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

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Reducing hunger and ensuring food and nutritional security to all citizens has been accepted as the primary responsibility of the state towards its citizens and is repeatedly endorsed at various international, national and regional forums. 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 under nourished person in South Asia (Bangladesh, India, Nepal, Pakistan and Sri Lanka) decreased from 291.2 million in 1991-92 to 272.3 million in 2001-02. FAO [2] and again increased to 281.4 million in 2014-15. FAO [2]. The persistent food insecurity creates the indirect costs for the economy as a whole in the form of loss of productivity and income, disabilities, absenteeism, low education and skill levels, poor cognitive development, etc. Hence, ensuring food security at the local, national and global level is the most rational investment for sustainable development. The Sustainable Development Goals (SDGs) have also emphasized on Food.

The present state of food insecurity in India does not present a rosy picture in front of our policy makers. The government has been implementing a wide range programmes for achieving food security at the household and individual levels. The public distribution system (PDS) supplies food items such as food grains and sugar at administered prices through the fair price shops. The wage employment programme like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is also crucial to overcome food insecurity. The government also targeted the food and nutritional status through the Mid-Day Meal programme for the school going children and Intrigrated Child Development Scheme (ICDS), the supplementary nutrition programme, for the children and women. National Food Security Act [3] has been implemented to extend the supplies of food at subsidized price for the targeted 75 per cent of rural and 60 per cent of urban people in India.

LITERATURE REVIEW

Swaminathan [4] and Vyas [5] reviewed the importance on state, market and civil society for performing important roles in reducing food insecurity. Imperfection in the market was the cause of food insecurity. Basu [6] highlighted the problems of high food inflation and lack of storage and suggested for strengthening of cold storage

infrastructure in India for food security. *Rid Out, Seed and Ostry* [7] drew attention on how food security is relevant to regional health authorities. They gave a brief concept of food security and tried to estimate food security on the basis of food security indicators. They concluded that food security is a complex issue and it widely varied with government policies, individual capacity, and issue & community characteristics. *Tendon and Lands* [8] observed that food security /nutritional status of an individual depends crucially on the relative prices of different commodities along with income levels. They stressed on the fact that household food security depends on the household behavior. *Dreze* [9] highlighted that right to food have to be achieved and it's needed to be linked with other economic and social rights such as the right to education, work, information, and health. *Himanshu* [10] examine the impact of PDS and MDM on poverty outcomes and on nutritional intake. He also said that Public expenditure-led social safety nets contributed to poverty reduction in a significant way directly and indirectly. *Deaton and Drèze* [11] showed that decline had occurred across the distribution of real per capita expenditure, in spite of increase in real income and no long-term increase in the relative price of food. The proportionate decline was larger among better-off sections of the population. They concluded that there are serious gaps in India's nutrition statistics and even the most basic nutrition trends are far from the clear. *Jha and Acharya* [12] showed a country with better and wider public provisioning to various branches of social protection/promotion/security could go a long way in addressing the concerns of food security, hunger and malnutrition.

Jangalmahal Region

On the basis of a number of socio-economic indicators the districts of West Bengal are segregated into two groups – relatively developed and relatively less developed Indian Rural Development Report 2013-14[13]. Out of total 19 districts of West Bengal eight are relatively developed and rest are relatively less developed. Three less developed districts namely, Paschim Medinipur, Bankura, Puruliya constitute the Jangalmahal region. The region is one of the most backward region of West Bengal and it provides the habitation to many of the inchoate tribes who survive using the various traditional practices. The region was also affected by extreme Maoist movement during 2009 and 2011. That generated shocks and risk on livelihood. The State Government has extended different social protection programmes to overcome the food insecurity, poverty and other deprivations of the people of this region.

Objective

In this brief background the present study analyses the status of the food security with the special reference to Jangalmahal region of West Bengal.

Database

The present work is based on National Sample Survey Organisation (NSSO) Unit Level Data on Consumer Expenditure Survey. We have used NSSO Unit Level Data relating to Consumer Expenditure (Type-1) of 61stRound (2004-05) and 68th Round (2011-12).

METHODOLOGY: THE ESTIMATION OF FOOD INSECURITY

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 [14]. 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). 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 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	R	ural	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 (Rs. Per capita per

month)								
	200	04-05	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 Rs.445 in the rural area and Rs. 573 in the urban area in 2004-05. The estimated food insecurity lines (FIL) in West Bengal were Rs. 280.4 for the rural area and Rs.322.0 for the urban area in 2004-05. In 2011-12, the corresponding FILs were Rs. 472.9 and Rs. 549.4 respectively.

The status of food insecurity (FIS) is measured with the help of the Foster, Greer and Therbecke (1984)[15] methodology which is specified as follows:

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

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, $\alpha = 0$, FI₀ implies the Incidence of Food Insecurity (IFI)

 $\alpha = 1$, FI₁ implies the Depth Food Insecurity (DFI)

 $\alpha = 2$, FI₂ Implies the Severity of Food Insecurity (SFI) and

Status of Food Insecurity (FIS) in the Jangalmahal Region vis-à-vis West Bengal

The overall food insecurity situation in West Bengal is shown in the Figure 1. 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 (DFI) also decreased from 5.9 per cent in 2004-05 to 3.2 per cent in 2011-12. The food insecurity risk measured by the severity of food insecurity (SFI) also decreased from 1.6 per cent in 2004-05 to 0.8 per cent in 2011-12. Thus, we can conclude that the overall food security situation in West Bengal improved during this period.



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 Household Consumption Expenditure

Table-3: Food Insecurity Situation in Kurai and Orban West Bengar									
Status of Food Insecurity		2004-05		201		1-12			
		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			

Table-3: Food Insecurity Situation in Rural and Urban West Rengal

Source: As in Figure 1.

Both rural and urban West Bengal has experienced a fall in food insecurity situation during 2004-05 to 2011-12. 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. The 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 urban West Bengal IFI, DFI and SFI also decreased during this period. But the incidence, depth and severity of food insecurity remained high in rural West Bengal compared to urban West Bengal (Table 3).



Source: As in Figure 1

The situation food insecurity in terms of incidence, depth and severity in the Jangalmahal region was higher than that of West Bengal. The share of food insecure people (IFI) decreased from 33.7 per cent in 2004-05 to 25 per cent in 2011-12. Depth of Food insecurity (DIG) also decreased from 7.1 per cent in 2004-05 to 4.3 per cent in 2011-12. The food insecurity risk (SFI) also decreased from 2.2 per cent in 2004-05 to 1.2 per cent in 2011-12 (Figure 3).

As regards the situation food insecurity across social groups the incidence of food insecurity was higher for the STs and the SCs, the former happened to be the worst position (Figure 4). In Jangalmahal Region, the percentage share of food insecure people for STs was very high in 2004-05(50.2) which decreased to 45.5 per cent in 2011-12. During 2004-05 to 2011-12 the reduction of incidence of food insecurity had observed for all social classes except OBCs. The reduction was the highest for 'Others' (12.4 per cent) and least for STs (4.7 per cent). In 2011-12, the population share for Scheduled Tribes (ST) and Scheduled Castes (SC) was 8.6 per cent and 23.2 per cent respectively in the Jangalmahal region whereas their share of food insecure people was 15.6 per cent and 31.4 per cent.



Fig-4: Incidence of Food Insecurity by Castes in the Jangalmahal Region, 2004-05 and 2011-12 Source-As in Figure1

Econometric Analysis of Food Security in the Jangalmahal Region of West Bengal Characteristics of Households Social Group

The distribution of households across castes in Jangalmahal region is shown in the Figure 5. Out of the total households in the Jangalmahal region 8.8 per cent households belong in Scheduled Tribes (ST), 22.7 per cent in Schedule Castes (SC), 11.8 per cent in Other Backward Caste (OBC) and the rest 56.7 per cent in General/Others Castes in 2004-05. The percentage shares of SC and ST households were more or less same in 2011-12. But the General/ Others households increased from 56.7 per cent in 2004-05 to 57.8 per cent in 2011-12. In contrary the OBC caste households decreased at the extent of 1.4 percentage points.





Source-As in Figure1

Households Size

A group of person normally living together and taking food from a common kitchen constitutes a household. The size of a household is the total number of persons in the household. In 2011-12, there were 47.3 percent households having members one to four and it was 33.2 percent in 2004-05. The numbers of household members in between five to eight were 45.1 per cent in 2011-12 and 53.4 per cent in 2004-05. The household having the number of members higher than eight was only 13.4 per cent in 2011-12 and 7.6 per cent in 2004-05. The average numbers of members of households in Jangalmahal region were 5 in 2004-05 as well as in 2011-12 (Figure-6).



Fig-6: Distribution of Households by the Size in Jangalmahal Region *Source*-As in Figure 1

Age of the Head of the Households

Intra household's decision power is delineated primarily on the basis of association of the head of the households. The greater the age of the household head, more rational becomes his decision. The distribution of the age of head of the households in Jangalmahal region for the year 2004-05 and 2011-12 are shown in Figure 7. There were 9.9 per cent and 10.1 per cent of households in 2004-05 and 2011-12 respectively with the head's age below thirty years. The distribution of the households by the age of head of households is positively skewed.



Fig-7: Distribution of Households by age of Head of the HHs in Jangalmahal Region Source-As in Figure 1

Status of Ration Card

As regards the status of ration card of the households in the Jangalmahal region, 6.1 per cent of households have AAY card, and 31.5 per cent households have BPL card in 2004-05. AAY and BPL card holder households decreased in

2011-12 in comparison with 2004-05. The 'Others' card holder households increased from 62.4 per cent to 67.3 per cent during this period (Figure 8).



Source-As in Figure 1

Type of Employments

Among the three status of employment the regular status of employment was relatively low in Jangalmahal. The households with at least one regular employee were 12.9 per cent in 2004-05 and it marginally decreased to 11 per cent in 2011-12. Majority of the households were either self-employed or casual labour.



Fig-9: Distribution of HHs by Types of Employment in Jangalmahal Region *Source:* As in Figure 1

Econometric Analysis of Food Insecurity at the Household Level in the Jangalmahal Region of West Bengal

The present section analyses the determinants of food insecurities at the household level in the Jangalmahal Region. This analyse is done for the years 2004-05 and 2011-12 separately 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 status of food insecurity. The choice is whether the households utilized her human and physical resources to derive income to recover food insecurity. The factor hypothesized to influence the food security can be grouped into four categories: cultural, social, demographic and economic. The *cultural factor* is specified by the average years of education (YED) of the members of the households. The *social factor* is specified by the castes of the households. Four *demographic factors* have used in our analysis: size of the households (HHSZ), female headed households (FHS), age of the head of the head of the household (AGEH) and square of the age of the head of the household (SAGEH). The *economic factors* are employment status, share of food expenditure to total expenditure (SFE), the status of Ration Card, per capita PDS benefit (in Rs.) and per capita Cultivable land (LANDP) in hectare.

Estimation at the Household Level, 2004-05 and 2011-12							
		2004-05		2011-12			
Notation	Specification	Mean	SD	Mean	SD		
Dependent Var					-		
PFINS	Whether the household is food insecure or not						
	(yes=1,0)	0.3	0.4	0.2	0.4		
Cultural Factor	•						
AEDU	Average education level of the households	4.3	3.4	5.4	3.8		
Social factors							
	Whether the household belongs to ST community (yes						
ST	= 1, no = 0)	0.1	0.3	0.1	0.3		
	Whether the household belongs to SC community (yes						
SC	= 1, no = 0)	0.2	0.4	0.2	0.4		
	Whether the households belongs to OBC Community						
OBC	(yes=1, no=0)	0.1	0.3	0.1	0.3		
Demographic F	actors						
HHSZ	Size of the households	5.0	2.7	4.2	2.0		
	Whether the head the family is Female						
FHS	(yes =1, no=0)	0.1	0.3	0.1	0.3		
AGEH	Age of the head of the households	46.8	13.7	47.4	13.4		
SAGEH	Squared age of head of the households	2379.2	1378.8	2428.4	1351.9		
Economic Factor	ors						
	Whether Household has a regular employee						
RE	(yes=1,no=0)	0.8	0.4	0.2	0.4		
	Whether Household has a Antyodaya ration card						
AAY	(yes=1,no=0)	0.1	0.2	0.0	0.2		
	Whether Household has a B.P.L ration card						
BPL	(yes=1,no=0)	0.3	0.5	0.3	0.5		
SFE	Percentage of food to total expenditure	60.0	11.7	55.8	12.0		
PDSV	Per Capita PDS Value (in Rs.)	3.3	7.3	0.4	0.7		
LNDAP	Per Capita Cultivable Land of Household (hectare)	0.4	0.6	0.2	0.5		

Table-3: Notation, Specification, Mean and Standard Deviation (SD) of the Variables used in the Probit Estimation at the Household Level, 2004-05 and 2011-12

The status of the food insecurity is analysed with the help of Probit Model Cameron and Trivedi [16]. The Probit Model also represents a sigmoid curve. It corresponds to the Cumulative Distribution Function (CDF) of a standard normal distribution. Here P_i is considered as standard normal CDF which is evaluated as a linear function of explanatory variable(s). Thus, the Probit Model is specified as

$$P_i = P(Y_i = 1)$$

= $F(\alpha + \beta X_i)$

Here $F(\alpha + \beta X_i)$ is the CDF of the standard normal distribution so that

$$P_i = F(\alpha + \beta X_i) = \int_{-\infty}^{\alpha + \beta X_i} f(Z) dz$$

Where

Z is the standard normal variable and f(Z) is the density faction of $Z \sim N(0,1)$ As in Probit model, the log-likelihood function is

$$\ln L = \sum_{i=1}^{n_1} Y_i ln P_i + \sum_{i=n_1+1}^{n} (1 - Y_i) \ln (1 - P_i)$$
$$= \sum_{i=1}^{n_1} Y_i ln F(\alpha + \beta X_i) + \sum_{i=n_1+1}^{n} (1 - Y_i) \ln [1 - F(\alpha + \beta X_i)]$$

The *lnL* is to be maximized with respect to α and β to estimate the unknown parameters. It has been shown that the log likelihood ratio (LR) is distributed as χ^2 with degrees of freedom k = number of estimable parameters in the model. Thus, our decision rule is: if $LR^* \sim \chi^2 > \chi^2_{\lambda,k}$, reject the null hypothesis which states that all the coefficients of the estimated model are simultaneously equal to zero, and conclude that there is overall significance of regression.

The Probit Regression Model for food insecurity analysis is specified as follows:

$DFINS_{i} = \beta_{1} + \beta_{2}AEDU_{i} + \beta_{3}ST_{i} + \beta_{4}SC_{i} + \beta_{5}OBC_{i} + \beta_{6}HHSZ_{i} + \beta_{7}FHS_{i} + \beta_{8}AGEH_{i} + \beta_{9}SAGEH_{i} + \beta_{10}RE_{i} + \beta_{11}AAY_{i} + \beta_{12}BPL_{i} + \beta_{13}SFE_{i} + \beta_{14}LANDP_{i} + \beta_{15}PCPV_{i} + U_{i}$

Where i =1, 2,....1308 for 2004-05 and i =1,2,....1152 for 2011-12 Two separate regression model are estimated – one for the year 2004-05 and other for 2011-12.

	Та	ble-4: Probit	Estimation o	f Food Insec	urity at the H	ouseholds Level				
Regression Results for 2004-05				Regression Results for 2011-12						
Number of observations = 1308 LR chi2(14) = 302.00					Number of observations = 1152 LR chi2(14) = 248.28					
Prob > chi2	= 0.0000				Prob > chi2	= 0.0000				
Pseudo R2	= 0.1993	3			Pseudo R2	= 0.2301				
Log likelihood	l = -606.716	646			Log likelihood = -415.31212					
	Coef.	Std. Err.	Z	P>z	Coef.	Std. Err.	Z	P>z		
Const.	-0.128	0.475	-0.27	0.788	-0.811	0.643	-1.26	0.207		
AEDU	-0.143	0.020	-7.18	0.000	-0.130	0.021	-6.24	0.000		
ST	0.433	0.152	2.86	0.004	0.531	0.173	3.08	0.002		
SC	0.059	0.109	0.54	0.591	0.283	0.129	2.2	0.028		
OBC	-0.039	0.139	-0.28	0.782	0.482	0.141	3.41	0.001		
HHSZ	0.159	0.019	8.5	0.000	0.216	0.028	7.65	0.000		
FHS	0.043	0.143	-0.3	0.076	0.085	0.158	0.54	0.059		
AGEH	-0.010	0.019	-0.53	0.095	-0.022	0.025	0.88	0.078		
SAGEH	0.0001	0.000	-0.02	0.098	0.0001	0.000	-1.01	0.312		
RE	-0.214	0.134	-1.6	0.100	-0.413	0.164	-2.53	0.012		
AAY	0.630	0.172	3.66	0.000	0.800	0.255	3.14	0.002		
BPL	0.418	0.105	3.97	0.000	0.586	0.116	5.06	0.000		
SFE	-0.007	0.004	-1.76	0.078	-0.022	0.005	-4.36	0.000		
LANDP	-0.355	0.083	-4.3	0.000	-0.659	0.186	-3.55	0.000		
PCPV	-0.005	0.006	-0.73	0.463	0.003	0.004	0.85	0.396		

The result of the probit estimation of food insecurity for the years 2004-05 and 2011-12 are shown in the Table 4. Here AEDU, AGEH, SFE, types of employment and LANDP are inversely related with the incidence of food insecurity across households. But HHSZ, FHS, SAGEH, AAY and BPL are positively related with the incidence of food insecurity. All these relationship are statistically significant.

An increase of the average years of education (AEDU) of the household reduces the chance of food insecurity. The households belonging to the lower caste are deprived in different dimensions. Here the results show that the chance of food insecurity is higher for SC, ST, and OBC 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. The 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 is decreased with the increase of age at a decreasing rate. The Higher age of the head denotes he or she has more rational in decision making. Higher age denotes the lower food insecurity. Adding the age squared to head age, allow us to model the effect of differing ages, rather than assuming the effect is linear for all ages. Economic factors, namely share of food in total consumption, and per capita cultivable land are negatively and significantly explain the food insecurity. The result is not contradictory at all. Actually the 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 the incidence of food insecurity.

CONCLUSION

The food insecure people decreased in rural as well as urban region during 2004-05 to 2011-12 in West Bengal. The situation of food insecurity was quite high in the rural area compared to the urban area. The Jangalmahal Region also witnessed a decline of incidence, depth and severity of food insecurity. But the situation of food insecurity in terms of incidence, depth and severity in the Jangalmahal Region was higher than that in whole of West Bengal. Food insecure people are relatively higher for socially disadvantaged classes – STs and SCs in the Jangalmahal Region as well as in

whole of West Bengal. The incidence of food insecurity depends of the socio-economic as well as demographic characteristic of the households. The chance of food insecurity decreases with higher average years of schooling of the household. The household belonging to the lower castes (STs, SCs and OBCs) are deprived in different dimensions; therefore, their chance of food insecurity is relatively higher than the upper caste people. Food insecurity is higher for larger size of households. The status of food insecurity is decreased with the increase of age of the head of the households but at a decreasing rate. The choice of consumption basket of the households, measured by the share of food in total consumption, is also important for food security. The households with higher share of food consumption lead to the lower incidence of food insecurity. The per capita cultivable land is deficient in the Jangalmahal Region. It is also caused for the food insecurity of the households. Nearly half of the ST people in the Jangalmahal region were food insecure. The failure of the entitlements, both own and public, is caused for the food insecurity. A course correction will be needed.

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