



RESEARCH ARTICLE

FOOD SECURITY STATUS OF MARINE FISHERIES HOUSEHOLDS IN BATTICALOA DISTRICT OF SRI LANKA

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ABSTRACT

The present study aims to determine the food security status of marine fisheries households in Batticaloa district of Sri Lanka and to analyse the impact of socioeconomic and demographic variables on the food security status of households in the district. This study was entirely depended on the primary data which was collected from a sampled questionnaire survey. The questionnaire survey was administered in the form of face-to-face interviews. Batticaloa district was selected and the sample was selected from seven fisheries inspectors division in the district. Marine fishing households were randomly selected as sample for the study. Five points Likert scale method was used in the study to calculate the index. The study confirmed that around half of the sampled marine fisheries households were in a moderate level of food security status in the study area. Using the logistic regression model, the study analyzed gender, age, marital status and education of household head, family size, fishing experience, household income and the household population in employment influencing the probability of household food security. The implication of the results highlights that the probability of a food security of the marine fisheries household in Batticaloa district of Sri Lanka depends on various factors such as Gender, Age and Level of Education, Fishing Experience of head of the households, Household Income and the Household Population in Employment. Introducing of alternative livelihood options has been the standard policy to uplift the income and food security conditions of the fishers.

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INTRODUCTION

Food security is a major issue which has importance in domestic economic development policies of many developing countries. It has emerged as a key development goal on the global development agenda. Food security includes issues related to the nature, quality, food access and security of the food supply. Household Food Security has been defined as "sufficient food consumption by all people at all times for a healthy and productive life" (Thompson and Metz, 1997). Studies on household food security are available in the literature at the national and global level. National level food supply determines the food availability of a country. However, The availability of adequate food at the national level doesn't necessarily ensure food security at the household level. Availability refers to the physical existence of food. On a national level, food availability is a combination of domestic food production, commercial food imports, and exports, food aid, and domestic food stocks.

Access is ensured when all households have enough resources to obtain food in sufficient quantity, quality, and diversity for a nutritious diet. This depends mainly on the number of household resources. Food insecurity in Sri Lanka has been based on composite indices constructed using aggregate variables falling under the broad dimensions-food availability, economic and physical accessibility which are direct or indirect determinants of food security (Mayadunne, and. Romeshun, 2013). However, there is no evidence for such study at the district level in Sri Lanka.

Objective of the study

The present study aims to determine the food security status of marine fisheries households in Batticaloa district of Sri Lanka and to analyse the impact of socioeconomic and demographic variables on the food security status of households in the district.

Literature Review

Food security is a concept that has evolved significantly over time by many scholars in various food security studies. Food and Agriculture Organization -FAO (1993) initially defined

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food security as “availability at all times of adequate world food supplies of basic food stuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices.”FAO, (2003) redefined the food security as “A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Many studies show that access to food is a very important dimension of food security. Generally, food security has three dimensions; availability, access, and utilization, and it can be analyzed at two levels; macro level and micro level. The macro level or national level food security mostly aims at the food availability aspects, while the micro aspects focus on household or individual food acquirement and utilization aspects (Kalansooriya and Chandrakumar, 2014).

Abur, (2014) assesses the food security status among farming households in Guma local government area of Benue state in north-central Nigeria. Primary data were collected from households selected through multi-stage sampling procedure. They used frequency, percentage, headcount method, food security gap and squared food security gap to analysis the collected data. Sangakkara and Nissanka (2008) conducted a study on Food security in Sri Lanka - agronomic implications and potentials. A study was to assess the status of household food security of Muslim community belonging to the marine fisheries sector in the Beruwala Divisional Secretariat Division in Sri Lanka. The data were collected from 494 individuals from 80 households located in 5 Fishing Inspection Divisions. The Aggregate Household Food Security Index developed by the FAO was used to evaluate the status of food security (Mukarrama *et al.*, 2013). Ahmed and Abeh, (2014) analyzed the determinants of food security among low-income households in Maiduguri Metropolis of Borno State, Nigeria. A logit model was used to identify the determinants of food Security.

Olayiwola, Tashikalma, and Giroh, (2017) analyzed the food security status and coping strategies among rural households in Oluyole local government areas of Oyo State, Nigeria. The specific objectives were to; describe the socio-economic characteristics of rural farming household heads, determine the level of food security status of the respondents, identify the coping strategies of rural household towards food insecurity in the study area and identify the causes of food insecurity encountered by respondents in the study area. Data collected were analyzed using descriptive and inferential statistics. In the present study food security includes dietary intake, Food diversity, and Food frequency. It uses food security index approach to identify the food security status of marine fisheries household and logistics regression approach was used to identify the factor determining the food security in the study area.

Research problems

Batticaloa district is one of the marine resources rich districts in Sri Lanka, and fishing is the second economic activity in this district. According to the fisheries statistics of the district, around 15 % of the population depends on fishing in the district. There is no evidence that studies on accessing the food security of fisher families in Eastern Sri Lanka were available in the literature. Hence, the present study aims to find the answers to the question of “What is the level of food security

status of marine fishers’ households in Batticaloa district of Sri Lanka?.

METHODS AND MATERIALS

This study was entirely depended on the primary data which was collected from a sampled questionnaire survey. The questionnaire survey was administered in the form of face-to-face interviews. Batticaloa district was selected and the sample was selected from seven fisheries inspectors division in the district. Marine fishing households were randomly selected as sample for the study. Five points Likert scale method was used in the study to calculate the index. The standardized indicators of a household were prepared using the method adopted from the Human Development Index to calculate life expectation index (Stanton, 2007). Many scholars Baby (2005), Muro, and Mazziotta, (2010), Rahman and Akter (2012), (Kumbhare *et al.*, 2013) used the same method to calculate the food security index.

$$Z_{indij} = \frac{(\text{Indicator})_{ij} - \text{Minimum}_j}{\text{Maximum}_j - \text{minimum}_j} \quad (1)$$

Where: Z_{indij} = Unit score of the i th respondent on the j^{th} component, $(\text{Indicator})_{ij}$ = Value of the i th respondent on the j^{th} component, Maximum = Maximum score on the j^{th} component, Minimum = Minimum score on the j^{th} component. From the standardized indicators, Household food security Index (HFSI) was calculated by averaging the standardized indicators.

$$HFSI = \frac{\sum_{j=1}^J z_{indij}}{J} \quad (2)$$

Where,

HFSI- Household Food Security Index.

J – Number of indicators used in the Index.

In the formula (1), “Indicator” is the original value of the sub-component as collected through the field survey. Minimum and maximum values of each subcomponent were obtained from a range of each indicator. From the standardized indicators, Household food security Index (HFSI) was calculated by averaging the standardized indicators by using formula (2)

In order to explore the impact of socioeconomic and demographic variables on households’ food security status, a logistic regression model was estimated. Baddeley and Barrowclough (2009) emphasize that a logistic regression model is used when the dependent variable is not continuous but instead has only two possible outcomes, zero or one. Households were grouped into 1 for a food secure, and 0 for food insecure based on the overall food security index (less than 0.5 = insecure and more than 0.5 = secured. Ashfaq, Haq, and Razzaq, (2014), Olagunju *et al.*, (2012), Ahmed and Abeh, (2014)) have used the logistic regression approach to identify the determining factor of food security in their studies. The binary variable Y_i is defined as follows:

Where Y_i = food security status

$Y_i = 1$ if household i is food secure; $Y_i = 0$ if household i is food insecure.

The regression model is defined as follows:

$$Y_i = \beta_0 + \beta_1 GE + \beta_2 AG + \beta_3 ED + \beta_4 EX + \beta_5 FS + \beta_6 MS + \beta_7 IN + \beta_8 PE + e_i$$

Where,

- GE: Gender of household head (Male = 0; female = 1).
- AG: Age of household head
- ED: Level of education of household head (in years)
- EX: Fishing Experience
- FS: Household size (Number of people in a household).
- MS: Marital status of household head (Married = 1; otherwise = 0).
- IN: Total monthly household income
- PE: Population in Employment. (Number of people in a household who are willing and able to work).
- e_i : error term

RESULTS AND DISCUSSION

Socio-Economic Characteristics

The study revealed that 97% marine fishers were male in the study area. They reported that the female of the household is responsible for cooking, childbearing, caring family and clothing in the family. Matthews *et al.* (2012) highlight that Men and women participate in almost all activities in the fisheries sector in developing countries. Women are often responsible for post-harvest activities, such as processing and trading. The present study demonstrates that female interest in fishing activities is very not as much of in the district. The district has multi-ethnicity. Majority of marine fishers were Tamils and 11% of them were Muslims. The research examines the age of samples fishers as a relevant socio-economic characteristic. The study revealed that most of the fishers were in the age group of 31 to 40 years (35.4%), followed by 41 to 50 years age group (30.3%). The study highlighted that the majority of marine fishers falls under the age of 30-50 years in the district. The present study also revealed that Out of sampled households 13% of fishers had no education, 51.4% of respondent had a primary level of education, 23.2% of respondents have completed middle level of education, 11.1% of respondents had a secondary level of education and around 1% of respondents had an advanced level of education.

The finding also revealed that the literacy rate of the respondents is 87% in the marine fishing community in the in the study area. Zakaria (2009) highlighted that the marital status either a positive or negative influence on socio-economic status as marital partner contribute to each other. The analysis shows that 97% of the sample were married. Family size to is an important socio-economic indicator as it affects the income and food security of the households. Family size has considerable influence on the income and expenditure of the family. It was found from the research majority of the fishers in the district had average family size (4-5). It exceeds the national level of family size (3.9 in 2016). Income is the most important factor to understand the status of the Socio-economic situation of the fishermen. The results also disclosed that the monthly income of fishers households was varied from 6,000/- 42,000/- Sri Lankan rupees.

Average monthly income of marine fisheries was 18,284.00 Sri Lankan Rupee (LKR). 60% of the sampled respondents earn income less than the average income in the study area.

Food Security Status of Marine Fishers

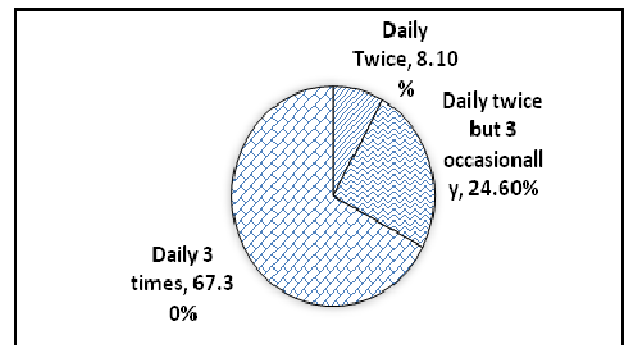
Based on the literature review four indicators, such as food frequency, food diversity, quality of food and income sources for food, have been included to investigate food security status in the present study.

Table 1. Food Security Index

Indicators	Mean	Index
Food frequency (No of meals & short eats per day)	4.59	0.7959
Food diversity (No of food items consumed per day)	3.22	0.4081
Quality of Foods	2.73	0.4331
Income source for food	3.24	0.4144
Aggregate Mean Score	3.45	-
Food Security Index	-	0.5129

Source: Computed from field data.

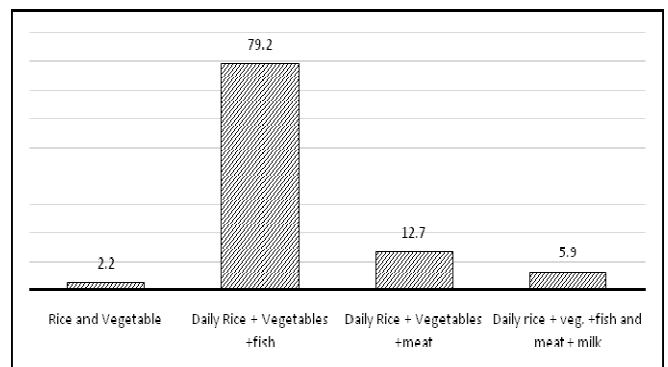
Indicators of the food security have been depicted in Table 1. It was revealed that the mean value of the food frequency was 4.59. It means that the majority of the respondents had meals three times a day. Index of this indicator was 0.7959 implied that the food frequency stood in a better position among the respondent in the study area. Figure: 1 also confirmed that the majority of respondent sufficient food frequency.



Source: Computed from field data.

Figure 1. Daily Food Frequency

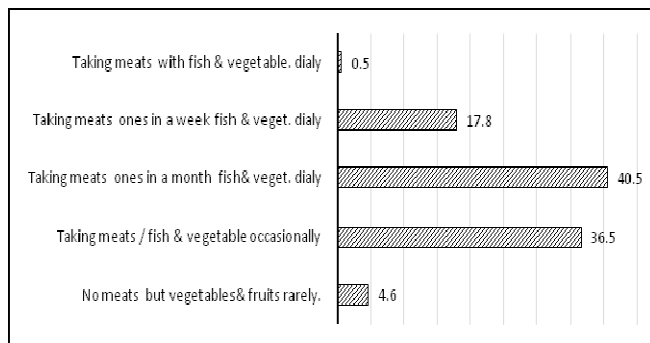
The mean score of the food diversity (number of food items consumed per day) was 3.22 and index for this indicator were 0.4081. Both scores showed a lower value than the mid-point. The figure: 2 confirmed that 79 % of the respondents get moderate food items (Rice + Vegetables + fish) in their daily diet.



Source: Computed from field data.

Figure 2. Daily Food Diversity

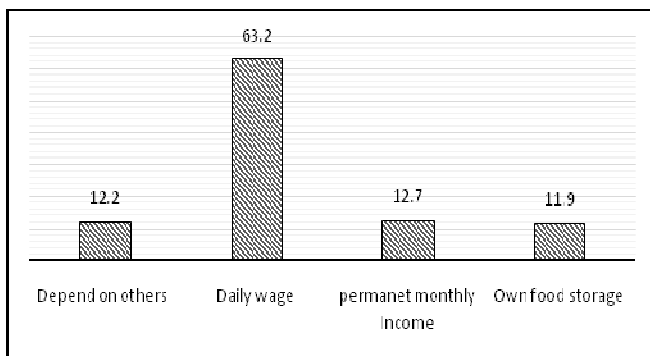
The mean score of the quality of food indicator was 2.73. It showed a lower value. Figure:3 confirmed that the majority of respondents (40.5%) taken meats ones in a month and fish and vegetables daily. The index score for this indicator was 0.4331 implied that the quality of food consumed by the fisheries households in Batticaloa district was very low.



Source: Computed from field data.

Figure 3. Quality of Food

The result also confirmed that the mean value of the income sources for food was below the midpoint. Index of this indicator scored a value below the mid-point of the scores of the scale. Figure 6.4 shows that 63% of the respondents depend on a daily wage from the fishing activities, and 12% of them depends on others for their food while 12% of the respondents had own food storage. It can also be noted that 12.7% of the respondent had stable income source for their daily food requirements in the study area.



Source: Computed from field data.

Figure 4. Income Sources for Food

The study reveals that the composite index of the Food Security scored a value of 0.5129 reflecting that marine fisheries households were in a better position regarding Food Security. An aggregate mean score of Food Security was 3.45. It also highlights that Food Security had a relatively better position among the respondent in the present research.

Socio-Economic Factors determining food security

The results show that the variables are important in explaining the determinants of household food security status in Batticaloa district. Among the eight explanatory variables fitted in the model, six have a significant effect on household food security. These variables include gender, household size, marital status, household income. The marginal effects are used to analyze the relationship between the dependent variable in relations to a one-unit increase in the value of the explanatory variable, with other variables remaining constant in the study, the marginal effects of the significant explanatory variables were estimated to highlight their importance for policy implementation and decision. The coefficient of the

gender of the head of household is significant at 10% and shows a positive relationship with household's food security status.

Table 2. Socio-Economic factors determining food Security

Variable	Coefficient	SE
Constant	-5.188 ***	1.130
GE-Gender of the household head	0.143 *	0.96
AG -Age of the household head (Years)	0.027 *	0.016
ED -Education of the Head (in years)	0.326 **	0.143
EX-Fishing Experience	0.061 ***	0.019
FS-Family Size	-0.067	0.100
MS-Marital Status	1.327	0.817
IN-Household income	0.0002**	1.000
PE-Population in employment	0.764 ***	0.268
Log-likelihood	438.260	

***, **, * significant at P<0.01, P<0.05, P<0.10 respectively

Source: Computed from field data,

The results, therefore, indicate that the gender of the respondent has a chance of being food secure in the study area. Age of the household head is significant at 10% level in explaining household food security. The positive sign of the coefficient reveals that an increase in age leads to an increase in the probability of a household being food secure. However, the results are similar to Olagunju *et al.*, (2012) which indicated that the likelihood of food insecurity decreases with an increase in age because older people have a better experience in subsistence and are able to accumulate better wealth. This result is contrary to Ahmed and Abeh, (2014) which shows that as the household heads advance in age, the probability of being food secure decreases. The coefficient of the variable education is significant at 5% level and carries a positive sign, suggesting that the higher level of household's education ensure a higher the probability of food security and vice versa in the study area. However, (Benjamin and Joseph, (2012), Kuwornu *et al.* (2013) found a negative and significant relationship between education and household food security. Fishing experience also significant at 1% level and has a positive relationship with food security of fisheries households in the study area. This indicates that the higher the numbers of years in fishing experience, the more food secure among the marine fishers households in the study area. The coefficient of household income is positive and significant at 5% level of significance. An increase in household income improves household food security because generally more food can be produced or purchased. Household income is the most significant determinant of household food security, with regards to food accessibility. The findings are similar to those of Bashir *et al.* (2012), who found a positive relationship between household income and household food security. This was an unexpected outcome as income provides the means to maintain the livelihood of a household. Population in employment is another variable that determines the food security. The coefficient of this variable is significant and carries a positive relationship with food security of fisheries households in the study area. The coefficient has a positive sign suggesting that the labor force has a positive effect on household food security. This implies that additional members who are able to work are most likely to contribute to the consumption of food in the household. The following variables were not significant, these variables include household size and marital status of the respondent. Household size has a negative coefficient and did not indicate any link with food security. This finding is not in line with other similar studies that found significant and positive or negative relationship between household food security and household size. These

results disagree with the prior expectations that the probability of a household being food secure decreases with an increase in household size. Moreover, the marital status does not have any relationship with food security in the study area.

Conclusion and Recommendation

Overall, the research shows that the marine fishing remains a popular livelihood activity in Batticaloa district. The present study confirmed that around half of the sampled marine fisheries households were in a moderate level of food security status in the study area. The implication of the results highlights that the probability of a food security of marine fisheries household in Batticaloa district of Sri Lanka depends on various factors such as Gender, Age of the household head, and Level of Education of the head of the households, Fishing Experience, Household Income and the Household Population in Employment. Introducing of alternative livelihood options has been the popular policy to uplift the income and socio-economic conditions. Home grading practice is another option to provide cheap, nutritional food requirement and food security, therefore, relevant donor agencies can organize training on diversified livelihood activities to increase the income of marine fisheries households in the study area.

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