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Dimension of household food security in Vidarbha region of Maharashtra, India

N. V. Kumbhare[1]*, B.S.Hansra[2], L. B. Kalantri[3], P. K. Jain[2] and R. N. Padaria[1]

[1]Division of Agricultural Extension, IARI, New Delhi-12, India.
[2]School of Agriculture, IGNOU, New Delhi, India.
[3]Sericulture, Government of Maharashtra, India.

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Household food security has attained significance due to mounting food crisis. Food, being one of the most basic needs for living, has become one of the most vital concerns for the world, as more and more people are living in poverty and hungry. The present study examines the dynamism of quality food availability, access and affordability by the rural households in two selected districts, that is, Bhandara and Chandrapur in Vidarbha region of Maharashtra, India. Two blocks each from Bhandara (Sakoli and Pauni) and Chandrapur (Bhadravati and Warora) districts were selected randomly. Furthermore, two villages from each block were selected randomly. Twenty-five (25) respondents were selected randomly from each of the sampled eight villages. Thus, a total of 200 respondents from two districts constituted the sample for the study. The study revealed that household food security status of the rural households was found low (59%) followed by very low (20%) and medium (16.50%) status of household food security. The overall household food security status was found low among below poverty line (BPL) household as compared to above poverty line (APL) households.

Key words: Household food security, food availability, food accessibility.

INTRODUCTION

Food, being one of the most basic needs for living, has become one of the most important concerns for the world, as more and more people are living in poverty and hungry. According to Gopichandran et al. (2010), food security has been a matter of concern in recent years due to the global food crisis and rising food prices. In spite of the highest priority accorded to hunger elimination among the UN Millennium Development Goals (UN-MDGs), the Food and Agricultural Organization (FAO) estimates that the number of people going to bed hungry is increasing. When UN-MDGs were adopted in 2000, about 820 million were estimated to be under-nourished. Now, it is over 1 billion (Swaminathan, 2010). According to Mohammadzadeh et al. (2010), food insecurity is related to household size, birth order, parental education level and occupation, and household economic status. Brinda (2003) observed that household food security remains to be a major concern around the globe with millions of adults and children suffering from malnourishment. Hoddinott and Yohannes (2002) suggested that household food security is an important measure of well-being.

In India, despite the presence of many public policies and social protection programmes to tackle household food insecurity, a large percentage of malnourished people exist. Food security has been a major developmental objective since the beginning of planning and it has achieved self-sufficiency in food grains in the 1970's

*Corresponding author. E-mail: n_kumbhare@yahoo.com. Tel: 91+11-25846434 (O). Fax: 91+11-25846434.

and has sustained it since then. After achieving self-sufficiency and even surplus production at the food front, the next major issue facing our country is the achievement of household food security. According to Srinivasan (2002), food security and poverty are directly related to each other. Chaturvedi (1997) measured food security with the help of three components, that is, availability, stability and access. Arene and Anyaeji (2010) found that about 60% of the households are food insecure, using expenditure method of estimating food security status. Mridula and Alex (2011) studied four important dimensions viz. production dimension, distribution dimension, nutrition dimension and socio-economic dimensions. Kulirani (2003) observed that food and nutritional security are subsets of livelihood security. According to Balgir (2008), the dietary patterns of people also affect the nutritional security of a community.

Below poverty line (BPL) is an economic benchmark and poverty threshold used by the government of India to indicate economic disadvantage and to identify individuals and households in need of government assistance and aid. In Bhandara district out of 1,198,810 population (2011), 1,16,000 households were under BPL, whereas in Chandrapur district out of 2,194,262 population (2011), 2,00,000 households were under BPL (source: http://mahaagri.gov.in).

In the recent years, there have been tremendous changes taking place in Indian agriculture and its socio-economic environment. The significant changes pertinent to Indian agriculture and its socio-economic environment are: degrading natural resource base, increasing fragmentation and marginalization of land holdings, increasing diversification and commercialization in agriculture, growing complexity of agricultural research, increasing demand of technical support, emphasis on spending on luxurious and comfortable life styles, widening ratio between food and non-food spending, declining social support system in villages, changing value system due to intensive media exposure particularly television in rural areas, rapid urbanization /industrialization affecting food and livelihood security, increasing tobacco and liquor consumption and increasing trends towards nuclear family. The need of household food security arises primarily due to the fluctuation in food production and rising food prices and changes in agricultural and socio-economic environment. Considering the above problems in mind, a study was conducted to investigate the dimension of household food security under changing agricultural and socio-economic environment in selected districts of Vidarbha region.

METHODOLOGY

The study was conducted in two selected districts, that is, Bhandara and Chandrapur in Vidarbha region of Maharashtra, India during 2011-2012. The Vidarbha region of Maharashtra has eleven districts, of which Bhandara (Latitude 21.17°N and Longitude 79.65°E) and Chandrapur (Latitude 19.30°N and 20.45°N and and Longitude 78.46°E) were selected to study the status of household food security. The district map of Maharashtra, India (Figure 1) shows that the Vidarbha region is known to be the most agrarian distressed regions in India where a majority of the farmers are dependent on agriculture. A preponderance of the rural households are facing the problems like poor irrigation facilities, poor economic base, low market price for agricultural produce, while the agriculture is dependent on vagaries of monsoon. Low agricultural production, less income source, indebtedness, high prices of food and non-food items and inadequate purchasing power among the rural poor are contributing to the problem of food insecurity. There have been more than 32,000 cases of farmers who committed suicides in Maharashtra in the last decade, of which 70% were reported from eleven districts of Vidarbha region (www.govtofmaha.gov.in).

BPL is an economic benchmark and poverty threshold used by the government of India to indicate economic disadvantage and to identify individuals and households in need of government assistance and aid. Planning Commission of India has defined poverty line on the basis of recommended nutritional requirements of 2400 calories per person per day for rural areas and 2100 calories per person per day for urban areas. Based on this, income criterion has been adopted in India to determine poverty line.

The expert group has actually lowered the calorie intake requirement from 2100 Kcal/day for urban areas and 2400 Kcal/day for rural areas to a single norm of 1800 Kcal/day. On calorie requirement, the Report says: "...the revised minimum calorie norm for India recommended by the FAO is currently around 1800 calories per capita per day, which is very close to the average calorie intake of those near the poverty line in urban areas (1776 calories per capita)" (Madhura, 2010). As per Planning Commission (2011), and Government of India (2009), an individual spending less than Rs. 32 per day in urban areas and less than Rs. 26 per day in rural areas on food, health and education are poor (BPL). About 9.4% populations in the study area are BPL.

For tackling the challenge to ensure food for all, currently the Government has been implementing some major social safety programmes like the Public Food Distribution System (PDS), the Integrated Child Development Services (ICDS), and 100 day-employment guarantee system under the Mahatma Gandhi National Rural Employment Guaranty Act (MNREGA), and Antodaya Anna Yojana (AAY). Apart from these four major flagship programmes, Government is implementing the Mid-day Meal Scheme for ensuring food security for the school children in particular.

Considering the above scenario, two blocks each from Bhandara (Sakoli and Pauni) and Chandrapur (Bhadravati and Warora) districts were selected randomly. Furthermore, two villages from each block were selected randomly. Twenty-five (25) respondents were selected randomly from each of the sampled eight villages. Thus, a total of 200 respondents from two districts constituted the sample for the study. Interview schedule based field survey was employed for data collection for seeking information on household food security under changing socio-economic environment.

Development of food security index

Household food security index (HHFSI) for rural household was calculated. Initially, it was decided to give specific weights (scale value) to each indicators of HHFSI based on their perceived significance. The normalized rank method suggested by Guilford (1954) was used for determining the scale value.

Baby (2005) used this method to compute the scale values for the components of livelihood security index. As per the method, four different indicators of HHFSI were ranked by a group of judges according to their perceived significance in determining the food security of the rural households. Ranking were obtained from 20

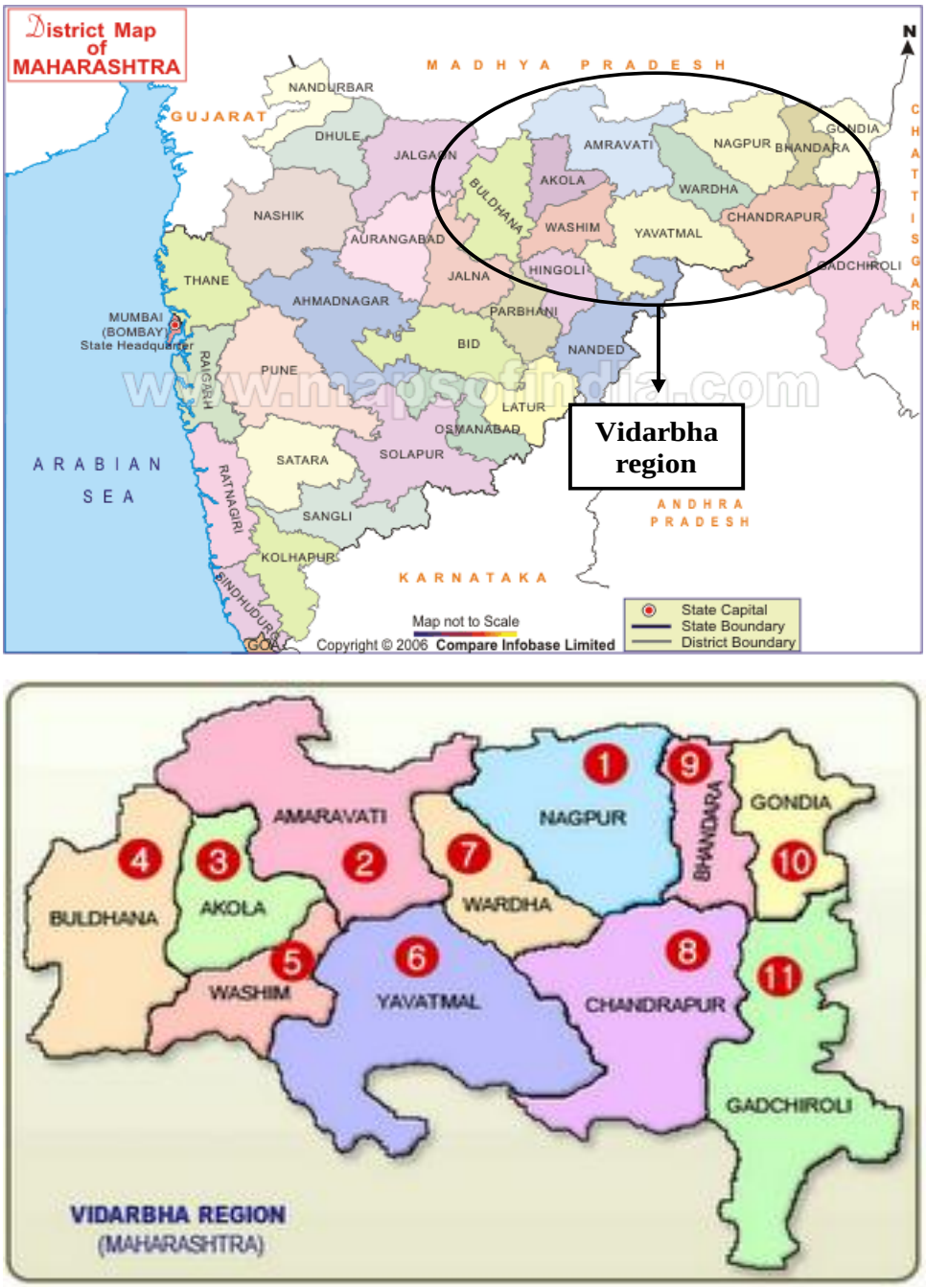

Figure 1. District map of Maharashtra, India.

judges who were experts in the fields of social science. The total score of each indicator were divided into 20 to obtain weighted score.

Computing the composite index of household food security

Each indicator of household food security consisted of different number of items and hence their range of scores was different. Therefore, the scores of all the four indicators were converted into unit score by using simple range and variance as given below.

$$Uij = \frac{Y_{ij} - Min\ y_i}{Max.yj - Min.y_j}$$

Where, U_{ij} = Unit score of the i^{th} indicator; Y_{ij} = Value of the i^{th} respondent on the j^{th} indicator; Max.yj = Maximum score on the j^{th} indicator; $Min.y_j$ = Minimum score on the j^{th} indicator.

The score of each indicator ranged from 0 to 1, that is, when y_{ij} is minimum, the score is 0 and when y_{ij} is maximum, the score is 1.

Table 1. Distribution of household according to their level of household food security.

S/N	Levels of household food security	Index score range	Status of Household Food Security					
			BPL (n = 46)		APL (n = 154)		Total (N = 200)	
			f	%	*f*	%	*f*	%
1	Very low	0.53 - 0.59	28	60.87	12	7.80	40	20.00
2	Low	0.60 - 0.66	16	34.78	102	66.22	118	59.00
3	Medium	0.67 - 0.73	2	4.35	31	20.13	33	16.50
4	High	0.74 - 0.80	00	00	5	3.25	5	2.50
5	Very high	0.81 - 0.87	00	00	4	2.60	4	2.00

The unit scores of each respondent were multiplied by respective indicator scale values and summed up. The scores thus obtained were divided by the total scale value and multiplied by 100 to get the HHFSI for each respondent.

$$HHFSI_i = \frac{\sum U_{ij}.S_j}{\sum S_j} \times 100$$

Where, $HHFSI_i$ = Household Food Security Index of i^{th} respondent; U_{ij} = Unit score of the i^{th} respondent on j^{th} indicator; S_j = Scale vale of the j^{th} indicator. In this way, mean HHFSI for the rural household was calculated. Reliability of the index was tested using 'R^2' value 0.710 which was found to be highly significant.

The status of household food security of rural households was calculated based on the total index score of all the four indicators, that is, food availability, food accessibility, food quality and food affordability. The classification of respondents into the categories of very low, low, medium, high and very high food security was based on the range of total food security index scores. Similarly, the extent of food availability, food accessibility, food quality and food affordability of rural household was calculated based on the respective index scores.

RESULTS AND DISCUSSION

The summary of significant findings of the study is presented below:

Status of household food security

The status of household food security of rural household was analyze based on the total index score of all the four indicators, that is, food availability, food accessibility, food quality and food affordability. The relevant findings are given in Table 1.

The household food security status of respondents depicted in Table 1 revealed that a majority of the BPL household (60.87%) had very low level of food security followed by low (34.78%) and medium (4.35%) level of food security, respectively. In case of above poverty line (APL) household, a majority (66.22%) had low level of food security followed by medium (20.13%) and very low (7.80%) level of household food security, respectively. In general, the overall household food security status of the respondents found that 59% had low household food security followed by very low (20%) and medium (16.50%) condition of food security, respectively. The low food security (LFS) status of the rural household may be due to small and marginal land holding, low agricultural production caused by changes in agricultural environment, lack of involvement of rural households in subsidiary occupation and changes in socio-economic environment because of rising food prices**.** It is also clear from Table 1 that, the overall household food security status is low among BPL household as compared to APL households which could be due to**,** a majority of the BPL households that were marginal land holders. According to Rukhsana (2011), food security is positively correlated to food availability, stability and accessibility. Similar findings have been stated by Rahim et al. (2011). Study conducted by Dast et al. (2006) found that the prevalence of food insecurity was 36.3%. Food insecurity increased with family size and declined with income, education and job status of the head of the family ($p<0.01$). Rahim et al. (2011) indicated that household food insecurity was prevalent in the northwest of Iran of food insecure households 970 (39.7%) had LFS and 488 (20%) households had very LFS (VLFS). According to Adekoya (2009), it is necessary to include food availability, affordability and accessibility as factors underpinning food security.

Extent of food availability

The extent of food availability was calculated based on the food availability index score and the data is depicted in Table 2.

It is observed from the data in Table 2 that a majority of the BPL household about 48% had medium level of food availability followed by low (21.7%) and very low (13%) status of food availability. In case of APL household, majority (47.4%) had high food availability status followed by medium (29.2%) and very high (11.7%) status of food availability. The overall food availability position of the households found that 39% had high food availability followed by medium (33.5%) and low (11%) level of food availability, respectively. It is clear from Table 2 that food availability status is low among BPL households as compared to APL households. According to Chaturvedi (1997), availability of enough food for all can be attained

Table 2. Distribution of household according to their extent of food availability.

S/N	Level of food availability	Index score range	Extent of food availability					
			BPL (n = 46)		APL (n = 154)		Total (N = 200)	
			f	%	*f*	%	*f*	%
1	Very low	0.53 - 0.60	6	13.0	6	3.9	12	6.0
2	Low	0.61 - 0.68	10	21.7	12	7.8	22	11.0
3	Medium	0.69 - 0.76	22	47.9	45	29.2	67	33.5
4	High	0.77 - 0.84	5	10.9	73	47.4	78	39.0
5	Very high	0.85 - 0.92	3	6.5	18	11.7	21	10.5

Table 3. Distribution of Household according to their extent of food accessibility.

S/N	Level of food accessibility	Index score range	Extent of food accessibility					
			BPL (n = 46)		APL (n = 154)		Total (N = 200)	
			f	%	*f*	%	*f*	%
1	Very low	0.43 - 0.49	19	41.2	35	22.7	54	27.0
2	Low	0.50 - 0.56	9	19.6	39	25.3	48	24.0
3	Medium	0.57 - 0.63	6	13.0	67	43.5	73	36.5
4	High	0.64 - 0.70	1	2.1	5	3.3	6	3.0
5	Very high	0.71 - 0.77	1	2.1	8	5.2	9	4.5

through efficient domestic production. Lynn et al. (1995) highlighted that people's participation at local level is pre-requisite for improving food production and sustaining access to food. For adequate nutritional improvement programmes and projects, the importance of the informal sectors in processing and distribution of food should be recognized. Similar findings were reported by Chakravarty and Dand (2006).

Extent of food accessibility

The data related to the extent of food accessibility by the rural people at household level is given in Table 3. It is observed from the data in Table 3 that a majority of the BPL household (41.2%) had very low food accessibility followed by low (19.6%) and medium (13%) food accessibility at household level. In case of APL households, a majority (43.5%) had medium food accessibility followed by low (25.3%) and very low (22.7%) status of food accessibility. Overall data show that 36.5% had medium level of food accessibility followed by very low (27%) and low (24%), respectively. It is also evident from Table 3 that food accessibility condition is low among BPL household as compared to APL households. Food accessibility has been found to be positively correlated with purchasing power (Chaturvedi, 1997). Similar findings were reported by Beaumier and Ford (2010).

Extent of food quality

The data related to the extent of food quality, that is, the intake of quality food by the respondents at household level is given in Table 4.

It is observed from the data in Table 4 that a majority of the BPL household (54.3%) were found in a very low quality food consumption category followed by low (41.4%) and medium (4.3%) quality food consumption category, respectively. However, a majority (68.8%) of APL household were found in low quality food consumption category followed by medium (16.3%) and very low (10.4%) quality food consumption category. Overall, 62.5% had low quality food consumption followed by very low (20.5%) and medium (13.5%). This could be due to low purchasing power and high cost of food item as intake of quality food is significantly correlated with annual income (purchasing power) of the households. Therefore, the rural households need to focus on subsidiary occupations like dairy, poultry etc. besides farming to get multiple sources of income. According to Adekoya (2009), access to quality food was not the problem but rather affordability, and this limited most people to consuming lower quality food items.

Extent of food affordability

The data related to the extent of food affordability of rural household is depicted in Table 5. It is noticed from the data in Table 5 that a majority of the BPL household (76.1%) were in a very low food affordability category followed by about 11% each in the category of high and very high food affordability category, respectively. Interestingly, a majority of the APL households (70.7%) were also found in very low food affordability category.

Table 4. Distribution of household according to their food quality.

S/N	Level of food quality	Index score range	Extent of food quality					
			BPL (n = 46)		APL (n = 154)		Total (N = 200)	
			f	%	*f*	%	*f*	%
1	Very low	0.50 - 0.60	25	54.3	16	10.4	41	20.5
2	Low	0.61 - 0.70	19	41.4	106	68.8	125	62.5
3	Medium	0.71 - 0.80	2	4.3	25	16.3	27	13.5
4	High	0.81 - 0.90	00	00	1	0.6	1	0.5
5	Very high	0.91 - 1.0	00	00	6	3.9	6	3.0

Table 5. Distribution of Household according to their extent of food affordability.

S/N	Level of food affordability	Index score range	Extent of food affordability					
			BPL (n = 46)		APL (n = 154)		Total (N = 200)	
			f	%	*f*	%	*f*	%
1	Very low	0.50 - 0.55	35	76.1	109	70.7	144	72.0
2	Low	0.56 - 0.61	1	2.1	13	8.5	14	7.0
3	Medium	0.62 - 0.67	00	00	00	00	00	00
4	High	0.68 - 0.73	5	10.9	19	12.3	24	12.0
5	Very high	0.74 - 0.80	5	10.9	13	8.5	18	9.0

Therefore, it is clear from Table 5 that a majority (72%) of the total rural household had very low food affordability condition, which might be due to low purchasing power and high cost of food items. It means good quality food is not affordable to most of the rural households. Similar findings were stated by Oni et al. (2010). Here, extension interventions are required to promote entrepreneurship among the rural households, so that they earn money from multiple sources to enhance their purchasing power. The government should support the rural households in the form of subsidies on important basic necessary items as household food security is an important measure of well-being suggested by Hoddinott and Yohannes (2002).

Factors associated with food security

Logistic regression analysis was employed to identify the factors associated with food security. The regression results of Logit model are given in Table 6, which shows the coefficients (B), their standard errors, the Wald chi-square statistics, odd ratio [Exp (B) and associated p-values]. The significant chi-square value and Nagelkerke R^2 value (0.710) show that the overall fit of the model was better.

The positively significant coefficients of exploratory variables indicated their positive influence on household food security and poverty status of the rural households. As expected, the variables such as size of land holding, annual income, social participation, adoption of modern agricultural technology, food availability ($p<0.05$) and food quality had positive and significant ($p<0.01$) influence on food security of the rural households. Annual income and food security were found to have highly significant ($p<0.01$) influence on food security. Similar findings were reported by Safia et al. (2010).

In contrary to the prior expectation, variables like age, education, value orientation, economic motivation, rationality in decision making, level of aspiration, change proneness, mass media exposure, extension agency contact, availability of resources, market orientation, food accessibility and food affordability were not having significant influence on poverty and food security status of the rural household. It suggests that emphasis has to be laid upon promotion of modern technologies for higher productivity and income.

Conclusion

The study examined the dynamism of quality food availability, access and affordability by the rural households. The study revealed that majority of the BPL household (60.87%) had very low level of food security status followed by low (34.78%) and medium (4.35%) level of food security, respectively. In case of APL household, majority (66.22%) had low level of food security followed by medium (20.13%) and very low (7.80%) level of household food security, respectively. Overall household food security status of the respondents in Bhandara and Chandrapur district of Vidarbha was found for about 59% followed by very low (20%) and medium (16.50%) status of food security. The overall household food security status was found low among

Table 6. Result of Logistic regression model.

S/N	Characteristics	'B' Value	S.E.	Wald	DF	Exp(B)	Significance P-value
1	Constant	11.873	15.470	0.589	1	143384.0	0.443
2	Awareness	-705	0.780	0.817	1	0.494	0.366
3	Age	-0.21	0.030	0.478	1	0.980	0.489
4	Education	0.184	0.184	1.002	1	1.202	0.317
5	Size of landholding	0.012	0.108	0.012	1	1.012	0.037*
6	Annual Income	0.000	0.000	8.491	1	1.000	0.004**
7	Social participation	1.253	0.522	5.769	1	3.500	0.016*
8	Value Orientation	-0.689	3.874	0.032	1	0.502	0.859
9	Adoption of modern agricultural technology	-63.424	32.584	3.789	1	0.000	0.050*
10	Economic motivation	-3.064	2.869	1.140	1	0.047	0.286
11	Rationality in decision making	-4.229	2.732	2.396	1	0.015	0.122
12	Level of aspiration	-2.506	2.364	1.124	1	0.082	0.289
13	Change proneness	-3.894	6.090	0.409	1	0.020	0.523
14	Mass media exposure	-1.839	1.889	0.948	1	0.159	0.330
15	Extension contact	1.448	0.935	2.397	1	4.254	0.122
16	Availability of resources	0.000	0.000	0.067	1	1.000	0.796
17	Market orientation	-1.208	1.744	0.480	1	0.299	0.488
18	Food availability	10.973	4.466	6.037	1	58260.852	0.014*
19	Food accessibility	0.464	4.888	0.009	1	1.590	0.924
20	Food quality	28.332	7.235	15.333	1	2.000	0.000**
21	Food affordability	1.798	3.002	0.359	1	6.036	0.549

Chi square = 126.425 (P<0.0001); -2Loglikelihood=89.286; R^2 = 0.710 (Negelkerke); Level of significance: ** (P<0.01); * (P<0.05).

BPL household as compared to APL households. Also, the food availability, food accessibility, food quality and food affordability status was found low in BPL household as compared to APL households. The variables like annual income, food quality, adoption of modern technology, social participation positively and significantly influenced household food security.

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