Scholars Journal of Arts, Humanities and Social Sciences **ISSN 2347-5374 (Online)**
Sch. J. Arts Humanit. Soc. Sci. 2017; 5(11B):1622-1634 **ISSN 2347-9493 (Print)**

(An International Publisher for Academic and Scientific Resources)

Role of Social Security Measure in Enhancing Food Security- An Empirical Evidence from Bankura

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Article History
Received: 24.10.2017
Accepted: 13.11.2017
Published: 30.11.2017

DOI:
10.36347/sjahss.2017.v05i11.012

Abstract: As depicted by FAO (2002), food security is interpreted 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'. Poverty is the root cause of food insecurity of a country in a normal period of time with a stable economic situation. Social security measures are can be expected to eliminate the poverty from the society through subsidies food assistance and the financial assistance to the financially excluded section of the community. It is likely to improve the food security status of the deprived people. In our study, 'food secure households' are households' with access to required calorie from the consumption of cereals, pulses, vegetables and flesh food items at the household level. The required calorie obtain from the consumption must be at least equal to or greater than what is required at household level medically (Harris- Benedict, 1918). With this end in view, we have collected data from various households residing in rural and urban areas of Bankura in the district of West Bengal. Our objective in this paper is to look into the impact of different socio-economic-demographic factors along with various social security measures on food security through enhancing consumption expenditure. This empirical study shows that with the access to social security measures the households do have food security in the form of consumption expenditure in the District of Bankura of West Bengal.
Keywords: Food Security, Calorie, Empirical, Household, Social Security.

INTRODUCTION

Defining food insecurity is a controversial issue as FAO [1] defined undernourishment as to the proportion of the population whose dietary energy consumption is less than a pre-defined threshold. This threshold is country specific and is evaluated in terms of the number of kilocalories required to conduct sedentary or light activities.

This definition is again refined in The State of Food Insecurity 2001. 'Food security is 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 [2]. Food security status can be measured from four directions; food availability, food accessibility, food utilization and stability.

Food availability is achieved when sufficient quantities of food are consistently available to all people within a country. It is a function of the combination of domestic food stocks, commercial food imports, food aid and domestic food production.

Food access is secured when all individuals within a household or outside have adequate resources to obtain appropriate foods for a nutritious diet. Food access is defined by the aggregate availability of food, supplied through market at market prices that one can obtain with his available resources at hand. Further the access is determined by the ability of households to get food from their own production and stocks, from the market and from the other sources. Food access is also a function of the physical, societal and policy environment.

Food utilization in its best outcome requires a diet providing sufficient energy and essential nutrients with potable water and adequate sanitation. Food utilization reflected through the nutritional condition of an individual is determined by the quantity and quality of dietary intake, general child care and feeding practices along with health status

and its causal factors. Poor infant care, inadequate access and inadequate character of health inspection and repairs are also major determinants of poor health and nutrition.

Stability implies anticipation against vulnerability. Families/countries may have sufficient food to feed its all members at present but in future for any sudden shock it may suffer from food deficiencies. So, stability means smooth consumption along with future coping strategy.

India has achieved self-sufficiency in food production after the green revolution. In respect of food insecurity prevailing in Indian economy availability is no longer the major cause. The problem lies in accessibility of food. Due to massive unemployment and low income among the population they have lower purchasing power that leads to lower availability of consumable calorie. As a result a portion of population in India is still suffering from calorie deficiencies.

Though, the government of India has taken various initiatives to increase the accessibility of food among its hunger population. Among them the prime two initiatives are NREGA and TPDS.

In this study we are trying to look into the role of social security measures like NREGA, TPDS along with microfinance and all other economic and social variables to enhance consumption expenditure to reduce calorie deprivation or enhance food security situation within the family in Bankura, a district of West Bengal in India.

Now, let us discuss some previous studies related to food security. USAID [3] drew lessons, learned from successful efforts in Asia and Latin America to help poor people move from hunger and malnutrition to sustainable development. This paper provides an overview of food security in the world and identifies measures available to reduce hunger and malnutrition. According to its experience, food aid is most effective when used in conjunction with complementary programs that is the recipient country itself must ensure that policies are in place which support economic growth and sustained development. In its view hunger results from lack of broad-based economic growth, environmental degradation and lack of access to family planning services. South Asia and Sub-Saharan Africa are the regions of most affected from food insecurity and it was predicted that the cereal food gap will be 255 million tons by the year 2025 in Asia alone. The causes of food insecurity over the world are chronic poverty, low agricultural productivity, high rate of population growth, civil conflict, poor infrastructure, ecological constraints, inappropriate economic policies, limited arable land and even cultural practices developed over many years.

Bobbie Von Haeften [4] argued that poverty is the main cause of food insecurity in Peru. He collected the data from the field survey of Peru and after analyzing the fact observed that 20% of the Peruvian populations are in extreme poverty. It means that they do not have sufficient income to purchase a nutritionally adequate diet. Keeping this point in mind the USAID program Title-II has devoted its resources towards poverty dominated areas in Peru particularly in Lima. Another major problem in Peru was malnutrition among young children. According to the survey report, 55% of children under five were chronically malnourished in the highlands of the Andes in Peru. For removing food insecurity in Peru, the Title-II has adopted some measures of food aid policy as more of the resources are to be going into the targeted populations for improving household nutrition and agricultural productivity and also it has other strategic objectives of increasing access through income among poor and improved health for high risk populations.

Godfrey B. A. Bahiigwa [5] studied on household food security in Uganda. The objective of his study was to determine the food security status of rural households during the period July 1997-June 1998 and to identify the main determinants of household food security. For his purpose he had collected data from 14 districts, selected from the four geographical regions, in the country. The survey was conducted during March-June 1998, but households were asked about their food security status during two agricultural seasons: July-December 1997 and January-June 1998. After analyzing the data, they have observed that during the first period (July-December 1997), 48 percent of households in Uganda were food secure and 52% food insecure. During the second period, (January-June 1998), 59 percent of households in Uganda were food secure, while 41 percent did not have enough food to feed themselves. He reached in conclusion that food security varies from one season to the next, depending mainly on the weather pattern and also varies across regions, agro-ecological zones and districts. And the three main causes of household food insecurity in both periods were inadequate rainfall, pests and diseases, and excessive rain. To ensure household food security, he suggests three main roles of the local government that is providing information through extension and seminars, improving access to credit, and supply of improved seed.

Ramesh Chand [6] analyzed the impact of trade and other reforms followed by India since 1991 on growth rate of agricultural output, food security, nutrition, regional equity, price stability, farm income, welfare of consumers and producers as affected by changes in prices brought about by reforms. After analyzing macro data empirically he pointed

out that agriculture sector witnessed sharp improvement in terms of trade during initial years of reforms. In the post WTO period though TOT remained favorable compared to the period before reforms but there is decline in them. Growth rate in GDP of agriculture sector remain same during the pre-reform decade and post reform period. There is modest increase in per capita income of farm and labour households during reforms, contributed more by non-farm incomes than farm incomes. There is also significant reduction in poverty. However, household food security and nutrition have worsened during reforms, because of high growth in prices of cereals due to government policy to give substantial hikes to cereal prices during reforms.

Gerard J. Gill, John Farrington, Edward Anderson, Cecilia Luttrell, Tim Conway, N.C. Saxena and Rachel Slater [7] made an overview of food security issues in relation to the Millennium Development Goals (MDGs) in seven Asian countries (Bangladesh, India, Nepal, China, Indonesia, Cambodia and Vietnam). According to the FAO [8], India alone has more undernourished people than the whole of Africa, with more than 20% of the population undernourished. It was estimated that in Bangladesh, India and Pakistan the percentage of GDP lost to anemia in 2001 was 1.8%, 1.3% and 0.8% respectively. After the combined analysis of causes and preferences of food insecurity in Asian countries, they have provided separate case studies for each of these seven countries.

Bangladesh [7] by nature it has extreme population density and high vulnerability to climatic shocks. Apart from this, it achieved self-sufficiency in cereal production in 1999/2000. A real cereal price has fallen and consumption has increases. In Bangladesh, around half of its population lives below the upper poverty line (2,122kcal/day) and a third below the lower poverty line (1,805kcal/day) so, under nutrition indicators are remain alarmingly high, and the rich-poor gap is growing. Food policies traditionally merely benefited the well-off.

Cambodia [7] has a favorable land-person ratio and large forestry and fishery resources but, much of the country's rich resource base (forest, fisheries, and land) has been assigned to large commercial concessions from which the poor have been excluded and the resources greedily exploited. Despite population increase, food production in the early 1990s was less than it had been in the late 1960s. There was wide variability in per capita production across the 24 provinces, very inadequate transport links and an array of illegal 'taxes 'on movement in Cambodia. There was no government system of food procurement to stabilize prices, and no public distribution to address food access problems.

China [7] has achieved impressive progress in recent decades towards the MDG on Hunger; it has also made strong progress towards other MDGs particularly that of halving the proportion of people living below the World Bank's $1-a-day poverty line. China's success is attributable to a large rise in domestic food production, driven by investments in irrigation and land reclamation, the development of high-yielding seed varieties and improved farming practices, and the improvement in farmers' production incentives. But, poorer households in remote, interior, regions, where opportunities for insuring against yield fluctuations are weak; former employees of state-owned enterprises which have closed following market liberalization, and recent migrants from rural to urban areas, who face limited entitlements to state social protection are still suffering from food insecurity.

India [7] since Independence has focused on reaching self-sufficiency in domestic food production that resulted in unacceptably high levels of food stock in recent years. Here hunger tends to be chronic rather than acute, with 233 million (1998–2000) undernourished in calorific and micronutrient terms with particular problems among women, adolescent girls and under-fives. Undernourishment is severe among Scheduled Castes and in those rural areas weakly integrated into markets, and has marked seasonal patterns. In India there has been substantial additional scope to place new issues on the policy agenda, including a switch of funds from some currently expensive and inefficient schemes towards direct cash transfers for clearly identifiable vulnerable groups, including the elderly, widows, single mothers and the disabled.

Indonesia [7] has reached strong economic growth between the 1960s and mid-1990s. But still concerns remain about the prevalence of under-nutrition among poorer and marginal groups, particularly rural children, and about the large number of people just above the poverty line. Rapid urbanization has had varying, and sometimes contradictory, effects on household food security.

Nepal [7] has grown both absolutely and relatively, from 33% in 1977 to 42% in 1995/6. Poor communications and low purchasing power are major constraints in the hills and mountains. The principal groups of poor and food insecure people are subsistence farmers, the low caste, tribal communities, girls and female-headed households.

Vietnam [7] has reduced Poverty levels significantly during the 1990s coinciding with rapid economic growth. The country has vastly improved its competitiveness in the agricultural and agro-industry sectors and its participation in

regional and world trade, and it is now the world's second largest rice exporter. But, mountainous areas with large ethnic minorities face the biggest problems in overcoming food insecurity. There are still 16 million undernourished people in Vietnam.

Jean-Marc Boussard, Benoit Daviron, Françoise Gérard, Tancrède Voituriez [9] discussed on the causes and consequences of the food insecurity situation prevailing throughout the region of Sub Saharan Africa. They have noted ten facts about African food insecurity and these are: 1) Malnutrition, in its various forms, appears primarily as a chronic widespread condition in Africa; 2) Food crisis, jeopardizing household livelihood and it superimposes on chronic food insecurity for a high share of households, 3) Food availability is uneven across countries, 4) Chronic food insecure households are widespread and scattered across regions, 5) despite inadequate level of calorie intake among a large share of population, imports are too low, 6) Most countries are dependent on climate conditions for food production, 7) Foreign supply share in total availability is not a determinant of food security countries performance, 8) there is a correlation between chronic food insecurity and widespread poverty, 9) food insecurity problem is basically related to access, 10) Household vulnerability is dependent on income sources. After that they have analyzed the food aid impact on food production both in adverse and favorable cases. According to them, the adverse effects of food aid are: it lowers local food prices to the detriment of farmers, many shift preferences for imported foods, labour market discouragement, act as disincentive for recipient governments and farmers to care for agriculture, hazardous effects of free insurance. Food aid has favorable effects also and these are: it is stimulus to demand for complementary foods, income effects on demand when food aid well targeted, Food-For-Work public goods and private inputs can help productivity and markets, alleviate binding (temporary/seasonal) liquidity constraints, Smoothens income variations and reduces costly risk mitigation.

The rest of the paper has been arranged as follows. Section 2 analyzes our methodology and database. Empirical findings are reported in section 3. Section 4 concludes these papers along with recommendations from our findings.

METHODOLOGY

Food security has been measured by calorie intake of any individual. Measuring availability of calorie in various food items is one of the most controversial jobs. Availability of calorie in different food items varies due to washing, cutting and processing. And also there is a gradation of different food items that have been purchased by different income groups. Here, in this paper to obtain calories present in different food items we have followed the table of food nutrition value of B.Srilakshmi [10]. The nutritional value of different food items may change to some extent due to gradation of different food items and due to not following the proper cooking procedure; but all these effects may be thought to be negligible. So, we have calculated the presence of calorie only in raw food items of monthly purchased food basket.

Our monthly available calories of the households are being estimated following Harris-Benedict measure [11]. To express it into daily households' available calorie we have divided the value estimated from the following expression by 30 days.

$$\text{Monthly Available Calorie} = \text{Cereals} \times 10 \times 345.5 + \text{Pulses} \times 10 \times 335 + \text{Mustard seeds} \times 10 \times 541 + \text{Sugar} \times 10 \times 398$$
$$+ \text{Fish} \times 10 \times 104 + \text{Chicken} \times 10 \times 239 + \text{Mutton} \times 10 \times 194 + \text{Vegetables} \times 10 \times 203$$

Our next tusk is to obtain the actual calorie requirement at the household level. Actual calorie requirement for each individual, male or female, has been obtained on the basis of formula proposed by Harris-Benedict [11]. Hence, as the calorie requirement for each member of the family is obtained, we sum up them to get family level calorie requirement per day. The proposed Harris-Benedict [11] equations for estimating calories are as follows.

For Men

$$\text{REE/BMR} = 66.5 + 13.75(\text{Weight}) + 5(\text{Height}) - 6.78(\text{Age})$$

And for Women

$$\text{REE/BMR} = 655.0955 + 9.5634(\text{Weight}) + 1.8496(\text{Height}) - 4.6756(\text{Age})$$

Where, weight has been measured in kilogram, height has been measured in centimeter and age has been measured in number of years. One should note that REE stands for Resting Energy Expenditure and BMR for Basal Metabolic Rate.

Given the standard calorie requirement and actual calorie consumption, we can confirm the number of families with having calorie deprivation/calorie surplus or in proxy term we can say food insecure/secure families. That is, the families with the ratio of actual calorie consumed/availability to the calorie requirement of the families are greater than equals to 100 are said to be food secure, otherwise insecure. Therefore, we categorize the families into two groups – one food secure and the other food insecure. Therefore, food security is the dummy variable that takes the value either 1 or 0. Thus, the dummy variable will take the value 1 if the families have the food security, otherwise 0.

After determining the food security status among the families whether a family is food secure or insecure according to our criteria, we go for analyzing the various factors which may influence the consumption expenditure/ the proxy of food security status of the family.

In our study we want to explain the consumption expenditure of the households on various food items. As calorie requirement from the context of households is almost fixed, since, the height, weight and physical activities of an adult person remain same for the time being. So, the actual deficiency in calorie availability to requirement occurred due to low purchasing power of the households. In that sense, to secure households in terms of food we need to check their consumption expenditure.

That may reflect the food insecurity situation of our study area. Now, let us try to explain the households' consumption expenditure. The explanatory variables includes the income of the households, the demographic variables like size of the family, the socio economic variables like education, religion and caste the basic amenities of the households like ownership of the house, having job card, ration card and access to microcredit facilities. In fact, we have tried to incorporate explanatory variables which are likely to make an impact on household consumption expenditure. Logarithmic functional form may be used. By using double log specification one can obtain direct estimates of elasticity's in addition; it allows us to interpret results in proportional changes.

Food security is likely to be affected by a set of socio-economic-demographic factors. Economic factor includes the income of the family. Apart from income, we have emphasized mostly on the demographic factors like female-male ratio, family size and dependency ratio. The sociological factors of food security are years of education of the household head, religion and caste. Here also we have considered various basic amenities including microcredit facilities, ownership of the house and having job card and ration card.

Therefore full logarithmic model of this study may be specified as follows

$$\ln CONSEXP = \beta_o + \beta_1 lnFAMINC + \beta_2 FAMSIZE + \beta_3 RELIGIONDUMMY + \beta_4 CASTEDUMMY$$

$$+\beta_5 HOWNER + \beta_6 JOBCARDDUMMY + \beta_7 RATIONCARDDUMMY + \beta_8 AMICROCREDIT + u$$

Where,

$FAMINC$ = Family income measured in Rupees

$FAMSIZE$ = Numbers of family members

$RELIGION = 1$, if Hindu

$= 0$, otherwise

$CASTE = 1$, if General

$= 0$, otherwise

$HOWNER = 1$, if Owned by households

$=0$, otherwise

$JOBCARD = 1$, if Enrolled in NREGA

$=0$, otherwise

$RATIONCARD = 1$, if yes

$=0$, otherwise

$AMICROCREDIT = 1$, if Member in any Microfinance Institutions

=0, otherwise

CONSEXP = Consumption Expenditure measured in rupees

The hypotheses we want to test are presented below:

Hypothsis_1: Family income is likely to increase the consumption expenditure. That is, we want to test the null hypothesis $H_0 : \beta_1 = 0$ against the alternative $H_1 : \beta_1 > 0.$

Hypothsis_2: There is a positive relationship between female-male ratio and food security. That is, our null hypothesis is $H_0 : \beta_2 = 0$ to be tested against the alternative $H_1 : \beta_2 > 0.$

Hypothsis_3: People from Hindu community may be in a better situation to have higher consumption expenditure. That is, we want to test the null hypothesis $H_0 : \beta_6 = 0$ against the alternative $H_1 : \beta_6 > 0.$

Hypothsis_4: General caste families are able to spend more on Food. That is, we want to test the null hypothesis $H_0 : \beta_7 = 0$ against the alternative $H_1 : \beta_7 > 0.$

Hypothsis_5: Families having own house are expected to consume more food. That is, we want to test the null hypothesis $H_0 : \beta_8 = 0$ against the alternative $H_1 : \beta_8 > 0.$

Hypothsis_6: Job card holding families are likely to have higher purchasing power. That is, we want to test the null hypothesis $H_0 : \beta_9 = 0$ against the alternative $H_1 : \beta_9 > 0.$

Hypothsis_7: Families holding Ration card are expected to have better consumption of food. That is, we want to test the null hypothesis $H_0 : \beta_{10} = 0$ against the alternative $H_1 : \beta_{10} > 0.$

Hypothsis_8: Access to micro credit to the families is likely to increase food consumption. That is, we want to test the null hypothesis $H_0 : \beta_{11} = 0$ against the alternative $H_1 : \beta_{11} > 0.$

For our purpose, we have collected data from the various places of Bankura in West Bengal, India. After selecting Bankura as our study area, we have purposively selected four Blocks. Among these four Blocks two are from the Panchayat areas (Onda and Raipur) and other two from the Municipalities (Bankura-1 and Bishnupur). From these four Blocks we have further purposively selected 8-10 villages/wards from each Block. And from each village/ward we have selected 8-10 families randomly and collected data on their Demographic, Economic, Social, Family and Personal information through direct interviewing method. We have collected two sorts of data, one on the household's monthly total purchase of various foods items and the other on the anthropometric information.

Table-1: Summary Statistics of Quantitative Variables from the District of Bankura

```
. summarize HHCA FAMINC CONSEXP FEMLR FAMSIZE DPDNCR EDUCATION

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
        HHCA |        303    8314.647    2425.123   2635.083      18237
      FAMINC |        303    6823.023    4605.565       1875    42855.8
     CONSEXP |        303    4572.868    2226.571        225      12100
       FEMLR |        303    1.066517    .8537585        .25          5
     FAMSIZE |        303    4.485149    1.411499          2         11
-------------+---------------------------------------------------------
      DPDNCR |        303     .649037    .1367309        .25   .8571429
   EDUCATION |        303    1.943894    1.016497          1          5
```

Table-2: Summary Statistics of Qualitative Variables from the District of Bankura

```
. summarize CADEPRE RELIGION CASTE HOWNER JOBCARD RATIONCARD AMICROCREDIT

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     CADEPRE |        303    .4917492    .5007589         0          1
    RELIGION |        303    .8778878     .327957         0          1
       CASTE |        303     .30033    .4591598         0          1
      HOWNER |        303    .6270627    .4843856         0          1
     JOBCARD |        303    .3366337    .4733401         0          1
-------------+---------------------------------------------------------
  RATIONCARD |        303    .7062706    .4562229         0          1
AMICROCREDIT |        303    .4323432    .4962209         0          1
```

Table-2: shows the summary statistics of our categorical variable. In our study area 49% of the populations are suffering from calorie deprivation whereas 51% of the populations are found as food secure according to our norm. Our study area is Hindu dominating area; almost 88% of populations are reported as Hindu community. Only 30% of the populations are belongs to the general caste families and remaining 70% are from non-general categories. 63% households are living in their own house and rests are living on rented house. Having job card under the NREGA scheme is found to be as 34% of the population approximately. Households are entitled to subsidized food aid under TPDS or having ration card is 70%. And 43% of the populations having access to microcredit under various micro finance institutions.

Table-3: Economic Information on Monthly Income and Expenditure (Rs) at Household Level for the Bankura Sample

	Family Monthly Income (FAMINC)	Consumption Expenditure (CONSEXP)	Education Expenditure (EDNEXP)	Health Expenditure (HLTHEXP)	Non-Food Expenditure (NFDEXP)
Mean	6823.023	4572.868	431.353	629.373	793.399
Median	5664.100	4126.000	500.000	500.000	800.000
Maximum	42855.800	12100.000	3000.000	3000.000	5000.000
Minimum	1875.000	225.000	100.000	0.000	200.000
Std. Dev.	4605.565	2226.571	384.863	332.204	388.608
Skewness	2.740	0.727	2.010	1.928	4.664
Kurtosis	17.301	2.994	10.396	11.479	47.608
C.V	67.500	48.691	89.222	52.783	48.980
Jarque-Bera	2961.292	26.658	894.800	1095.464	26220.410
Probability	0.000	0.000	0.000	0.000	0.000
Observations	303	303	303	303	303

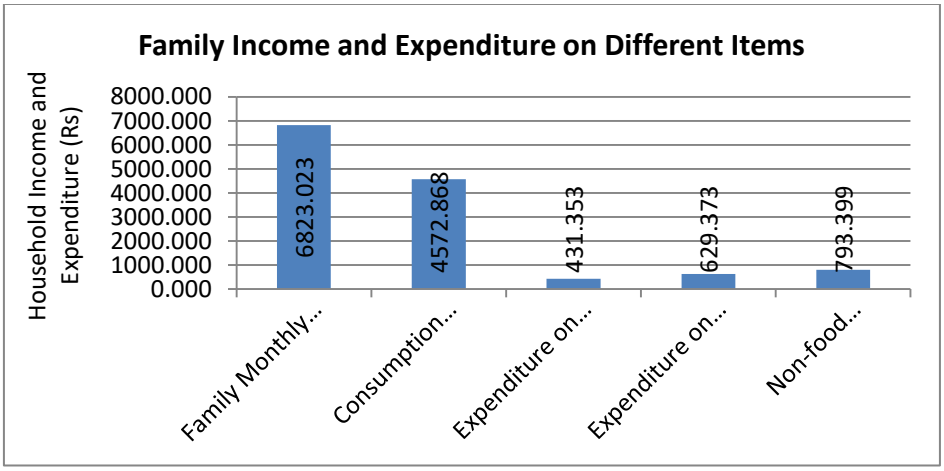

Chart-1

The table 3 and chart 1, show the monthly income and expenditure of the Bankura households. The average monthly income of the households is Rs-6823/- with the minimum and maximum monthly income Rs-1875/- and Rs-42856/- respectively. Here exists greater variation in monthly income of the families (C.V-67.50) than Burdwan and combined households. On expenditure part the monthly average expenditure on consumption, education for children, health and non-food items are Rs-4573/-, Rs-431/-, Rs-629/- and Rs-793/- respectively. Here also among these four categories of expenditure largest variability exists in expenditure on education (C.V-89.222) and lowest variability exists in consumption expenditure (C.V-48.691).

The table 4 and chart 2 is showing the societal status of the Bankura households. In Bankura there are total 303 households among them 266 households are reported themselves as Hindu and only 37 households are non-Hindu. In percentage term it is 87.79 and 12.21 percent respectively. And 91(30.03%) households have been reporting themselves as belonging to general categories and 212 (69.97%) as non-general categories.

Table-4: Socio Cultural Features of the households in the Bankura Sample

	Number of Households		%age
Religion	Hindu (=1)	266	87.79
	Others (=0)	37	12.21
	Total	303	100
Caste	General (=1)	91	30.03
	Others (=0)	212	69.97
	Total	303	100

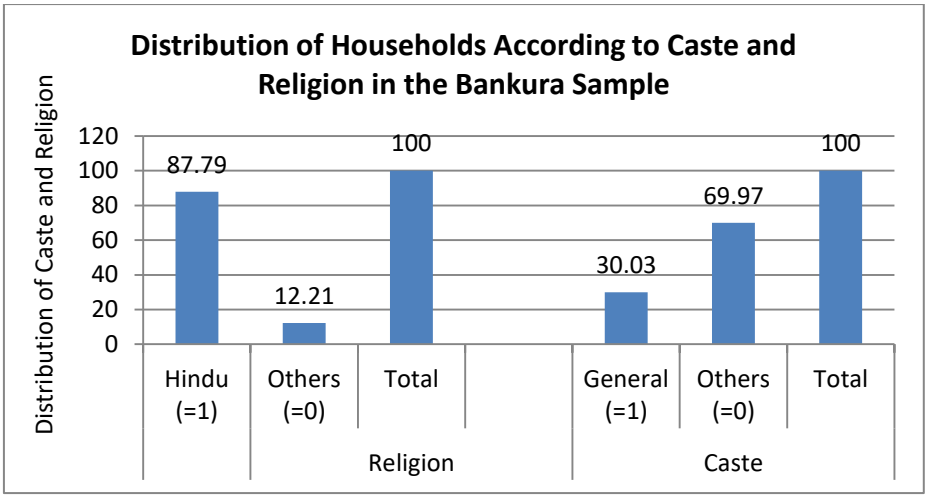

Chart-2

Table-5: Anthropometric Information on Height, Weight, BMR and Requirement of Calorie for moderate activities at Individual Level for the Bankura Sample

	WEIGHT	HEIGHT	BMR	CR
Mean	43.167	150.985	1218.200	1888.210
Median	49.853	160.947	1276.788	1979.021
Maximum	55.478	165.248	1463.341	2268.179
Minimum	6.074	61.096	466.948	723.769
Std. Dev.	12.834	21.057	175.837	272.547
Skewness	-1.194	-2.054	-1.366	-1.366
Kurtosis	3.071	6.508	4.797	4.797
C.V	29.731	13.946	14.434	14.434
Jarque-Bera	331.314	1695.134	620.891	620.891
Probability	0	0	0	0
Observations	1394	1394	1394	1394

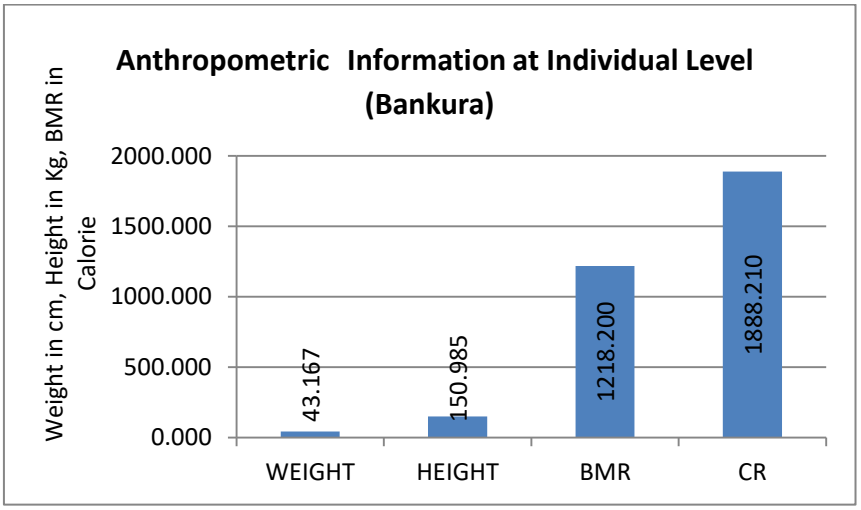

Chart-3

The table 5 and the chart 3, represent the anthropometric information based on total population of Bankura sample households. And here our sample size is 1394 individuals from 303 households. The mean height of this sample individuals are 43.17 cm and the average weight 151 kg. For the given average height and average weight they need roughly 1218 Kcal per day for maintaining their BMR. And they are ultimately needed 1888 Kcal for maintaining their daily moderate life style. Again, in Bankura there is comparatively zero variability among height, BMR and calorie requirement for moderate activities (as C.V=14 (approximately) in all 3 cases). And in weight there exist highest variability among the individual (C.V=29.73) ranging from 6 kg to 55.4 kg.

Table-6: Economic Information on Necessity and Availability of Calorie at Household Level for the Bankura Sample

	Household Calorie Requirement (HHCR)	Household Calorie Availability (HHCA)	Households Calorie Availability in percentage of Required Calorie (HHCARC)
Mean	8557.650	8314.647	98.711
Median	8132.287	8109.833	99.406
Maximum	20585.440	18237.000	152.871
Minimum	1831.198	2635.083	59.459
Std. Dev.	2496.558	2425.123	17.151
Skewness	0.967	0.879	0.062
Kurtosis	5.292	4.573	2.597
C.V	29.173	29.167	17.375
Jarque-Bera	113.525	70.262	2.241
Probability	0.000	0.000	0.326
Observations	303	303	303

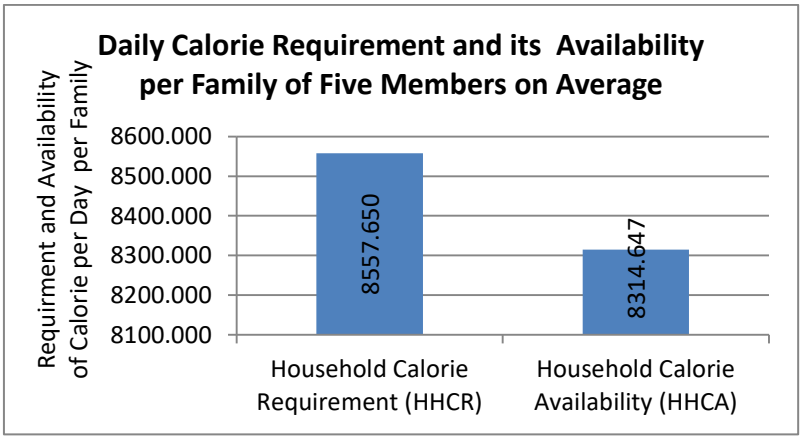

Chart-4

The table 6 and chart 4 present the calorie status of Bankura households. It sees that the average daily calorie requirement at the household level is 8558 Kcal. Whereas the daily average availability of calorie at the household level from their monthly purchases of raw food items is 8315 Kcal. As a result the households average calorie availability in percentage of required calorie is 99 Kcal. Here greater variability exists on household's calorie availability and in households calorie requirement in almost same amount (C.V=29).

Table-7: Percentage Distribution of Households having Basic Amenities in the Bankura Sample

Basic Amenities	Yes/No	%age of Households
Electricity	Yes(=1)	91.42
	No(=0)	8.58
	Total	100
Sanitation	Inside House(=1)	16.83
	Outside House(=0)	83.17
	Total	100
Own House	Yes(=1)	62.71
	No(=0)	37.29
	Total	100.00
Job Card	Yes(=1)	33.66
	No(=0)	66.34
	Total	100
Ration Card	Yes(=1)	70.63
	No(=0)	29.37
	Total	100
Access to microcredit	Yes(=1)	43.23
	No(=0)	56.77
	Total	100.00

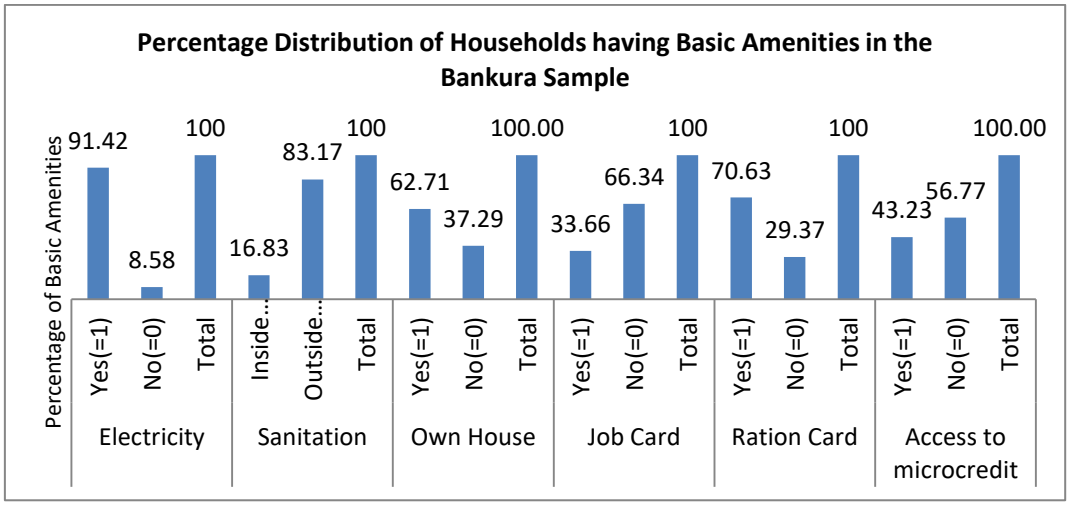

Chart-5

Table 7 and chart 5 present the percentage of sample households drawn from Bankura district enjoying basic amenities. Her electricity facilities for lighting are availed by 91.42% households which is also equivalent to gross percentage. Only 16.83 % of households having sanitation system inside their house that is far behind than combined sample households. 62.71% of the households have their own house and the remaining percentages are residing on rented house. Job card facilities of guaranteed employment under NREGA are enjoying by 33.66% household that is again lower than both combined and Burdwan sample. And the ration card facilities for availing subsidies foods under TPDS are benefited only 70.63% of households that is quite larger. The access to microcredit facilities is available to the 43.23% of population. And the rest of 56.77% of the population are still not getting befits from any kind of credit institutions.

Table-8: Regression Results of our log-linear model from the District of Bankura

```
. regress lnCONSEXP lnFAMINC lnFAMSIZE RELIGION CASTE HOWNER  JOBCARD RATIONCARD AMICROCREDIT

      Source |       SS       df       MS              Number of obs =     303
-------------+------------------------------           F(  8,   294) =  121.40
       Model |  64.7114295     8  8.08892869            Prob > F      =  0.0000
    Residual |  19.5892788   294    .0666302            R-squared     =  0.7676
-------------+------------------------------           Adj R-squared =  0.7613
       Total |  84.3007084   302  .279141419            Root MSE      =  .25813

------------------------------------------------------------------------------
   lnCONSEXP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    lnFAMINC |   .5238196   .042405    12.35   0.000     .4403639    .6072754
   lnFAMSIZE |   .0470583   .0235817    2.00   0.047      .000648    .0934685
    RELIGION |  -.0531642   .0475068   -1.12   0.264    -.1466607    .0403324
      CASTE  |   .0085866   .0352302    0.24   0.808    -.0607489     .077922
     HOWNER  |   .0456914   .0367717    1.24   0.215    -.0266777    .1180606
     JOBCARD |  -.0503242   .0374143   -1.35   0.180     -.123958    .0233095
  RATIONCARD |   .0797182   .0384743    2.07   0.039     .0039982    .1554381
AMICROCREDIT |   .3376468   .0479795    7.04   0.000     .2432201    .4320736
       _cons |   3.608096   .3454591   10.44   0.000      2.92821    4.287982
------------------------------------------------------------------------------
```

Table 8 represents our log-lin model regression result. Our parameter estimate for family income on family consumption expenditure is 0.524 and it is statistically highly significant. Since equation is logarithmic form, its coefficients can be interpreted for quantitative variable as elasticity term. It means that increase in income by 1% would lead to increase in consumption expenditure by 0.524%. Clearly consumption expenditure is income inelastic. This means that increase in family income no doubt increases the consumption expenditure.

Our next parameter estimate for family size is 0.047 and it is also statistically significant at 4.7 percent level of significance. It can also be interpreted in elasticity term. That is, if size of the family is increased by 1% the expenditure

on consumption will also increase by .047%. As we can assume that the larger the size of the family and the greater the number of income earners, the expenditure on consumption is likely to be higher.

Our next two estimates are religion and caste and both are taken as dummy. But, both the variables are found as statistically insignificant. Since, in our data set of 303 families the non-Hindu and general caste families are too small, so they may not lead to any significant impact on our estimated equation as dummy variables.

The coefficient of having job card is found to be negative but statistically insignificant. Ration card is also a dummy variable in our Model. It is found to be positive and significant at 3.9% level of significance. This can be interpreted as that the ration card will increase consumption expenditure by 8.3% ($(e^{\beta_i}-1)\times 100$) in favor of those who have ration card against who don't have any ration card. Because, having ration card means having entitlement in TPDS of Govt. of India. This also means that they are entitled to having subsidies on food items and hence get food items at cheapest rate. Whereas families with no ration card have to buy their entire daily necessary food items from open market with manifold higher prices. This is a fact and is likely to reduce the food security.

The last parameter estimates in this model is access to micro credit, it is also a dummy variable. It is found to be positive and significant at 0% level of significance. This can also be interpreted as that the access to micro credit will increase consumption expenditure by 40% ($(e^{\beta_i}-1)\times 100$) in favor of those who do have access to micro credit against who don't have.

DISCUSSION

Table-1: shows the descriptive summary of the quantitative variables of our study area. The total number of family we have visited is 303. The average daily availability of calorie per family is 8315 Kcal, whereas the minimum availability of calorie for at least two members of a family is 1875 Kcal that is almost equal to the requirement for a single person only as per any standard requirement norms. The average monthly income for the families is Rs-6823/-, with the minimum of Rs-1875/- and maximum of Rs-42,855/-. The average female-male ratio is 1, that is, 1:1 family. Where, minimum ratio is .25 that is female-male ratio is 1:4 and the maximum is 5 indicating ratio in the form 5:1. The mean family size is 4 in absolute number with the minimum of 2 members and maximum of 11 members. The average dependency ratio is .65 where minimum is .25 and maximum is .85. And the mean years of schooling of the head of the households is 2 years with minimum of 1 years schooling and maximum of 5 years schooling.

CONCLUSIONS AND RECOMMENDATIONS

Poverty or the lack of purchasing power to obtain minimal daily requirement of calorie for living an active and healthy life is the root cause of food insecurity. This doctrine has proved almost in every study related to food security/insecurity. Our study is also not an exception to draw this conclusion.

Another very well-known fact is that the lower the family size, the lower is the requirement of total calorie for the family. But it is also true that larger size of the family means greater number of working population and it will lead to higher purchasing power for daily required necessary consumption and bring the bigger consumption basket.

Having own house of any kind Kaccha/Paaka is the status symbol of households socio-economic condition. Definitely, having own house families are richer than the families of living on rented house. In that respect own house households are suffering lesser calorie deprivation (if any) than those of rented households.

Having job card of one or two members of the families implies that the households will have access to secured income opportunity or additional income opportunity for at least 100 days of a year. So, the secured 100 or more days' income opportunity with primary occupation of the households will definitely help them purchase the necessary consumption goods as well as ensure calorie security which may be equivalently considered, in other words, as food security. Similarly, having ration card for all members or some members of the family will give them access to the subsidies from the food program of the government under TPDS. Accessing to food at the cheaper rate will benefits the households in two ways. First, it increases the monthly food grain availability for the family. And second, it releases the income of the households to buy other necessary consumption good as rice, wheat, sugar and kerosin oil (available through ration system) are not to be purchased whole amount from the open market. And finally, access to micro credit is just like an earning opportunity. Households with credit facilities may start a new small business or home based handicraft works as it is evident from various studies. Increasing/adopting new income opportunity will lead to more income to consume and calorie security as required. In our study in the district of Bankura in West Bengal, it is also

evident that the households with having micro credit facilities are able to spend more on consumption and their calorie deprivation is lesser than the households not having micro credit facilities.

Therefore, the necessary condition for removing poverty or food insecurity is tantamount to increasing income opportunity. And, though not panacea, micro finance can be prescribed as one of the best ways of creating income opportunity after job card, if it is provided and guided in the right direction.

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