford. When prices go up for items like rice, pulses, vegetables, milk and cooking oil poor rural families feel the pressure. If prices rise but income stays the same people have to cut back on food. This can hurt the health of children, women and older adults.

Nutritional status is closely tied to what people eat along with health care, education, sanitation and living conditions. Good nutrition helps in growing strong thinking clearly staying healthy and working well. Lack of food can lead to undernutrition missing vitamins and minerals and other health issues so studying food security should not just look at how much food's eaten, but also how nutritious and varied the food is the study focuses on Kancheepuram District in Tamil Nadu. This area has a mix of farming and nonfarming jobs. People work in agriculture, farm labor, silk weaving, small industries, business and other fields. The different types of work income levels and job conditions can lead to differences in how much families spend on food and how well they can get food.

In Kancheepuram the economic situation of households is shaped by many things. These include income, family size, education, job type, food prices and access to government aid. Families that depend on farm labor or temporary jobs often have income. This can make it hard to eat well every day. Households that earn more and have education may know more about balanced diets and what nutrients are needed. The Indian government has launched programs to fight hunger and improve nutrition. These include the Public Distribution System (PDS) the National Food Security Act of 2013 the Integrated Child Development Services (ICDS) and the PM POSHAN Scheme. These programs aim to help people who're poor and vulnerable. They help families get food and improve their nutrition. Not all families benefit equally. The results depend on how aware people are how easy it is to reach the programs and how well they are run.

In this study "An Economic Analysis of Food Security, Household Income and Nutritional Status among Rural Households, in Kancheepuram District, Tamil Nadu, India" looks at how household income, food spending, food security and nutrition connected. It also tries to find out which social and economic factors affect food security. The study also looks at how government programs help families get food and improve their nutrition.

Problems of the Study

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Food security and nutritional well-being significantly influence the living standards of rural households in India. Despite advancements in agricultural development and food distribution, many families struggle to access sufficient, nutritious food, largely due to unstable incomes from agriculture and daily wage labor. This variability affects consistent food consumption. Rising food prices further challenge low-income families, forcing them to compromise on balanced diets. Larger household sizes dilute the food quantity and quality available per member, particularly impacting vulnerable groups like children and the elderly. Nutritional awareness is also lacking, with many unable to make informed food choices. In Kancheepuram District, diverse occupations lead to income and food expenditure variations, necessitating an understanding of how these economic conditions affect food security. While government programs like the Public Distribution System have improved access to food grains, they do not guarantee adequate nutrition, as other factors like education, sanitation, and healthcare also play critical roles. Thus, a systematic investigation is required to analyze the interplay between household income, food expenditure, food security, and nutritional status, aiming to identify key factors and suggest measures to enhance dietary diversity and well-being.

Scope of the Study

The study investigates the economic and nutritional conditions of rural households in Kancheepuram District, Tamil Nadu, focusing on the relationship between household income, food consumption expenditure, food security, and nutritional status. It encompasses various rural economic activities, including agriculture and self-employment, to analyze food consumption patterns across different income groups. Key variables explored include household income, monthly food and non-food expenditures, and dietary diversity, particularly the consumption of nutrient-rich foods. The nutritional status is assessed using dietary indicators and anthropometric data. Additionally, the role of government welfare programs, such as the Public Distribution System and National Food Security Act, is examined for their impact on food accessibility. The study utilizes quantitative techniques for data analysis and aims to inform economists, policymakers, and development institutions about factors influencing food security and nutritional well-being among economically vulnerable households in the district.

Review of the Literature

Arora and Nabi (2022), in their study Determinants Affecting Household Food Security in India: A Critical Review, examined the various socioeconomic factors influencing household food security in India. Their review identified education, employment, household income, family size, nutritional knowledge, land ownership, agricultural production and food price inflation as important determinants. The authors emphasized the need for further empirical research to examine the combined influence of these factors on household food security.

Goli, Rammohan, and Reddy (2021) explored the connection between agricultural landholding, caste, and household food security in rural Uttar Pradesh, utilizing survey data from 5,087 households. Their findings revealed that land ownership and social inequality significantly affected food insecurity, with many food-insecure households lacking agricultural land or owning only marginal land. Furthermore, socially disadvantaged groups were more

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likely to experience food insecurity. The authors highlighted the need to incorporate land ownership and social inequalities into food security policy development for rural communities.

Raghunathan et al. (2021), in their research Affordability of Nutritious Diets in Rural India, examined the economic affordability of nutritious food among rural households. The researchers analysed the cost of obtaining diets that meet nutritional recommendations. Their findings highlighted that nutritious diets were not always affordable for economically weaker households. The study emphasized the importance of improving income opportunities, monitoring food prices and strengthening social protection programmes.

Gupta and Pingali (2020) examined the link between agricultural production diversity, market access, and dietary diversity in rural Indian households, utilizing data from 3,600 households in four districts collected in 2017. Their findings revealed that market access significantly enhances dietary diversity, with variations noted across different households and locations. The study highlighted that improved market access allows rural families to purchase a wider range of nutritious foods.

Krishnamurthy, Pathania, and Tandon (2017) examined the impact of food price subsidies on household nutrition in India, focusing on subsidized rice distribution in Chhattisgarh during the early 2000s. The research compared nutritional changes in Chhattisgarh with neighboring districts, revealing that increased rice availability led to improved nutritional intake, especially among eligible households. The findings emphasized that food price subsidies enhance the purchasing power of economically disadvantaged families, thereby contributing to better nutrition. The study underscored the significance of targeted food subsidy programs in improving household nutrition.

Research Gap

The review highlights that food security and nutritional status have been analyzed from various perspectives, including economics, agriculture, and social factors. Key areas examined include household income, poverty, dietary diversity, food distribution programs, and nutritional outcomes. However, several gaps persist: many studies focus on national or regional levels, neglecting the variability of rural households across districts; there is a lack of integrated investigations combining income, food expenditure, security, and nutrition; agricultural production's impact on purchasing capacity requires more attention; household characteristics influencing food security are underexplored; and the relationship between government welfare programs and food accessibility is not well studied at the district level. The proposed study aims to fill these gaps by examining these factors within rural households in Kancheepuram District, Tamil Nadu, using primary data and statistical techniques to enhance understanding of socioeconomic factors affecting food security and nutrition, thus aiding policymakers in addressing related challenges.

Objectives of the Study

The main objective of the present study is

- To analyse the relationship between food security, household income and nutritional status among rural households in Kancheepuram District, Tamil Nadu.

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Research Methodology

Research Design	:	Descriptive and Analytical research design
Nature and Sources of Data	:	Primary and Secondary data
Study Area	:	Kancheepuram District of Tamil Nadu
Sample Size	:	250 Rural households
Sampling Design	:	Multistage sampling technique
Method of Data Collection	:	Structured interview schedule
Statistical Tools and Techniques	:	Percentage analysis, Chi-square test, Correlation Analysis, Multiple regression, ANOVA

Hypothesis

Based on the objectives of the study the connection, between household conditions and nutritional well-being is examined. Household economic conditions shape how families eat and feel. To explore this link the following hypotheses are prepared for investigation.

Hypothesis 1: Household Income and Food Security

- There is no significant relationship between household income and food security among rural households in India.
- There is a significant relationship between household income and food security among rural households in India.

Hypothesis 2: Household Income and Food Expenditure

- There is no significant difference in food consumption expenditure among rural households belonging to different income groups.
- There is a significant difference in food consumption expenditure among rural households belonging to different income groups.

Hypothesis 3: Household Size and Food Security

- There is no significant association between household size and food security.
- There is a significant association between household size and food security.

These hypotheses will be tested using appropriate statistical techniques at a specified level of significance, generally 5%.

Limitations of the Study

Every research study has limitations influenced by geographical area, sample size, and data collection methods. This study focuses on rural households in Kancheepuram District, Tamil Nadu, which may not represent all rural households in India. Limitations include the sample size of 400 households, potential inaccuracies in income reporting, and variations over time in income and food prices. Seasonal changes can also affect consumption patterns. Furthermore, the accuracy of food consumption data depends on respondents' memory, and nutritional status

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assessments require dietary information and anthropometric data. Socioeconomic disparities may influence nutritional outcomes, and the study partly relies on secondary data, which may vary in definition and methodology. Lastly, accessibility to government programs like the Public Distribution System might differ among households. Despite these factors, the study aims to shed light on the connections between household income, food security, and nutrition among rural households, offering insights for improving their conditions.

Results and Analysis

Table 1: Distribution of Respondents by Socio-Economic Characteristics (N = 250)

S.No	Socio-economic variable	Category	Frequency	Percentage
1	Age	Below 30 years	37	14.8
		30–40 years	73	29.2
		41–50 years	67	26.8
		Above 50 years	73	29.2
2	Gender	Male	194	77.6
		Female	56	22.4
3	Education	No formal Education	42	16.8
		Primary	75	30.0
		Secondary	101	40.4
		Higher Education	32	12.8
4	Occupation	Agriculture	56	22.4
		Agricultural Labour	95	38.0
		Non-agricultural work	65	26.0
		Self-employment	34	13.6

Source: Primary Data

Table 1 presents the socio-economic characteristics of the 250 respondents selected for the study. When looking at age the biggest group is people between 30 and 40 years old and those over 50 years old. Each of these groups makes up 29.2% of the people surveyed. People under 30 years old are 14.8%. Those between 41 and 50 years old are 26.8%. Looking at gender there are more men, than women. Men make up 77.6% of the people surveyed while women are 22.4%. When it comes to education the common level is secondary education. 40.4% Of the people have finished this level. Another 30% have primary education and 16.8% have no formal education at all. 12.8% Have higher education. In terms of jobs working in agriculture is the common. 38% Of the people are involved in work. Then there are -agricultural workers, who make up 26% of the sample. People who work in agriculture are 22.4%. Self-employed people are 13.6%. This group of people is mostly men, not very highly educated. They are mostly working in agriculture.

Table 2: Block-wise Distribution of Sample Households

S.No	Development block	Frequency	Percentage
1	Kancheepuram	38	15.2
2	Kundrathur	38	15.2
3	Sriperumbudur	56	22.4
4	Uthiramerur	63	25.2
5	Walajabad	55	22.0

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Total	**250**	**100.0**

Source: Primary Data

Table 2 presents the distribution of the 250 sample households across five development blocks. Uthiramerur accounts for the highest proportion, with 63 households (25.2%). Sriperumbudur represents 22.4%, followed by Walajabad at 22%. Kancheepuram and Kundrathur each account for 15.2% The distribution provides an illustrative geographical representation of the selected households across the five development blocks.

Table 3: Monthly Income

S.No	Monthly Income	Frequency	Percentage
1	Below ₹10,000	45	18.0
2	₹10,001–20,000	78	31.2
3	₹20,001–30,000	68	27.2
4	₹30,001–40,000	40	16.0
5	Above ₹40,000	19	7.6
Total		**250**	**100.0**

Source: Primary Data

Table 3 presents the monthly income distribution among the selected households, revealing that 31.2% fall within the ₹10,001 to ₹20,000 income range, making it the largest category. In addition, approximately 27.2% earn between ₹20,001 and ₹30,000, while 18% have incomes below ₹10,000 per month. Conversely, only a small fraction, 7.6%, belong to the income group exceeding ₹40,000. This distribution highlights that a significant number of households are classified within the lower and middle-income brackets, suggesting prevalent economic constraints among the studied population.

Table 4: Monthly Food Expenditure

S.No	Monthly food expenditure	Frequency	Percentage
1	Below ₹3,000	7	2.8
2	₹3,001–5,000	74	29.6
3	₹5,001–7,000	119	47.6
4	₹7,001–10,000	48	19.2
5	Above ₹10,000	2	0.8
Total		**250**	**100.0**

Source: Primary Data

Table 4 shows that 47.6% of households spend ₹5,001–7,000 monthly on food, while 29.6% spend ₹3,001–5,000 and 19.2% spend ₹7,001–10,000. The majority of households are in the ₹5,001–7,000 category. This spending pattern must be analyzed alongside factors like household income, family size, and food prices to assess nutrition affordability.

Table 5: D Food Security Status

S.No	Food security status	Frequency	Percentage
1	Food secure	174	69.6
2	Food insecure	76	30.4
Total		**250**	**100.0**

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Source: Primary Data

Table 5 indicates that 69.6% (174 households) are food secure, while 30.4% (76 households) are food insecure, highlighting that nearly three in ten households face food insecurity. This underscores the need to examine household income, family size, food expenditure, and access to food assistance in the context of rural food security.

Table 6: Nutritional Status

S.No	Nutritional status	Frequency	Percentage
1	Underweight	46	18.4
2	Normal	174	69.6
3	Overweight	29	11.6
4	Obese	1	0.4
Total		**250**	**100.0**

Source: Primary Data

Table 6 indicates that 69.6% of the adult respondents belong to the normal nutritional category. Underweight respondents account for 18.4%, while 11.6% are overweight. Only 0.4% are classified as obese. The distribution nutritional problems may include both undernutrition and excess body weight. In the actual research, these classifications must be calculated using measured adult height and weight and appropriate BMI standards.

Hypothesis 1: Household Income and Food Security

- There is no significant association between monthly household income and food security among rural households.
- There is a significant association between monthly household income and food security among rural households.

Table 7: Association between Monthly Household Income and Food Security

S.No	Monthly income	Food insecure	Food secure	Total
1	Below ₹10,000	16	29	45
2	₹10,001–20,000	34	44	78
3	₹20,001–30,000	17	51	68
4	₹30,001–40,000	6	34	40
5	Above ₹40,000	3	16	19
Total		**76**	**174**	**250**

Source: Primary Data

Table 8: Chi-Square Test Results

S.No	Chi-square value	Degrees of freedom	p-value	Significance level
1	14.316	4	0.0064	0.05

Source: Computed

The chi-square test conducted yields a value of 14.316 with 4 degrees of freedom, resulting in a p-value of 0.0064. Because this p-value is lower than the 5% significance threshold, we reject the null hypothesis in favor of the alternative hypothesis. This conclusion indicates a

statistically significant relationship between monthly household income and food security. Additionally, cross-tabulation findings reveal that a higher proportion of food-secure households exists within the upper income brackets. This suggests that household income plays a crucial role in determining food security, highlighting its importance as an economic factor influencing access to food resources.

Hypothesis 2: Household Income and Food Expenditure

- There is no significant relationship between monthly household income and monthly food expenditure.
- There is a significant relationship between monthly household income and monthly food expenditure.

Table 9: Correlation between Household Income and Food Expenditure

Variables	Correlation coefficient (r)	p-value	Result
Monthly household income and monthly food expenditure	0.803	<0.001	Significant positive relationship

Source: Computed

The analysis reveals a strong positive correlation coefficient of 0.803 between monthly household income and food expenditure, suggesting that as household income increases, food spending also tends to rise. The statistical significance of this relationship is underscored by a p-value of less than 0.001, leading to the rejection of the null hypothesis at the 5% significance level. This indicates that higher income levels are associated with increased food expenses, emphasizing the role of household purchasing power in influencing food consumption. However, it is important to note that correlation does not imply causation; thus, an increase in income does not automatically result in increased food expenditure.

Hypothesis 3: Household Size and Food Security

- There is no significant association between household size and food security.
- There is a significant association between household size and food security.

Binary logistic regression is used to examine the relationship between household food security and selected explanatory variables.

The dependent variable is coded as:

- 1 – Food secure
- 0 – Food insecure

The explanatory variables include monthly household income, large family size, access to the Public Distribution System and dietary diversity score.

Table 10: Logistic Regression Analysis of Factors Associated with Food Security

S.No	Explanatory variable	Odds ratio	p-value	Statistical result

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1	Monthly income (per ₹10,000 increase)	1.219	0.251	Not significant
2	Large family size (above 5 members)	0.286	<0.001	Significant
3	PDS access	1.762	0.147	Not significant
4	Dietary diversity score	1.844	<0.001	Significant

Source: Computed

Model

Statistical measure	Result
Pseudo R^2	0.219
Model likelihood-ratio test	$p < 0.001$
Dependent variable	Food security status

The logistic regression analysis examines socio-economic factors affecting household food security. Monthly income shows a positive odds ratio of 1.219 but is not statistically significant (p-value 0.251). Conversely, large family size has an odds ratio of 0.286, indicating lower food security odds and statistical significance. PDS access has an odds ratio of 1.762 but lacks significance (p-value 0.147). Dietary diversity shows a significant odds ratio of 1.844, indicating increased food security with higher diversity scores. The overall model is statistically significant, rejecting the null hypothesis, though individual variable interpretations should be considered separately.

Major Findings of the Study

Socio-Economic Characteristics

- 29.2% of respondents aged 30–40 and 29.2% above 50.
- Male respondents: 77.6%; Female respondents: 22.4%.
- Educational qualifications: 40.4% secondary education, 30% primary education.
- Major occupation: Agricultural labour (38%).

Household Income

- 31.2% of households earn ₹10,001–20,000/month.
- 27.2% earn ₹20,001–30,000/month.
- 18% earn below ₹10,000/month.
- 7.6% earn above ₹40,000/month.
- Highlights differences in income and the importance of stable income for food accessibility.

Household Food Expenditure

- 47.6% spend ₹5,001–7,000/month on food.
- 29.6% spend ₹3,001–5,000/month.
- 19.2% spend ₹7,001–10,000/month.
- Connection between food spending, income, and family size.

Household Food Security

- 69.6% classified as food secure; 30.4% food insecure.
- Economic resources are crucial for household food access.

Nutritional Status

- 69.6% of adults normal weight; 18.4% underweight; 11.6% overweight; 0.4% obese.
- Importance of addressing both undernutrition and obesity.

Findings Based on Hypothesis Testing

- Hypothesis I: Significant association between household income and food security ($p < 0.05$).
- Hypothesis II: Strong positive relationship between household income and food expenditure ($p < 0.001$).
- Hypothesis III: Family size and dietary diversity significantly influence food security ($p < 0.001$).

Conclusion

Food security and nutrition are key indicators of household welfare and rural development. This study examines rural households in Kancheepuram District, Tamil Nadu, highlighting how household income, food expenditure, family size, and dietary diversity impact food security. It finds that improving food security goes beyond food availability, necessitating stable livelihoods, affordable nutritious food, public distribution, nutrition awareness, and healthcare access. An integrated approach involving agriculture, rural development, public health, and social welfare is essential. The study underscores the need to enhance rural livelihoods and promote diverse, nutritious food consumption for better quality of life. Final results should incorporate actual field-survey data before journal submission.

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