

Status of Food Security in West Bengal: A Study Based on NSSO Unit Level Data

Sk Md Abul Basar and Pinaki Das*

Department of Economics with Rural Development, Vidyasagar University, Medinipur, West Bengal, India

*Corresponding author: pdas_pbc@yahoo.co.in

ABSTRACTS

In this paper we attempt to analyse the status of food insecurity of West Bengal on the basis of NSSO unit level data for the years 2004-05 and 2011-12. In West Bengal, 32.2 per cent people were food insecure in 2004-05 which reduced to 20.1 per cent in 2011-12. In rural West Bengal the share of food insecure people decreased from 35.4 per cent in 2004-05 to 22 per cent in 2011-12. It also decreased in urban India. Our subgroup analysis points out that across the social groups the vulnerabilities were relatively high for STs and SCs than the others. Along with the economic factors the social and demographic factors were also equally important for the food insecurity of the households. The incidence of food insecurity decreased with the increase of the years of schooling, age of the head, and per capita cultivable land of the household. The status of employment and the choice of consumption basket of the households have also played an important role for the food security.

Keywords: Food Insecurity, Incidence, Depth, Severity

The concept of food security is interpreted in a variety of ways. Food and Agricultural Organization (FAO) defined food security as "A situation there exists when all people, at all times, have physical social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for active and healthy life" (FAO, 2001). Food security is a situation relating to the individuals is not a one-off matter but it have to be sustained overtime. In the last few decades' intensive agriculture and new crop varieties have fuelled a steady increase in per capita food production and decreasing world food prices have made food more available to a greater number of people. In 2001-03, there are 854 million undernourished people in the world, out of which 820 million were in developing countries and rest in the developed countries. In 2014-15, still 794.6 million people were undernourished (FAO 2015). At

the global level, the South Asian Region is the home to more chronically food insecure people than the other regions in the world. The number of undernourished person in South Asia (Bangladesh, India, Nepal, Pakistan and Sri Lanka) decreased from 291.2 million in 1991-92 to 272.3 million in 2001-03 (FAO 2015) and again increased to 281.4 million in 2014-15 (FAO 2015). In 1975, approximately one in three people in developing countries was underfed; today, the number of underfed has dropped to one in five (FAO 2015). In a developing country like India where the achievement of food security is a frightening task, the consequence of ignoring the problem of food and nutritional security seems very disastrous. The Govt. of India and the state govt. have been introducing a set of programmes for achieving food security at the household and individual levels. National Food Security Act (2013) has been implemented to extend the supplies of

food at subsidised price for targeted 75 per cent of rural and 60 per cent of urban people in India.

Swaminathan (2003), Dreze (2004), Jha and Acharya (2016) & Vyas (2000) reviewed the importance on state, market and civil society can plays an important role in reducing food insecurity. Imperfection in the market was the cause of food insecurity. Basu (2011,) concerned with the problems of high food inflation for food insecurity and he pointed out that - lack of storage infrastructure was the cause of food inflation in India.

Rid Out, Seed and Ostry (2006) & Himanshu (2013) concluded that food security is widely varied with government policies, individual capacity, and issue & community characteristics. Tendon and Lands (2011) observed that household food security depends on the household behavior whereas PDS and MDM plays an important role on food security outcomes. Deaton and Drèze (2009)observed that in spite of increase in real income and no long-term increase in the relative price of food, real per capita expenditure have declined. The proportionate decline was larger among better-off sections of the population.

Objective

In this brief background the present study analyses the status of the food security of West Bengal.

MATERIALS AND METHODS

(a) Database

The present work is totally based on NSSO Unit Level Data on Consumption Expenditure of 61st Round and 68th Round. We have used NSSO Unit Level Data relating to Consumer Expenditure (Type-1) of 61st Round (2004-05) and 68th Round (2011-12). In the 61st Round NSSO unit level survey total number of sample households was 7877 in West Bengal. Total numbers of estimated households were 17570562.99 and total number of population was 78936819.44 in 2004-05. In 68th Round (2011-12) Survey, number of sample households were 6315. In this round total numbers of estimated households are 21049253.97 and total numbers of estimated population was 85126031.24.

(b) Methodology

Estimation of Food Insecurity Line

In the present study the food insecurity line is estimated from the poverty line. Poverty line is given by the Expert Group under the chairmanship of Rangarajan on behalf of the Planning Commission of India (Planning Commission, 2014). The methodology is based on an exogenously determined poverty line expressed in terms of per capita consumption expenditure in a month. The Expert Committee gave two separate consumption baskets for the rural and urban areas in India as well as the state specific rural and urban poverty lines for the years 2004-05 and 2011-12. The budget share of food items of the poverty line class is considered as a food insecurity line [FIL] (Das & Basar, 2018). The FIL is the minimum amount of monetary value for a person’s minimum food requirement during a month. The food insecurity lines (FIL) are derived from poverty line as follows:

$$FIL_{ij} = PL_{ij} * X_{ij} [i = 1, 2...28 \text{ and } j = 1, 2]$$

Where, FIL_{ij} is the food insecurity line of the i -th state in the j -th region.

PL_{ij} is the poverty line of the i -th state in the j -th region and

X_{ij} is the share of food of the i -th state in the j -th region.

Table 1: Percentage Share of Food Basket in Total Consumption Expenditure of Poverty Line Class in West Bengal, 2004-05 and 2011-12

Share of Food and Non-Food	Rural		Urban	
	2004-05	2011-12	2004-05	2011-12
Share of Food in Total Consumption	63	56.2	60.4	56
Share of Non-food in Total Consumption	37	43.8	39.6	44

Sources: Report of the Expert Group to Review the Methodology for Measurement of Poverty, Planning Commission, Government of India, 2009 and 2014.

The percentage shares of food and non-food consumption of poverty line class is shown in Table 1 for the years 2004-05 and 2011-12. In 2004-05, the percentage share of food was 63 per cent and 56.2

per cent in the rural and urban areas respectively. The corresponding shares in 2011-12 were 60.4 per cent and 56 per cent respectively. The share of food consumption to total consumption decreased in the rural as well as in the urban area during this period.

Table 2: Food Insecurity Lines in Rural and Urban West Bengal in 2004-05 and 2011-12 (₹ Per capita per month)

	2004-05		2011-12	
	Rural	Urban	Rural	Urban
Poverty Line	445.0	573.0	783.0	981.0
Food Insecurity Line	280.4	322.0	472.9	549.4

Sources: Authors Calculation form state specific poverty lines (Tendulkar Methodology).

The poverty lines in West Bengal were ₹ 445 in the rural area and ₹ 573 in the urban area in 2004-05. The estimated food insecurity lines (FIL) in West Bengal were ₹ 280.4 for the rural area and ₹ 322.0 for the urban area in 2004-05. In 2011-12, the corresponding FILs were ₹ 472.9 and ₹ 549.4 respectively.

Estimation of Food Insecurity

The status of food insecurity (FIS) is measured with the help of the Foster, Greer and Therbecke (1984) methodology which is specified as follows:

$$FI_{\infty} = \frac{1}{N} \sum_{i=1}^q \left(\frac{P_F F - E_i}{P_F F} \right)^{\infty}; \infty = 0, 1, \text{ and } 2$$

Where, N is the total number of population & q is the number of food insecure people, $P_F F$ is the food security line and E_i is the expenditure of the i -th household.

When, $\alpha = 0$, FI_0 implies the Incidence of Food Insecurity (IFI)

$\alpha = 1$, FI_1 implies the Depth Food Insecurity (DFI) and $\alpha = 2$, FI_2 Implies the Severity of Food Insecurity (SFI)

EMPIRICAL RESULTS

The overall food insecurity situation in West Bengal is shown in the Fig. 1 for the year 2004-05 & 2011-12. The share of food insecure people (IFI) decreased

from 32.2 per cent in 2004-05 to 20.1 per cent in 2011-12. Depth of Food insecurity (DIG) also decreased from 5.9 per cent in 2004-05 to 3.2 per cent in 2011-12 and Severity of food insecurity (SFI) or food insecurity risk also decreased from 1.6 per cent in 2004-05 to 0.8 per cent in 2011-12. We can conclude that, overall food security situation in West Bengal has improved.

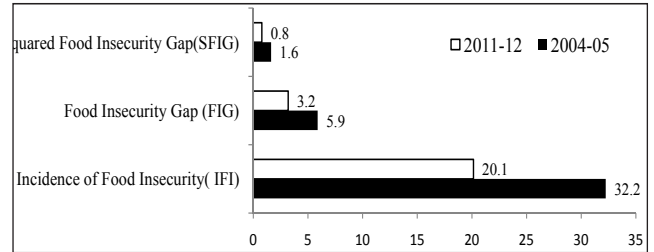


Fig. 1: IFI, DFI, SFI in West Bengal, 2004-05 and 2011-12

Source: Authors estimation from NSSO Unit Level Data of 61st and 68th Round Survey of Consumption Expenditure.

Table 3: Food Insecurity Situation in Rural and Urban West Bengal

	2004-05		2011-12	
	Rural	Urban	Rural	Urban
Incidence of Food Insecurity(IFI)	35.4	22.6	22.0	15.0
Depth of Food Insecurity (DFI)	6.6	3.8	3.4	2.7
Severity of Food Insecurity (SFI)	1.8	1.0	0.8	0.7

Source: Authors estimation from NSSO Unit Level Data of 61st and 68th Round Survey of Consumption Expenditure

Now we bring the discussion on incidence along with depth and severity of food insecurity in rural and urban Region of West Bengal (Table 3). Compromising 2011-12 to 2004-05, we have the following features. In both rural and urban areas, incidence, depth and risk of food insecurity has decreased. In rural West Bengal, food insecure people (IFI) decreased from 35.4 per cent in 2004-05 to 22.0 per cent in 2011-12. DFI also decreased from 6.6 per cent in 2004-05 to 3.4 per cent in 2011-12 and SFI decreased from 1.8 per cent in 2004-05 to 0.8 per cent in 2011-12. In case of urban West Bengal, IFI decreased from 22.6 per cent in 2004-05 to 15.0 per cent in 2011-12, DFI from 3.8 per cent in 2004-05 to 2.7 per cent in 2011-12 and SFI from 1.0 per cent in 2004-05 to 0.7 per cent in 2011-12. But the incidence, depth and severity of food insecurity

remained high in rural West Bengal in comparison to urban West Bengal.

Across social groups, Scheduled Tribes (ST) had the highest incidence of food insecurity in rural West Bengal for both the years 2004-05 & 2011-12. It has been observed that the STs population is with the most incidence of food insecurity (having the highest point). It has also shown the highest rate of decline for SC category. In 2011-12, the rural population share for STs and SCs was 5.9 and 31.1 per cent respectively whereas their share of rural food insecure people was 46.2 per cent and 23.6 per cent respectively. Food insecurity risk was the highest for STs followed by SC, Backward Classes (OBC) and lastly General. The least percentage change in food insecurity was for General, For ST and SC group whose food insecurity was also higher in terms of depth and severity measures. In urban West Bengal, generally SC had the highest food insecurity levels, followed by ST, OBC, and others respectively. In 2011-12 ST, SC and OBC constituted 2.4, 16.7 and 14.5 per cents of the urban population but comprised 32.8, 17.2 and 14.5 per cent of the urban food insecure people respectively. At the incidence level the percentage point decline for ST but was higher than that of SC, and for depth and severity the percentage point decline for SC but was higher than that of ST. Our sub-group analysis pointed out that across social groups, food insecure people were higher among the ST and the SC, the former happened to be the worst position in rural and the latter in urban (Fig. 2 & Table 4).

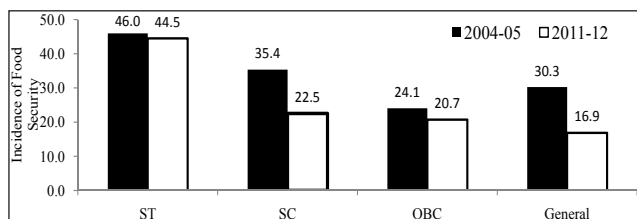


Fig. 2: Incidence of Food Insecurity by Castes in West Bengal, 2004-05 and 2011-12

Table 4: Food Insecurity by caste in West Bengal, 2004-05 and 2011-12

Caste	Rural						Urban					
	2004-05			2011-12			2004-05			2011-12		
	$\alpha=0$	$\alpha=1$	$\alpha=2$	$\alpha=0$	$\alpha=1$	$\alpha=2$	$\alpha=0$	$\alpha=1$	$\alpha=2$	$\alpha=0$	$\alpha=1$	$\alpha=2$
ST	46.8	10.3	3.3	46.2	9.9	2.9	31.1	3.3	0.6	32.8	6.7	1.9
SC	35.3	6.2	1.7	23.6	3.5	0.8	35.7	6.1	1.6	17.2	3.4	1
OBC	24.3	5.1	1.7	22.8	3.8	1	22.7	3.5	1.1	14.5	2.6	0.7
General	35.1	6.4	1.7	18.3	2.5	0.5	18.9	3.1	0.8	14	2.4	0.6

Source: Authors Estimation from NSSO Unit Level Data of 61st and 68th Round Survey of Consumption Expenditure.

Source: Authors Estimation from NSSO Unit Level Data of 61st and 68th Round Survey of Consumption Expenditure.

Econometric analysis of Food Insecurity at the household level

The present section analyses the determinants of food insecurities at the household level of West Bengal for the years 2005-05 and 2011-12 on the basis of NSSO Unit Level Data. Households are widely varied in terms of socio-economic, demographic and cultural factors and the resultant outcomes are differential food insecurities status. The factor hypothesized to influence the food insecurities can be grouped into four categories: Cultural, Social, Demographic and Economic. Mean, coefficient of variation (CV), maximum, minimum and the notations used for the variables are listed in the Table 5.

Probit Regression Model for Food Insecurity Analysis

$$DFINS_i = \beta_1 + \beta_2 AEDU_i + \beta_3 ST_i + \beta_4 SC_i + \beta_5 OBC_i + \beta_6 HHSZ_i + \beta_7 FHS_i + \beta_8 AGEH_i + \beta_9 SAGEH_i + \beta_{10} RE_i + \beta_{11} AAY_i + \beta_{12} BPL_i + \beta_{13} SFE_i + \beta_{14} PCLAND_i + U_i$$

Where $i=1, 2, \dots, 7877$ for 2004-05 and $i=1, 2, \dots, 6315$ for 2011-12.

Two separate regressions are estimated – one for the year 2004-05 and other for 2011-12.

The result of the probit estimation of food insecurity for the years 2004-05 and 2011-12 are shown in the Table 6. Average education of the households is negatively and significantly related to food insecure households. It means that as the average years of schooling of the households increases the chance of food insecurity decreases. Household’s food security is positively and significantly related to the STs and OBCs. It means that the household belonging to the lower caste are deprived in

Table 5: Notation, Specification, mean and Standard Deviation (SD) of the Variables Used in Probit Estimation at the Household Level in 2004-05 and 2011-12

Notation	Specification	2004-05				2011-12			
		Max	Min	Mean	SD	Max	Min	Mean	SD
Dependent Variable									
PFNIS	Whether the household is food insecure (yes = 1, no = 0)	1	0	0.3	0.4	1	0	0.2	0.4
Cultural Factors									
AEDU	Average education level of the households	17	0	4.5	3.6	17	0	5.8	4
Social Factors									
ST	Whether the household belongs to ST community (yes = 1, no = 0)	1	0	0.1	0.2	1	0	0	0.2
SC	Whether the household belongs to SC community (yes = 1, no = 0)	1	0	0.2	0.4	1	0	0.2	0.4
OBC	Whether the households belongs to OBC Community (yes = 1, no = 0)	1	0	0.1	0.2	1	0	0.1	0.3
Demographic Factors									
HHSZ	Size of the households	26	1	4.6	2.3	17	1	4.1	2
FHS	Whether the head the family is Female (yes = 1, no = 0)	1	0	0.1	0.3	1	0	0.1	0.3
AGEH	Age of the head of the households	100	8	45.9	13.4	104	13	48.1	14
SAGEH	Squared age of head of the households	10000	64	2288.5	1318.7	10816	169	2508.4	1428
Economic Factors									
RE	Whether Household has a regular employee (yes = 1, no = 0)	1	0	0.8	0.4	1	0	0.3	0.4
AAY	Whether Household has a Antyodaya ration card (yes = 1, no = 0)	1	0	0	0.1	1	0	0	0.2
BPL	Whether Household has a B.P.L ration card (yes = 1, no = 0)	1	0	0.2	0.4	1	0	0.2	0.4
SFE	Percentage of food to total expenditure	96.3	6.5	58.1	12.7	90.4	4	52.7	13.2
PCALand	Per Capita Cultivable Land of Households	13.4	0	0.2	0.5	20	0	0.1	0.6
BWD	Back Ward Districts (Yes = 1, No = 0)	1.0	0.0	0.4	0.5	1.0	0.0	0.4	0.5

different dimensions. Here the results show that the chance of food insecurity is higher for SCs, STs, and OBCs households. Demographic factors, namely household size (HHSZ) and female headed HHs (FHS) are significantly explaining the household food insecurity where both the factor is positively related. Age of head of household (AGEH) and square of age of head of household (SAGEH) are also significantly related with food insecurity – former is negatively and latter is positively related. This means that the chance of food insecurity decreased with the age at a decreasing rate. Economic factors, namely share of food in

total consumption, and per capita cultivable land are negatively and significantly explain the food insecurity. In the present study, PDS facilities by the means of AAY and BPL card are positively associated with food insecurity. The result is not contradictory at all. Actually the AAY and BPL beneficiaries are mostly belonging in poor and deprived households. The AAY and BPL facilities help them to increase their food consumption level but they may not overcome food insecurity. AAY and BPL card give the eligibility of the households for PDS food grains.

Table 6: Probit Estimation of Food Insecurity at Household Level in 2004-05 & 2011-12

Number of observation = 7877					Number of observation = 6315				
LR chi ² (13) = 1835.70					LR chi ² (13) = 1065.67				
Prob > chi ² = 0.0000					Prob > chi ² = 0.0000				
Pseudo R2 = 0.2030					Pseudo R2 = 0.1994				
Log likelihood = -3603.4018					Log likelihood = -2139.6066				
	Coefficient.	Std. Err.	z	P>z	Coefficient	Std. Err.	z	P>z	
AEDU	-0.156	0.007	-21.03	0.000	-0.131	0.009	-15.270	0.000	
ST	0.098	0.073	1.35	0.178	0.388	0.093	4.180	0.000	
SC	0.005	0.040	0.12	0.901	0.071	0.052	1.370	0.098	
OBC	0.014	0.071	0.19	0.848	0.254	0.071	3.580	0.000	
HHSZ	0.184	0.008	22.38	0.000	0.166	0.011	14.480	0.000	
FHS	0.340	0.055	6.21	0.000	0.342	0.061	5.590	0.000	
AGEH	-0.042	0.007	-5.74	0.000	-0.006	0.010	0.620	0.038	
SAGEH	0.000	0.000	4.54	0.000	0.000	0.000	-0.900	0.366	
RE	-0.237	0.049	4.82	0.000	-0.137	0.057	-2.410	0.016	
AAY	0.590	0.104	5.64	0.000	0.668	0.113	5.890	0.000	
BPL	0.260	0.041	6.31	0.000	0.619	0.048	12.990	0.000	
SFE	-0.007	0.002	-4.39	0.000	-0.015	0.002	-7.090	0.000	
PCLand	-0.625	0.048	-12.94	0.000	-0.758	0.110	-6.880	0.000	
Constant	0.441	0.197	2.24	0.025	-0.664	0.255	-2.610	0.009	

CONCLUSION

In West Bengal, the percentage of food insecure people has been decreased during 2004-05 to 2011-12. The situation of food insecurity is quite high in rural West Bengal than that of urban West Bengal. Food insecure people are relatively high for socially disadvantage classes- STs and SCs. Food insecurity across households is significantly explained by the socio-economic and cultural factors of the households. The chance of food insecurity decreases with higher average years of schooling of the households. The household belonging to the lower caste are deprived in different dimensions; therefore, their chance of food insecurity is higher for STs, OBCs and SCs. Economic factors, namely share of food in total consumption and per capita cultivable land are negatively and significantly explain the food insecurity.

REFERENCES

Basu, K. 2011. India’s Food grain Policy: An Economic Theory Perspective. *Economic & Political Weekly*, 46(5): 37-45.

Das, P. and Abul Basar, Sk Md., 2018. Status of Food Security in the Jangalmahal Region of West Bengal: A Study Based on the NSSO Unit Level Data. *Scholars Journal of Arts, Humanities and Social Sciences*, 6(4), 884- 892.

Drèze, J. 2004. Democracy and Right to Food. *Economic and Political Weekly*, 39(17): 1723.

Deaton, A. and Drèze, J. 2009. Food and Nutrition in India: Facts and Interpretations. *Economic & Political Weekly*, XLIV(7).

Food and Agriculture Organization 2001. *The State of Food Insecurity in the World 2001*. Rome.

Food and Agriculture Organization 2015. The State of Food Insecurity in the World 2015. Strengthening the enabling environment for food security and nutrition. *International Fund for Agricultural Development, World Food Program* Rome: FAO. <http://www.fao.org/3/a4ef2d16-70a7-460a-a9ac2a65a533269a/i4646e.pdf>

Food and Agriculture Organization 2016. Methods for estimating comparable rates of food insecurity experienced by adults throughout the world, Rome (available at www.fao.org/3/i4830e.pdf).

Gopalan, C, B.V. Rama Sastri and Balasubramanian, S.C. 1980. Nutritive value of Indian Foods. *Hyderabad: National Institute of Nutrition, Indian Council of Medical Research* (3rd edition).

Himanshu 2013. *Poverty and food security in India*. Asian Development Bank, Working Paper Series No.369, September 2013.

Jha, P. and Acharya, N. 2016. Public Provisioning for Social Protection and Its Implications for Food Security. *Economic & Political Weekly*, 51(18): 101.

Maxwell. 1995. *Measuring Food Insecurity: The frequency and severity of coping strategies*, IFPRI FCND Discussion Paper No 8, Washington, 1995.

Planning Commission 2014. Report of the Expert Group to Review the Methodology for Measurement of Poverty, Government of India.

Rid Out, K. Barbara, S. and Ostry, A. 2006. Putting food on the public health table : Making food security relevant to regional health authorities. *Canadian Journal of Public Health*, **97**(3): 233-236.

Swaminathan, M. 2003. Strategies Towards Food Security. *Social Scientist*, 31(9/10) (Sep.- Oct., 2003), 58-94, Stable URL: <http://www.jstor.org/stable/3518136>.

Tandon, S. and Landes, R. 2011. The Sensitivity of Food Security in India to Alternate Estimation Methods, *Economic & Political Weekly*, **46**(22): 92-99.

Vyas, V.S. 2000. Ensuring Food Security: The State, Market and Civil Society. *Economic and Political Weekly*, **35**(50): 4402.

