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Determinants of Household Food Insecurity among Tribal Population: An Experience from Rural West Bengal, India

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ABSTRACT

Background: Knowledge regarding distribution and determinants of household food insecurity focusing on vulnerable groups is utmost important for ensuring food security, which is every nation prime agenda. This study was conducted to determine the prevalence and determinants of household food insecurity among the tribal population of Purulia, West Bengal. **Methods:** A cross-sectional study was carried out among 134 tribal households covering a total 632 population selected from 3 administrative divisions of Purulia district by two-stage random sampling. Information collected on selected demographic and socio-economic profile of the households including utilization of public distribution system (PDS) by house-to-house interview. A Bengali version of validated household food security scale-short form was used as a tool for data collection. Furthermore, the anthropometry was carried out among the children aged 6-59 months. **Results:** The results showed that the prevalence of household food insecurity was 35.8% in the study area. Households with lower socio-economic status, kutch houses, low income related to the family members, holding of below poverty line (BPL), and ration card were significantly associated with the household food insecurity. Prevalence of under-weight and stunting among 6-59 months children were found significantly more among food insecure households. **Conclusions:** In spite of several efforts, household food insecurity was quite prevalent especially among vulnerable poor households. Therefore, it shows that food security along with poverty reduction activities are required to be increased at the household level.

Keywords: *Determinants; Household food insecurity; India; Tribal population*

Introduction

Despite rapid economic growth, remarkable progress in food production as well as sufficiency and technological innovations, India is lagging behind the commitment for achieving

'Millennium Development Goals'. The regional inequality associated with ignorance and poverty especially among vulnerable population make the situation worse even seventy years after

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independence. More than 217 million undernourished people are living in India (Food and Agriculture Organization, 2002).

About 40.4% and 44.9% of the children below the age of 3 years were underweight and stunted, respectively, in India (National Family Health Survey (NFHS-3) 2007). According to the 'Global Hunger Index', India placed in the 'alarming category' (Grebmer KV, 2010). The 'World Food Summit' at Rome in 1996 adopted the definition: 'Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life' (Food and Agriculture Organization, 1996). However, it is a challenging job for a vast and populous country like India where 25.7% of the population is below the poverty line in rural areas (Planning Commission, 2013).

Scheduled tribes are considered as socially and economically one of the most vulnerable populations comprised 8.6% of the India population (Registrar General and Census Commissioner of India under the Ministry of Home Affairs, 2011). Poverty, ignorance and under nutrition are prevalent among the tribal population (National Family Health Survey (NFHS-3) 2007). Valid and reliable information are necessary for formulating strategies to confront the situation. Several methods are commonly used for assessing food insecurity at the household level. The qualitative measures based on the 'Household Food Security Scale' (HFSS) are rapid and cheap methods to assess the perception of the people regarding household food insecurity (Bickel G, 2000). Considering these facts in mind, the present study aimed to investigate the prevalence and determinants of household food insecurity among the tribal population of Purulia district, West Bengal.

Materials and Methods

Study design and setting: A community based cross-sectional study was conducted among the tribal population of Purulia district of West Bengal during October 2015 to March 2016.

Purulia is a borderline drought prone district situated at West Bengal with a population of 2,92,7965; nearly 20% of which belonged to scheduled tribes (Registrar General and Census Commissioner of India under the Ministry of Home Affairs, 2011).

Study units and participants: The present study considered household as the study unit and all the family members of the studied households were included for assessing the food security status at the household level. Anthropometric indicators of the children aged 6-59 months used as proxy outcome indicators of the household food security.

Sample size and sampling technique: Considering the prevalence of household food insecurity as 44% (Chakraborty, 2005); 5% alpha error, 20% relative precision and 10% non-response rate, the desired sample size was 134. The district of Purulia has three administrative divisions namely; Purulia Sadar East, Purulia Sadar West and Raghunathpur. Villages with at least 25% tribal population were eligible for inclusion in the present study. Two-stage random sampling technique was used for selection of the villages (one from each administrative division). The required number of the studied households from randomly selected villages out of the administrative divisions was calculated by using probability proportional to size (PPS) sampling to ensure representation of all divisions. In each village, required numbers of tribal households were selected randomly and in case of non-availability, households from the nearby tribal village were investigated.

Ethical issues and necessary approval: The study obeyed the ethical standards for an observational study and approved by the Institutional Ethics Committee, Midnapore Medical College, Paschim Medinipur, and West Bengal. The informed written consent was obtained from each of the study participant.

Data collection and measurements: The head of the household or any responsible adult family

member, preferably a woman was interviewed with means of a predesigned, pretested, semi-structured questionnaire. The demographic, socio-economic as well as food security status information at household level were collected.

A slightly modified and validated bengali version of 'Six-item HFSS-Short Form' was used to assess the household food security status after pretesting (Bickel G, 2000). The households responding affirmatively to four or more items of the scale were considered as very low food secure and those responded to two to three affirmative answers were considered as low food secure households. Households which responded negatively to all six items and those which gave only one affirmative answer were coded as households with high food security and marginal food security, respectively (Blumberg SJ, 1999). High and marginal food secure households were considered as food secure; whereas low and very low food secure households were categorized as food insecure households. Socio-economic status of the households was assessed by the 'modified Prasad classification' (Mangal A, 2015). The utilization of the public distribution system (PDS) through fair price shops was also enquired and expressed as regular (on an average ≥ 3 weeks/month), irregular (< 3 weeks/month), and not used PDS at all as stated by the respondents. Anthropometric assessments such as weight and height were measured among the youngest children aged 6-59 months presented in the surveyed households by using standard techniques (World Health Organization, 1995) and expressed in terms of weight-for-age and weight-for height/length indicators as the new WHO standards (World Health Organizatio, 2007).

Data analysis: After verification, the data were entered in Microsoft Excel worksheet (2010 version). The statistical analysis was done using the Epi-Info™ [Version 7.2] software package. The continuous variables were expressed in terms of mean and standard

deviation. Proportions were used for calculating the prevalence of different grades of household food security. Associations between risk factors and the household food insecurity were evaluated by calculating the chi-square test. For all statistical tests, P-value < 0.05 was considered as statistically significant.

Results

Among 134 surveyed households, the majority (58.2%) lived in kutcha houses and 23.1% and 18.7% lived in semi-pucca and pucca houses, respectively. The average family size was 5.7 ± 0.37 and the majority (97%) belonged to Hindu caste. Illiteracy was evident among 35.8% of the housekeepers and more than half of them (56%) engaged in unskilled works. Under-five children were among 47% (63 out of 134) of the households.

According to the 'modified B.G. Prasad scale' (Mangal A, 2015), 91% of the households belonged to poor socio-economic (class V and class IV) and the remaining (only 9%) belonged to lower middle, upper middle and upper class (class I to class III) together. The average total income related to members was 4.04 ± 0.15 . The majority (85.9%) of the households had Below Poverty Line (BPL) ration card and 70.1% households utilized the public distribution system for ration on regular (≥ 3 weeks/month) basis.

The prevalence of food security (considering both high as well as marginal food security) was 64.2% among the studied households and the rest (35.8%) of the households had food insecurity (32.8% belonged to very low food secure category and 3% were low food secure category). Intake of the balanced diet represented a proxy measure of dietary quality in the study. Only 44% of the households took balanced meal on regular basis. (**Table 1**)

The overall household food insecurity was 35.8%. All (100%) the food insecure households were Hindu. (Household Food insecurity was not significantly different according to education and occupation of the housekeeper and presence of under-five children in the family (**Table 2**).

Food insecurity was significantly more prevalent ($P < 0.05$) among families who lived in kutcha houses (79.2%) and where members' income to the total income was $1 : > 4$ (62.5%) as compared to the ratio of $1 \leq 4$. It was also evident that food insecurity increased with increasing socio-economic classes (Class I to Class V) as in the B.G. Prasad scale with the highest prevalence (77.1%) in Class V. Though majority (95.8%) of the food insecure households had BPL ration

card, only 66.7% of the families utilized the PDS regularly. One-third of the food insecure households (16.7% in each category) did not utilize the PDS at all or regularly due to financial constraints (**Table 3**).

Table 4 indicates that the prevalence of underweight (72.7%) as well as stunting (54.5%) among the children aged 6-59 months were significantly higher among the food insecure households ($P < 0.05$).

Table 1. Prevalence of different categories of household food insecurity

Categories of household food security		N	%
Food Secure	High food secure	39	29.1
	Marginal food secure	47	35.1
Food Insecure	Low food secure	04	3.0
	Very low food secure	44	32.8
Balanced Diet ^a	Regular	59	44.0
	Not regular	75	56.0
Total		134	100

^a: taking rational mix of essential nutrients

Table 2. Household food insecurity by selected socio-demographic factors

Variables		Total households		Food Insecure		P-value ^a
		N	%	N	%	
Religion	Hindu	130	97.0	48	100	--
	Islam / Others	04	3.0	0	0	
Education of the housekeeper	Illiterate	48	35.8	20	41.8	0.05
	1-4	13	9.7	03	6.2	
	5-12	51	38.1	22	45.8	
	> 12	22	16.4	03	6.2	
Occupation of the housekeeper	Service/Business	25	18.7	06	12.5	0.19
	Skilled worker	14	10.4	3	6.2	
	Unskilled Worker	75	56.0	29	60.4	
	Home maker	20	14.9	10	20.8	
Under-five children?	Yes	63	47.0	23	47.9	0.87
	No	71	53.0	25	52.1	

^a: chi square test

Table 3. Household food insecurity by selected socio-economic factors

Variables	Total households		Food Insecure		P-value ^a
	N	%	N	%	
Socio-economic status (as per B.G. Prasad's classification)					0.08
Class I to III	12	9.0	01	02.1	
Class IV	31	23.1	10	20.8	
Class V	91	67.9	37	77.1	
Earning to total family members ratio					< 0.001
≤4	84	62.7	18	37.5	
>4	50	37.3	30	62.5	
Possession of BPL ration card					0.02
Yes	115	85.9	46	95.8	
No	19	14.2	02	4.2	
Utilization of the PDS					0.07
Not utilized at all	28	20.9	08	16.7	
Regularly utilized	94	70.1	32	66.7	
Not regularly utilized	12	9.0	08	16.7	
Type of house					< 0.001
Kutcha	78	58.2	38	79.2	
Pucca	25	18.7	04	8.3	
Semi Pucca	31	23.1	06	12.5	

^a: chi square test

Table 4. Household food insecurity by under-nutrition status of the children 6-59 months

Nutrition status	Total households		Food insecure		P-value ^a
	N	%	N	%	
Underweight					< 0.001
Yes	20	35.1	16	72.7	
No	37	64.9	6	27.3	
Stunting					< 0.001
Yes	16	28.1	12	54.5	
NO	41	71.9	10	45.5	

^a: chi square test

Discussion

The present study revealed that 35.8% of the households were food insecure in the study areas. The majority (32.8%) of which belonged to very low food secure category and the remaining (3%) were in low food secure category. A similar study from rural West Bengal among tribal population reported higher prevalence (52.8% of overall prevalence; 29.6% and 23.2% were low and very

low food secure, respectively) (Mukhopadhyay DK, 2010). Another study also reported higher prevalence (51%) of household food insecurity as compared to the present study (Agarwal S, 2009). The difference in the prevalence may be due to different study settings as well as up-scaling of food security interventions. The present study revealed that though nearly two third (64.2%) of the studied households were food secure, only in

44% of the households where family members with balanced diet (rational mix of essential nutrients) which reflected the quality of consumed food as well as the nutritional security.

Food security depends on several factors, such as availability and accessibility of food, food safety, economic access, social acceptance. Furthermore, not only food security, but also nutritional security can't be ignored. A study from North India among population of an urban slum reported only 34.2% of the households consumed balanced diet (Agarwal S, 2009). The present study showed a significant association between parameters of lower socio-economic status such as kutchra houses, high earning to total family members ratio (> 4) and lower class (Class V) of modified B.G Prasad scale. Several studies also reported similar association between lower socio-economic status and high unemployment to employment ratio with household food insecurity (Agarwal S, 2009, Mukhopadhyay DK, 2010, Ray SK, 1997).

The majority of the studied households possessed BPL card (85.9%) and regularly utilized the PDS (70.1%) which could be justified as rational inclusion (inclusion as below poverty line); since the study was conducted among the most socio-economical vulnerable tribal population in the driest district of West Bengal. However, surprisingly, even one third (33.4%) of the food insecure households those had BPL ration card did not utilize the PDS regularly, probably due to monetary constraints. Poverty was intractably related to household food security, since there was a positive association between lower socio-economic status and food insecurity (**Table 3**). A similar study among tribal population of rural West Bengal reported less prevalence of possession of BPL card (69.3%) as well as regular utilization of PDS (56.9%) than the results of the present study (Mukhopadhyay DK, 2010). Another study also reported less availed services of PDS in spite of owning a ration card on regular basis in an urban colony of North India (Chinnakali, 2014). A study from urban area of Tamil Nadu, India reported overall

58.5% households and 82.9% households in the lower socioeconomic strata used the PDS mainly for buying rice-the main food, respectively (Gopichandran V, 2010).

Therefore, mere availability and accessibility of food is not enough for household food security without improving the purchasing power. The community awareness program along with association of the marginalized rural community with the existing poverty reduction activities and income generation programs should be promoted.

The present study revealed higher prevalence of under-nutrition among tribal with children under the age of 5; similar to the findings of other studies (Agarwal S, 2009, Mukhopadhyay DK, 2009, Yadav RJ, 1999). The proportions of under-weight and stunting among children aged 6-59 months were found 35.1% and 28.1%, respectively; while it increased drastically in food insecure households (72.7% under-weight and 54.5% stunting). A greater prevalence was found than the national as well as the state prevalence (National Family Health Survey (NFHS-3) 2007). Several other studies reported less prevalence findings. The findings differed due to the different references used in anthropometric interpretation, different study settings and study population (Chinnakali, 2014, Mukhopadhyay DK, 2009, Ray SK, 1997).

Conclusions

It was concluded that food as well as nutritional insecurity were prevalent among the study population. Food insecurity was significantly associated with lower socio-economic status. The study findings showed that better accessibility of balanced food and improvement of socio-economic status are required. The community awareness program along with association of the vulnerable and marginalized community with the existing poverty alleviation activities and income generation programs should be strongly promoted. Not only the quantity, but also the quality of the ration should be requested to ensure about both food and nutritional security at the household level.

The present study tried to assess both quantities as well as quality aspects of household food security among the marginalized community of rural West Bengal. Nutritional status of the under-five children was considered as one of the most important proxy indicators of severe consequences of household food insecurity. However the study had some limitations, which suggest cautious interpretation of its findings. The study mainly relied on self-reported data which had some subjective components related to social expectations. The study was carried out only among a small tribal population of a single district of West Bengal; therefore, the study findings could not be generalized. The diet survey was not considered for assessing nutritional security. The knowledge regarding low cost locally available food, food diversity, social acceptance etc. was not assessed. A further large scale study with refined tools must be conducted to ascertain the exact situations of household food security and its predictors especially among vulnerable population in India for better program management and policy construction towards achieving the 'Millennium Development Goals'.

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Authors' Contributions

Yasmin S, Sinha N and Baur B designed and conceptualize the study. Yasmin S, Bhattacharjya A and Sinha N analyzed the data. All the authors collected the data, took part in drafting of the manuscript and finally approved the same. Yasmin S, Sinha N and Baur B critically reviewed and edited and manuscript.

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Conflict of Interest

None of the authors declared any conflict of interest.

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