

An Empirical Study of Food Security and Food Consumption Pattern in the District of Puruliya in West Bengal

Maniklal Adhikary¹, Diti Banerjee²

¹Professor of Economics, Burdwan University, Golapbag, East Barddhaman, W.B.-713104

²Research Scholar in Economics, Burdwan University

Abstract

Puruliya is one of the most backward districts in the state of West Bengal. Insufficiency of food and hence the resultant lack of nutrition for maintaining appropriate standard of living are the common features in the life of people in Puruliya. In this study we want to investigate the status of food security of the households in the rural and urban region of Puruliya due to variation in income and the choice of their food basket. A cross sectional study on 750 households of Puruliya from both rural and urban household has been made to compute the food consumption pattern at the household level using four point Likert scale. Based on the food consumption pattern, the indicator of food security at household level has been calculated on the basis of actual calorie availed by the households from the intake of food as proportion to the medically required calorie. The result of the study shows that the rural population (39.87%) suffers from food insecurity more than the urban population (13.60%). Logit regression analysis has been applied to look into the impact of food consumption pattern along with other determinants on the food security. Our analysis shows that food consumption pattern (0.013) and family income (0.004) has direct relation with food security. Holding PDS card does not reflect very much impact on food security and that may be because of not providing diverse food groups to ensure balanced diet instead of cereal based calories.

Keywords: Food security, Calorie deprivation, Food Consumption Pattern, Balanced Diet

JEL Classification: Z18, Q18, Y10

Introduction

Purulia is one of the most underdeveloped districts of West Bengal, with extreme climate conditions in summer as well as in Winter. It has also been identified as a drought-prone district. The HDI of Puruliya is 0.45 and holds rank 16 in West Bengal (www.wbplan.gov.in). The district is lagging in terms of livelihood, Economy, Education, and life expectancy.

During the first wave of Covid 19, at least one in every 5 households has faced a food crisis in some way or the other, said Mr Amartya Sen. According to his study, crises faced in rural areas are 'marginally higher' than in urban localities. Study claims that lower social groups have also suffered a lot more than

¹Professor of Economics, Burdwan University, Golapbag, East Barddhaman, W.B.-713104

²Research Scholar in Economics, Burdwan University

the general categories. The food crisis was not the same for the entire state of West Bengal, as it had its highest impact on Puruliya at 47.5%

Food is one of the prime needs of human life. Not getting enough amount of food on daily basis can lead a poverty and nutrition trap for human life (Jha et al 2006). It leads to low purchasing power, hence low or poor consumption level which in turn creates health hazards and leads to poor productive capacity, and the circle goes on. To escape this trap, a serious policy prescription is required. According to various contemporary studies, different kinds of hazards and hindrances are faced by most of the rural population of most of the states and districts. Therefore, in our present study, we want to examine the rural-urban disparities in the district of Purulia in terms of income, expenditure is done on food, access to a balanced diet, social economic and food assistance on food security status. We have measured food security in terms of access to required calories by the household as per ICMR 2020 report. If a household can achieve the requisite calories then the household will be identified as food secure, otherwise food insecure.

Objective

The objective our present paper is to estimate the food security/insecurity condition in one of the most backward district of West Bengal i.e.; Puruliya. The district is lacking behind because of several things like agriculture, extreme weather condition, drought due to lack of rain hence lack of income opportunities within the district and lack of availability and access to vast diversified food market. Our objective in this study is

- To estimate the food consumption pattern of the households of the district
- Next, to estimate the impact of food consumption pattern on household's food security of the district along with some other important explanatory variables
- We also want to observe the rural urban disparities in the food security status of the district

Review of Literature

Show (2015) observed that rural area has two different kinds of consumption pattern for two different Class of population i.e; labour class and middle-class service holder. The labour class population spends more of their income on food than the other class.

As Puruliya is one of the most backward states of West Bengal, **Roy (et al 2015)** computed the change in economic activities taking place throughout the years and prescribed for enhancement of economic activities and several policies to improve the economy.

Biswas (2017) pointed out that extreme weather conditions of Puruliya, suitable crops for specific seasons, and seasonal hazards for agricultural difficulties should be considered to improve Purulia's economic and agricultural conditions.

As Puruliya is one of the backward districts in terms of food security and agricultural options, the study of **Halder (2012)** has tried to find out the current and future opportunities for irrigation to improve the condition of agri-food security.

A study of food consumption patterns of the adult population of rural and urban populations of the Faizabad district of Uttar Pradesh had been done by **Pandey (et al 2014)**. The study reviews quite similar consumption of cereals but seasonal fruits and fast food consumption are less in rural areas. Mustard oil consumption in rural regions is very much high instead to refined oil, which is mainly used in urban regions.

As Puruliya suffers from extreme weather conditions the present study of **Roy and Hazra (2020)** has tried to assess monthly drought and early warnings of droughts in the Puruliya district.

Mitra et.al 2023 opted for a cross sectional study on 240 slum households of Bankura district to assess food security with nutritional adequacy and dietary diversiry specially foe under 5 age group and result shows 29.1% of them having food security where as 44.23% and 26.6% of having low and very low level of food security respectively.

Only 43.2% (56.8%) household identified as food secure (food insecure) in a study (**Muche et.al 2022**) on rural Ethiopia where coffee and wheat are dominant crop and use of logit model empirically shows educational level, credit possibility to wheat and coffee growers, land degradation, access to the market all has a significant impact on food security.

Methodology

Firstly we want to compute the pattern of consumption for the district of Puruliya. For that, we had to use the principle component analysis method on our dataset that are collected by using 4 points Likert scale method. We have considered 12 food components that are very common in consumption for both the rural and urban region of the district. The score of the food consumption pattern (FDCONPAT) lies between 0 and 100. Value closer to zero implies an unhealthy pattern of consumption and a value closer to 100 implies a healthy pattern of consumption of the households of the district.

Our formula to compute the food consumption pattern score is

$$FDCONPAT = \left(\frac{\text{Actual Score} - \text{Minimum Score}}{\text{Maximum Score} - \text{Minimum Score}} \right) * 100$$

Next, we want to observe the impact of food consumption pattern score along with some other important factor on food security using a probilistic model for the district Puruliya. As our food security status is considered as binary variable where households with having food security is identified by binary value 1 and households with not having food security is identified by binary value 0 therefore we have tried to form a logit regression model of food security for the district of Puruliya. Our model is as follows-

$$p(FDSECURITY_i = 1 | X) = \gamma_0 + \gamma_1 FDCONPAT_i + \gamma_2 FAMINC_i + \gamma_3 FOODEXP_i + \gamma_4 HSTEDN_i + \gamma_5 AGEHD_i + \gamma_6 NMMEM_i + \gamma_7 NMFCARD_i + \phi_1 REGION_i + \phi_2 RELIGION_i + \phi_3 CASTE_i + \phi_4 GENHDFAM_i + \phi_5 JOBCARD_i + \phi_6 LAND_i + \phi_7 LIVESTK_i + \phi_8 LNDLVSTK_i + u_i$$

Where,

FDSECURITY is food security

FDCONPAT is food consumption pattern

FAMINC is monthly family income

FOODEXP food expenditure

HSTEDN is highest educational attainment by any of the household member in terms of years of education

AGEHD age of the household head as age in years

NMEM is family size

NMFCARD is the number of PDS card holding. The variable is a dummy variable which is 1 if at least any one of the household member enjoying the facilities of PDS card and 0 otherwise.

REGION is the rural and urban region where dummy value 1 for urban region and 0 for rural region

RELIGION is Hindu (dummy value 1) and Non-Hindu (dummy value 0) religion

CASTE is the caste division of General (dummy value 1) and Non-General (dummy value 0) household

GENHDFAM is the gender of the head of the family, dummy value 1 for male headed household and dummy value 0 for female headed household

JOB CARD is holding a job card implies dummy value 1 and 0 otherwise

LAND is the holding of agricultural land with dummy value 1 if household owns agricultural land and 0 otherwise

LIVESTK is the holding of live stock (Yes-1, No-0)

LNDLVSTK is both holding of land and live stock jointly (Yes-1, No-0).

Hypothesis we are going to test are as follows-

Hypothesis 1: As food consumption pattern score increases probability of food security is likely to increase ($\gamma_1 > 0$).

Hypothesis 2: With increase in monthly income the probability of achieving food security increases ($\gamma_2 > 0$)

Hypothesis 3: Probability of food security expected to go up with increase in FOODEXP ($\gamma_3 > 0$).

Hypothesis 4: Probability of food security is higher with higher educational qualification by any of the member of the household ($\gamma_4 > 0$).

Hypothesis 5: Probability of being food secure is expected to be reduced with increase with the age of the household head ($\gamma_5 < 0$).

Hypothesis 6: Probability of food security is reduced with addition in family size ($\gamma_6 < 0$).

Hypothesis 7: Holding a PDS card by the household raises the probability of food security ($\gamma_7 > 0$)

Hypothesis 8: The probability of food security is likely to be higher in urban region than in rural region ($\phi_1 > 0$).

Hypothesis 9: Households belongs to Hindu community expected to have higher probability of being food secure ($\phi_2 > 0$)

Hypothesis 10: General caste households are expected to have higher probability of food security ($\phi_3 > 0$)

Hypothesis 11: Male headed households are likely to have higher probability of food security ($\phi_4 > 0$)

Hypothesis 12: Having a job implies greater probability of food security ($\phi_5 > 0$).

Hypothesis 13: Owning agricultural land means probability of achieving food security is likely to be higher ($\phi_6 > 0$).

Hypothesis 14: Holding live stock implies additional income hence to have higher probability of food security ($\phi_7 > 0$).

Hypothesis 15: Probability of achieving food security is even higher with access to both land and livestock ($\phi_8 > 0$).

Data description

Collecting primary data is a very tricky job. To serve our purpose of this study we have collected 750 households data from entire Puruliya district. The district has four subdivision we have collected data by selecting some CD blocks from each subdivision using purposive sampling method then used the mixed

sampling method to choose the villages and the households for our study. We have collected data from two blocks each from Jhalda and Manbazar subdivision whereas three blocks each from Puruliya Sadar and Raghunathpur subdivision. We have prepared a predesigned questionnaire including two sets of questions: one is questions on households socio economic demographic profile and another is questions on household's daily food consumption pattern using 4 point Likert Scale method, monthly or daily purchased food basket and also some basic health measurement like height and body weight along with the work profile of the members of the household.

Estimation Result & Discussion

Let us now discuss the table-1 which presents the summary statistic of some of our important quantitative variables with their mean value, median value, maximum value and minimum value. Our data from the district Puruliya consist household with maximum of Rupees 25000 income for a month and minimum of Rupees 2500 per month income for a household. Mean monthly family income of the district is Rs. 11111 and median income is Rs. 11300. The district is lacking behind in educational achievements also and that reflects our data as mean education of the district is 6.86 with median highest education in the family is 6 with maximum of 17 years of education and minimum of 0 years of education i.e; illiteracy occurs.

Table-1 Summary Statistic of Important Quantitative Variables.

	Monthly family Income in Rupees	Highest Education in the Family	Age of the Household Head	Family Size	Number of Card Holding
Mean	11111	6.86	51.21	4	4
Median	11300	6	54	4	4
Maximum Value	25000	17	78	6	6
Minimum Value	2500	0	20	2	1

*Author's own computation based on primary data

Life expectancy of the district is also very low shows in the mean age of the head of the household i.e; 51.21 years and median age of the head of the household is 54 for the district. Maximum age found at 78 years and minimum age found for a head of the household of the district in our dataset is 20 years.

Mean family size is of 4, median is also 4. Highest family size in our data set is 6 members in the household and minimum of 2 members in a family. In case of number of card holding mean value of card holding we found as 4, median is also 4. Highest card holding for a family is all 6 members holding a PDS card each and minimum value occurs as 1 implies at least one ration card available to a household.

Table-2 here presents the percentage distribution of some important qualitative variables. Our first variable is region; entire district's data set consists of 33.3% rural household and 66.7% urban households. Data set consists of 36.13% Hindu household and rest 63.87% Non-Hindu household. In terms of caste division the data set consists of 56.40% General caste household and 43.60% Non-General household. 65.33% male headed households are there in our sample and 34.67% female headed households are there in the sample.

Table-2 Percentage Distribution of Important Qualitative Variables

Region	Rural	33.3%
	Urban	66.7%
Religion	Hindu	36.13%
	Non-Hindu	63.87%
Caste	General	56.40%
	Non-General	43.60%
Gender of the Household Head	Male Headed	65.33%
	Female Headed	34.67%

*Author’s own computation based on primary data

Table-3 Percentage distribution of food security in Rural urban Puruliya

	Food Security	Food Insecurity
Puruliya (Pooled Data)	46.53%	53.47%
Rural Region	26.8%	39.87%
Urban Region	19.73%	13.6%

*Author’s own computation based on primary data

Refer to table-3 we observe that our entire district data set i.e; pooled data set consists of 46.53% food secure household and 53.47% food insecure household. To consider the regional disparities in terms of food secure and insecure households we found 39.87% food insecure households are there in rural Puruliya in contrast with 26.8% food secure household. Food security occurs by 19.73% in urban Puruliya against 13.6% food insecurity.

Let us refer to the table number 4 where we have presented the outcome of our logit regression estimation. Our first variable is food consumption pattern that have a positive impact on household’s food security implies probability of achieving food security is likely to be higher with an improvement of food consumption pattern. The coefficient (0.013) is statistically significant at 1% level of significance.

Probability of food security is likely to be higher with increase in monthly family income of the households. Result (0.004) is significant at 1 percent level.

Our maximum likelihood regression estimation result (-0.001) is showing an inverse relation with food security at 1 percent level as food expenditure increases probability of food security decreases by 0.001 percent. The may be the price hike and inflation in the food market.

The variable highest educational attainment is insignificant in our study.

Family size has inverse relation with household’s food security. As family size increases probability of food security decreases. The result (-0.8) is statistically significant at 1 percent level of significance.

Holding PDS card raises the probability of food security but the result is statistically insignificant here.

Urban households are likely to have higher probability of achieving food security. Coefficient (0.34) is significant at 1% level.

Religion is statistically insignificant in our logit regression analysis.

General caste households likely to have higher probability than of Non-General caste households. The coefficient (0.49) is significant at 10 percent level.

Our logit regression estimate of the parameter gender head of the household is statistically insignificant. Holding a job card implies higher probability of being food secure and the result (0.085) is statistically significant at 1 % level of significance.

Table-4: Logit Regression of Food Security in the District of Puruliya using Food Consumption Pattern as a Continuous variable

Iteration	0			log likelihood	=	-518.0563
Iteration	1			log likelihood	=	-452.1497
Iteration	2			log likelihood	=	-452.0423
Iteration	3			log likelihood	=	-452.0423
Logistic regression				Number of obs	=	750
				LR chi2(15)	=	132.0300
				Prob > chi2	=	0.0000
Log likelihood = -452.04229				Pseudo R2	=	0.1274
FDSECURITY	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
FDCONPAT	0.01264	0.00454	2.7835	0.0022	-0.01016	0.07635
FAMINC	0.00378	0.00131	2.8899	0.0012	0.00198	0.00123
FOODEXP	-0.00159	0.00023	-6.8387	0.0005	-0.00615	0.00030
HSTEDN	-0.01390	0.02266	-0.6132	0.5400	-0.05832	0.03052
AGEHD	0.01103	0.00674	1.6365	0.1020	-0.00218	0.02424
NMEM	-0.82915	0.10382	-7.9867	0.0000	-1.03263	-0.62567
NMFCARD	0.06583	0.08403	0.7834	0.4330	-0.09887	0.23053
REGION	0.33823	0.12927	2.6165	0.0025	-0.02354	0.91187
RELIGION	-0.00126	0.22371	-0.0056	0.9960	-0.43971	0.43720
CASTE	0.49046	0.28507	1.7205	0.0850	-0.06827	1.04920
GENHDFAM	0.06069	0.21632	0.2806	0.7790	-0.36328	0.48467
JOBCARD	0.08496	0.01637	5.1909	0.0010	0.03123	0.13293
LAND	0.28382	0.07625	3.7222	0.0026	0.17730	0.30536
LIVESTK	0.05062	0.02315	2.1871	0.0040	0.03511	0.43299
LNDLVSTK	0.57560	0.27596	2.0858	0.0213	-0.16128	1.31247
_cons	2.62527	0.67375	3.8965	0.0000	1.30475	3.94580

* Author's own computation based on primary data

Agricultural land holding implies higher probability of food security. Our coefficient value (0.28) is statistically significant at 1% significance level.

Live stock holding also implies greater probability of food security. The result (0.05) is significant at 1 percent significance level.

Holding both land and live stock jointly implies higher probability of achieving food security. The result (0.58) is statistically significant at 5% significance level.

Table-5 represents the marginal impact of one unit change in explanatory variables in our logit regression model.

Marginal impact of food consumption pattern on food security is insignificant.

Marginal impact of monthly family income on food security is also become insignificant. Food expenditure, highest educational qualification by any member of the family, household head’s age and ration card holding all explanatory variables became statistically insignificant in our marginal effect equation of logit regression model for the Puruliya district.

The family size has negative marginal effect on food security reflects one unit increase in the family size showing negative effect on food security. The coefficient is significant at 1 percent level.

Table-5: Marginal Impact of Explanatory Variables on Food Security of the Households of Puruliya District

dy/dx w.r.t.	dy/dx	Std. Err.	z	P> z	[95% Conf. Interval]	
FDCONPAT	-0.00031	0.00113	-0.2784	0.7810	-0.00252	0.00190
FAMINC	-0.00001	0.00001	-1.2261	0.2200	-0.00002	0.00001
FOODEXP	-0.00004	0.00006	-0.6846	0.4940	-0.00015	0.00007
HSTEDN	-0.00345	0.00563	-0.6132	0.5400	-0.01448	0.00758
AGEHD	0.00274	0.00167	1.6367	0.1020	-0.00054	0.00602
NFMEM	-0.20586	0.02577	-7.9877	0.0000	-0.25638	-0.15535
NMFCARD	0.01634	0.02087	0.7832	0.4340	-0.02456	0.05724

*Author’s own computation based on primary data

Conclusion

Feeling the stomach is important to run the human body but feeling the stomach with healthy nutritious food with required proportion is even more important to lead a healthy, active and disease free balanced life. As our study district Puruliya is one of the most backward districts in terms of economy and livelihood food security is one of the main concerns of the district. Therefore our objective of the study was to estimate the status of food security of the district. Food insecurity depends upon insufficient income, lack of access, lack of knowledge regarding food consumption more importantly unhealthy food consumption pattern. Our study reveals that almost 53.47% of our total sample households are suffering from food insecurity. Food insecurity is much higher in rural areas of Puruliya district than in the urban households. From our study we can easily observe that households with healthy food consumption pattern have greater access to food security. Therefore it is important to generate knowledge regarding healthy food consumption pattern. Government can initiate an awareness programme regarding nutrition rich consumption pattern with minimum level of income.

Income is the most important factor that is essential to get required food. The district is lacking behind in this context therefore it is necessary to generate source of income for the inhabitants of the district. There are possibilities to generate income source by stimulating tourism business, small scale craft business in the district and involve local population especially rural population into it. Government may consider this matter on a serious note.

Expenditure made on food should elevate the food security status but in our case it affects food security in reverse way i.e; because general price hike in the overall food market. As income of the population of the district is low therefore overall price hike in the food market increases their food expenditure but do not elevate their food security status but affects inversely. Therefore food price hike and market inflation rate should check.

Our result indicates control in family size is important. Rural Puruliya needs some special attention from the Government for overall development so that food security can go better off for them in future. As holding job card, having land, live stock helps them out to achieve food security therefore promotion of holding live stock and revision in land distribution policy is necessary.

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