Household Food Insecurity and Coping Strategies
in a Rural Community of West Bengal

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Abstract

This study aims to understand the depth of household food insecurity and elucidates the coping mechanisms opted by households. A cross sectional study was conducted among 485 households in rural setting of West Bengal. Findings revealed that only 20 per cent households were food secure, whereas 44 per cent categorised as 'food insecure', 30 per cent were 'food insecure with hunger (moderately)' and six per cent households identified as 'food insecure with hunger (severe). Multivariate binary logistic regression model showed that education of head of the household, caste, source of income, MPCE status and availability of livestock were significantly associated with the household food security. The most common coping strategies opted by households were to consume less preferred and less expensive food (98%), followed by borrowed food from relatives (73%). Similarly, common livelihood coping mechanisms were use of past saving cash (95%) and reduction of spending on other expense (94%). In conclusion, the present study documents the depth of food insecurity in the study area and seeks attention of policy planners to address the issue through proper implementation of food safety based interventions.

Key words: Food security, food insecurity, hunger, rural community, coping strategies, livelihood, food safety.

I. Introduction

Despite several efforts and international partnership, India has failed to achieve both Millennium Development Goal (MDG) and World Food Summit (WFS) targets to reduce the number of hungry people. It is the home of 1.21 billion people as per 2011 census. Out of these, as estimated by Food and Agricultural Organization, 195 million people or 15 per cent of the total population, are undernourished which account for one-fourth of the world's hungry (FAO/IFAD/WFP, 2015). Economic growth and improved agricultural productivity were not found beneficial in eradication of poverty and hunger in India. Progress in declining numbers of undernourished people is significantly sluggish in India (7%) compared with the world (21%) during 1900-2015. Unexpectedly, when the number of people undernourished in the world declined from 821 million in 2005-07 to 795 million in 2015, the number has increased for India from 190 million to 195 million despite better economic growth and agricultural performance. India is one of the fastest-growing economies in the world showed a GDP growth of 4.98 per cent during 2013-14 and expected growth of 5.5 per cent in 2014-15. Apparently its food grain production estimated to be 259 million tonnes for the year 2013-14 and buffer stock with the Food Corporation of India (FCI) were sufficient to ensure food security (*State of Indian Agriculture, 2012-2013*). Despite of these adequate food stocks, millions of people in India are dying of hunger.

The concept of 'food security' has undergone several changes (Maxwell and Frankenberger, 1992). In the past it was mostly measured by national availability and stocks of food grains

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(Konandreas et al., 1975). However, it was realised by policy makers and others that national availability and stocks of food grains did not ensure the households or individual access to food entitlement. Thus, the focus shifted from national level to household and individual levels in the mid-1980s, particularly after Sen's theory on food entitlement (1981). Complexity arose due to diversified views and approaches in defining the concept. Smith et al. (1993) listed nearly two hundred definitions of food security to see the evaluation in the concept over the time. Hitherto, measuring household food security is a global priority for researchers and policy makers due to its multidimensional and complex indicators. World Food Summit (1996) laid down, "Food security exists when all people, at all time, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preference for an active and healthy life." This definition encompasses four fundamental aspects: availability, accessibility, utilization and stabilization. Many researchers attempted to define food security in several ways which can be grouped under quantitative and qualitative approaches. Quantitative approach includes household's calorie intake survey (Ahmad et al., 2004), income expenditure survey and anthropometric survey to measure food security. In another way, food security is measured qualitatively using diet diversity index, coping strategies index (Ziae et al., 2013), Radimer/Cornell hunger and food insecurity instrument (Zalilah & Tham, 2002; Zalilah & Geok, 2008) and food security survey module (Abafita & Kim, 2014).

In India most of the studies measure food security either based on calorie norm approach (Tandon & Landes, 2012; Kumar et al., 2012) or based on national food production and food availability criteria (Ittyearah, 2013; Rao & Deshpande, 2002), thus neglecting multidirectional and qualitative aspects of household food security. Moreover, any single indicator may not be adequate to measure household food security. It needs suits of indicators to capture the complexity of food security (Maxwell et al., 1999). The latter at household is mainly determined by a set of human, physical, social and economic capitals. Plenty of studies have documented the role of household structure, demographic composition, access to land, employment opportunity, assets and availability of livestock as determinants of household food security (Zalilah & Geok, 2008 ; Sharafkhani et al., 2010). Further, food insecurity is a matter of anxiety on public heath perspective. People from food insecure households are more likely to suffer micro-nutrients deficiency and show many adverse health outcomes. Children (Alaimo et al., 2002), women (Adams et al., 2003) and adolescents (Lee & Frongillo, 2001) are the most vulnerable to suffer from the adverse health outcomes as a result of food insecurity at the household. Studies give evidence that household food insecurity is positively associated with obesity among adults (Olson, 1999). Zalilah & Lin (2004) find that household food insecurity as a risk factor for overweight and obesity among women from rural Malaysia.

Households overcome food insecurity condition in several potential ways; they will develop the shelf insurance of coping strategy to minimize the risks of household food insecurity condition. Households' responses to the food insecurity may vary by country, region, ethnic group, community, social class, Gender, age, and sessions. Severities of coping mechanism also vary with the households' resource potential to cope with the critical food insecure condition. A study of semi-arid area in central Tanzania shows that economically well-off families surpass the seasonal threats of food insecurity by means of changing farming practices and mobilization of external labour for agricultural production, while poor households have no other means except to sell their own labour as a means of survival during food shortage at home (Liwenga, 2003). An extent numbers of coping behaviour have been listed in the literature, include, change in cropping pattern, migration to urban area for search of employment, migration for other rural area for search of employment, collection of wild food, selling household assets, borrowing money or creels from others, consumption of food distributed through relief programmes, breakup of the household and distress migration.

II. Methodology

Data and sample size

The present study utilized a cross-sectional data collected from Bankura district of West Bengal in India. The study followed a multi-stage sampling and collected information from 485 households. A semi-structured questionnaire was used to administrate the survey. The instrument included measures of socio-demographic and household characteristics, household access to land, livestock, food security status, and coping behaviours of the household. Information was collected through the face-to-face interview with adult women, who is primarily responsible for food distribution in the household. In situations where the women were not available or not able to provide the required information (e.g. household resources, economy), any adult member of the households were interviewed to elicit responses.

Measuring household food security status

Household food security status was assessed using food security survey module designed by U.S. Census Bureau. The main advantage of this module is that its multiple indicator questions capture and distinguish the various levels of severity throughout the full range of severity with which the phenomenon of food insecurity or hunger is experienced. Further, this module was used successfully in India to understand the determinants and extents of household food insecurity (Agarwal et al., 2009; Mukhopadhyay & Biswas, 2010). The module contains an 18-item set of questions regarding food adequacy and financial constraints that asks whether a variety of behaviours or conditions had occurred within the past 12 months. All the 18 questions were coded into binary form, either affirmative or negative. Some questions having three response categories like "often true" sometimes true" and "never true". For such questions both "often" and "sometimes" were considered as affirmative responses because they indicate that the condition occurred at some time during the year and "never true" category was considered as negative response. There are again some follow-up questions whose response categories were "almost every month", "some months but not every month" and "only one or two months." In such case, first two responses were considered as affirmative and the third was considered as negative. Households that replied negative answer to the all eighteen items or 1- 3 positive responses were classified as food secure, households with 4-7 affirmative responses were classified as food insecure without hunger, households with 8-12 affirmative responses were classified as food insecure with hunger (moderately) and those responded with 13-18 affirmative answers classified as food insecure with hunger (severely). However, last two categories were merged as food insecure with hunger for the convenience of the analysis. The module reliability was examined using Cronbach's alpha value (Cronbach's alpha=0.77). Streiner and Norman suggested that values for alpha should exceed 0.7, while values in excess of 0.90 might be suggestive that some items are redundant (Streiner & Norman, 1989).

Measuring coping strategies

To understand the coping strategy of household, information was collected about 'Consumption coping strategy' as well as 'Livelihood coping strategy' when a household faced food deficient condition. Consumption coping strategy specifically related with the strategy to food consumption pattern that includes: dietary change; attempt to increase household food availability through some short term strategy; trying to reduce the number of household members; and adopting some rationing strategy. Livelihood coping strategies due to food deficiency, are those which are helpful for a food insecure household to sustain their life rather than to make theme food secure directly. These includes: working as casual labour, selling assets and live stocks, sending children for work, compromising with heath care etc.

Explanatory variables

A set of socio-economic and demographic characteristics of the household were included in the study to explain the household food security condition. These predictor variables were selected based on their theoretical and observed importance applied in literature. Demographic characteristics include age, sex (male or female), education status (categorised as uneducated,

educated up to 5th standard, educated from 6th -10th standard, educated more than 10th standard) of head of the household, and size of the household. Social characteristics include religion (Hindu and Muslim) and caste (which is categorised as follows – Scheduled Castes, Scheduled Tribes, Other Backward Castes, and General). Household economic characteristics included in this study are source of income (e.g. agriculture, agricultural labour, other labour, services, and Business), currently employed members in the household (one, two, three, and more than three), size of land (landless, marginal landholder, medium landholder, and large landholder), livestock in the household (yes or no), and monthly per capita expenditure (MPCE) of the household. To assess the MPCE of the household, the household consumer expenditure information was collected on various food and non-food items. Recall period for food and common items were generally 30 days but some non-food and less frequent items' expenditure were collected for 365 days' recall basis. The total expenditure incurred by households on domestic consumption during the reference period was divided by the family size to arrive at MPCE.

Analytical approach

Analytical approach followed in this study divided in two steps: in the first step, bi-variate analyses was carried out to understand the differentials in the prevalence of household food security status by socio-demographic characteristics. Pearson Chi-squared test was used to test the significance of differentials. In the second step, multivariate binary logistic regression model was used to understand the determinants of household food security status. In this model household food security status was considered as dependent variable, which was coded into binary form (i.e., food insecure =0; food secure =1). All the demographic, social and economic characteristics of household were included as independent or explanatory variables. Outcomes of this model were interpreted in-term of odds ratio.

III. Results

The study population shows a spectrum of social and economic diversity (Table 1). There are only two major religious groups found in the study area i.e., Hindus and Muslims. Nearly three-fourths (75%) of the study population is from Hindu community and only one-fourths (25%) population belongs to Muslim community. Out of 485 surveyed households, 29 per cent belong to Scheduled Castes and 21 per cent are from Scheduled Tribes population. Nearly 40 per cent households belong to General category and 10 per cent households are in the category of Other Backward Castes. Analysis suggests that majority of the households (92%) are headed by male member. Majority of the sampled households (55%) shows that age of the household head lies between 31 to 60 years and mean age of the head of the household in the study population is 45 years. It is found that 60 per cent of the sample households where head of the households is uneducated. Only five per cent head of the household in surveyed households have completed 10th standard of educational level. Result represents that most of the families (57%) of the surveyed households are living in joint families. Mean size of the sampled households is 5.7 *i.e.* on an average six persons are living per household in the study population. Agriculture and agricultural labour are the dominant source of income of the households. Nearly 34 per cent households have reported agriculture as a major source of income for their households. It is found that mean land holding size of the surveyed households is only about one acre, but there is an uneven distribution of possession of land in the study population. More than half of the study households (60%) have no land for agriculture or have less than 0.5 acre of land.

A significant proportion of the sample households were food insecure. The present study shows that only 20 per cent households were food secure whereas 44 per cent categorised as 'food insecure', 30 per cent were categorised as 'food insecure with hunger (moderately)' and six per cent households identified as 'food insecure with hunger (severe) category (Figure 1). Households characteristics varies significantly with the household food security status (Table 2). In general, food insecure households were characterized by smaller household size. Household Monthly Per Capita Expenditure (MPCE) and size of the land positively associated with the household food

Table 1: Socio- demographic characteristics of the sample households (N=485)

Socio-demographic and economic characteristics	Percentage	Total (N)
Religion		
Hindu	74.8	363
Muslim	25.2	122
Caste		
SCs	28.7	139
STs	20.6	100
OBCs	10.3	50
General	40.4	196
Sex of the household head		
Male	92.8	450
Female	7.2	35
Age of the household head		
Up to 30 years old	24.5	119
31 to 60 years old	55.3	268
> 60 years old	20.2	98
Median Age in Years	40	485
Mean Age in Years	44.9	485
Education of the household head		
Uneducated	59.6	289
Up to 5th standard	12.2	59
6th to 10th standard	22.9	111
>10 standard	5.4	26
Size of the household		
2 persons and less	32	155
2 to 6 Persons	57.9	281
>6 Persons	10.1	49
Mean size of the household	5.72	485
Major source of income		
Agriculture	34	165
Agricultural labour	28.5	138
Other labour	21.9	106
Services	6.8	33
Hawker/others	8.9	43
Size of landholding in the household/in acre (Max: 15; Min: 0)		
0 - 0.5	60	291
0.51 - 2.0	24.9	121
2.1 - 4.0	9.5	46
4.1 – 15	5.6	27
Mean size of landholding (in acres)	0.94	
Livestock in the household/in numbers (Max: 39; Min: 0)		
No livestock	37.7	183
1 -5	21	102
6 – 15	36.1	175
15 or More	5.2	25
Mean Number of livestock (in numbers)	5.34	

security condition. Average MPCE in food secure households were Rs. 944 whereas it was Rs. 601 in food insecure households and much lower in food insecure with hunger household i.e., Rs. 406. Average size of land was much higher in the food secure household (2.4 acres) compared to food insecure (0.9 acre), and food insecure with hunger households (0.1 acre). Levels of nutritional consumptions were positively associated with the household food security status. Average per

capita consumption of calorie, protein and fat were better in food secure households compared to food insecure households. Similarly, household dietary diversity score was much better in food secure households compared to food insecure and food insecure with hunger households.

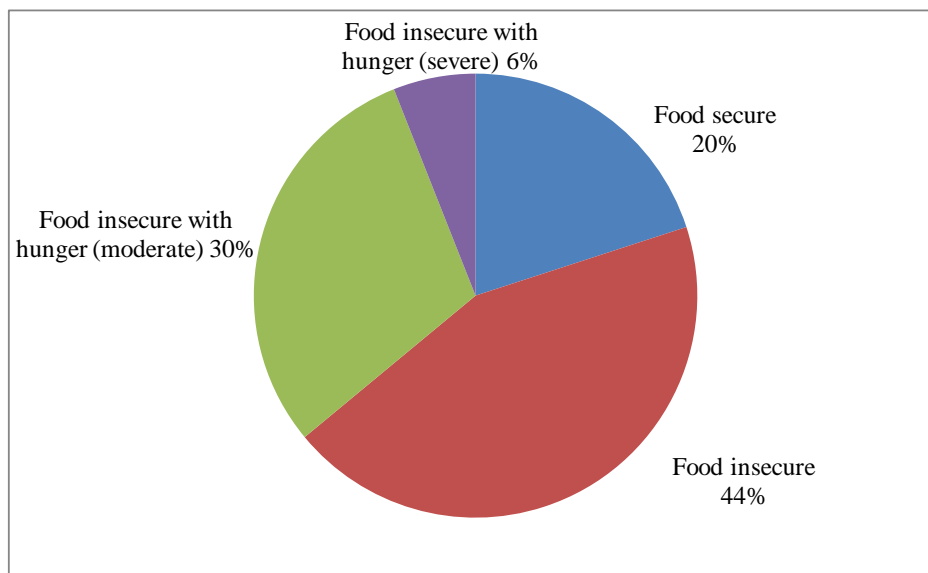Figure 1: Household's food security status

Table 2: Selected socio-demographic characteristics by household's food security status

Households' socio-demographic characteristics	Food security status		
	Food secure	Food insecure	Food insecure with hunger
Average family size of the households	7.0	5.7	5.1
Average monthly per capita expenditure (MPCE in Rs.)	944	601	406
Average size of landholdings (in acres)	2.4	0.9	0.1
Average per capita calorie consumption (Kcal)	2077	2124	1871
Average per capita protein consumption (gms)	56.4	53.2	45.3
Average per capita fat consumption (gms)	28.0	21.9	16.9
Average dietary diversity scores	8.4	7.5	6.0

Household food security varies significantly with the socio-demographic and economic characteristics of the household (Table 3). The prevalence of food security varies with the demographic characteristics of the head of household. Prevalence of food secure households were highest in the households where age of the head of households were more than 60 years (30 per cent) and educational level was more than 10th standard (77 per cent). Larger families were more food secure than the smaller families. Not a single among scheduled tribe households were food secure. Similarly, proportion of food secure households among schedule caste households were also very low i.e. only nine per cent. Most of the service holder households were food secure (75 per cent) but almost all the households where main earning member was agricultural labour were food insecure. Prevalence of food secure households were highest in those households where at least three members were currently employed, have land of more than 4 acres, have livestock in the house, and belong to richest MPCE quintiles. Results from multivariate analysis (Table 3) also indicate that households those head of households have more than 10th standard of schooling were 7.5 times more likely to be food secure (p=0.005). Likewise, general caste households and service holder households were 2.3 times more likely (p = 0.000) and 4.3 times more likely (p = 0.000) to be food secure than the corresponding categories. Another strong predictor of household food

Table 3: Prevalence and determinants of household food security by elected household's characteristics

Independent variables	Food secure households			Multivariate model			
	%	No.	p-value	Odds ratio	p-value	CL (95%)	
Age of the household head			p = 0.001				
Up to 30 years	9.2	11					
31 to 60 years	21.3	57		1.217	0.715	(0.424	3.491)
> 60 years old	29.6	29		1.118	0.865	(0.307	4.070)
Sex of the household head			p = 1.000				
Male	20.0	90					
Female	20.0	7		1.393	0.673	(0.298	6.501)
Education of the household head			p = 0.000				
Uneducated	11.4	33					
Up to 5th Standard	23.7	14		0.880	0.804	(0.321	2.415)
6th to 10th Standard	27.0	30		1.359	0.454	(0.609	3.029)
>10 standard	76.9	20		7.486	0.005	(1.865	30.039)
Size of the household			p = 0.000				
4 persons and less	12.9	20					
5 to 8 Persons	17.8	50		1.149	0.910	(0.102	12.899)
9 persons and more	55.1	27		1.412	0.861	(0.030	67.495)
Religion			p = 0.229				
Hindu	18.7	68		1.273	0.580	(0.541	2.999)
Muslim	23.8	29					
Caste			p = 0.000				
SC	8.6	12					
ST	0.0	0		1.000			
OBC	32.0	16		1.640	0.394	(0.526	5.111)
General	35.2	69		2.313	0.084	(0.894	5.981)
Major source of income			p = 0.000				
Agriculture	30.9	51					
Agricultural labour	0.7	1		0.158	0.124	(0.015	1.659)
Other labour	4.7	5		0.594	0.486	(0.137	2.569)
Services	75.8	25		4.353	0.026	(1.193	15.887)
Hawker/others	34.9	15		2.104	0.214	(0.651	6.802)
Currently employed members in the household			p = 0.000				
1	13.5	32					
2	21.8	32		2.813	0.389	(0.267	29.623)
3	35.8	24		6.500	0.273	(0.229	184.743)
>4	27.3	9		2.327	0.686	(0.039	139.241)
Households economic dependency ratio			p= 0.006				
1 : 2 or less	9.8	8					
1 : 3	27.1	42		2.578	0.258	(0.500	13.280)
1 : 4	22.5	29		3.316	0.206	(0.518	21.234)
1 : 5 or more	15.1	18		3.159	0.505	(0.107	93.211)
Size of landholding in the household / in acres			p = 0.000				
0 - 0.5 ®	7.2	21					
0.51 - 2.0	28.1	34		1.207	0.734	(0.407	3.580)
2.1 - 4.0	52.2	24		1.408	0.626	(0.356	5.571)
4.1 – 15	66.7	18		1.094	0.918	(0.200	5.979)
Livestock in the household			p = 0.000				
No ®	9.8	18					
Yes	26.2	79		1.587	0.320	(0.638	3.949)
MPCE groups			p = 0.000				
1st quintiles®	1.0	1					
2nd quintiles	0.0	0		1.000			
3rd quintiles	13.4	13		9.599	0.044	(1.063	86.699)
4th quintiles	32.0	31		16.815	0.013	(1.814	155.884)
5th quintiles	53.6	52		24.518	0.006	(2.468	243.566)
Constant k				0.001	0.000	(0.000	0.029)

Table 4: Coping strategies by the household during food shortage

Rank	Consumption / livelihood coping strategies	Households opted at anytime	
		%	No.
Consumption coping strategies			
1	Rely less preferred and less expensive food	98.4	477
2	Borrowed food or rely on help from a friend or relative	73.0	354
3	Reduce number of meals eaten in a day	66.2	321
4	Restrict consumption by adults in order for small children to eat	64.7	314
5	Limit portion size at mealtime for any member of the household	63.9	310
6	Ration the money you have and buy prepared food for your household	60.8	295
7	Feed working members of household at the expense of non-working members	59.2	287
8	Purchase food on credit	59.0	286
9	Gather wild food , hunt or harvest immature crops	49.5	240
10	Send children or any other household member to eat elsewhere	43.9	213
11	Skip entire day without eating anything	43.7	212
12	You consume seed stock held for the next session	32.4	157
13	Send any household member to beg	7.6	37
Livelihood coping strategies			
1	Usek past cash saving	94.9	460
2	Reduce spend on other expense	93.6	454
3	Reduce spending on health for household members	84.1	408
4	Any other coping strategies	79.6	386
5	Reduce food consumption in your household	68.0	330
6	Any member of the household took work on additional hours	67.8	329
7	Receive help from friends and relatives	54.0	262
8	Borrow money from stokvels	53.6	260
9	Borrow money from relatives	45.6	221
10	Sell any livestock	36.3	176
11	Sell any agricultural product	28.9	140
12	Sell any other household assets	20.8	101
13	Any child or aged persons have gone for work, only because household have no sufficient money to survive	18.4	89
14	Any pregnant women have gone for work, only because household have no sufficient money to survive	11.6	56
15	Received help/cash from NGOs and Others	11.1	54
16	Sell any land property	1.4	7

security emerged is household's MPCE status. Chances of being food secure of a family increases with the rise of MPCE status of the family.

Households find several ways to deal with food insecurity either by compromising with food consumption or by reducing the income shocks at the households. The most common consumption coping strategies opted by households were to consume less preferred and less expensive food (98%), followed by borrowed food from relative (73%), reduced number of meals eaten in a day (66%) and restricted adult's consumption in order for small children to eat (65%). Another common strategy was that majority of the households give priority in feeding to working members at the expense on non-working members. Nearly 50 per cent household mentioned that they gather wild food, 43 per cent households reported that they send their child or any other member to eat elsewhere. Nearly 43 per cent households reported that they skipped entire day without eating anything during food shortage at home. However, three per cent households reported that they had to skip food for entire day one to two days per week during the food insecurity condition. On the other hand, livelihood coping mechanisms are the long term coping mechanisms that help to minimise the risks of income shocks in the household. Most common livelihood coping strategy (Table 4) adopted by the household is use of past saving cash (95 per cent), 94 per cent households reduce their spending on other expense and 84 per cent household compromise with the health and

treatment seeking for household members. Nearly 68 per cent households reported that they reduce food consumption in the households during the food shortage. Almost same proportion households reported that their members had to work on additional hours to overcome the income shocks at the household. More than half of the sample households (54 per cent) reported that they take help from their friends and relatives during the time of income shocks. Majority of people prefer to borrow money from the stokvels than to borrow money from relatives during the time of poverty shocks. Nearly 36 per cent households had to sell their livestock and 28 per cent households had to sell their agricultural product during the time of income shortage. In some situation they adopt some sever kind of coping strategies to fight against income hardship, such as, selling of household's assets (21 per cent). Many times households are bound to send their child, aged and pregnant women members of the household for work to earn enough money for their survival. A small proportion of households had to sell their land to improve the livelihood security.

IV. Discussion and conclusion

The present study made a comprehensive assessment on household food security status and coping mechanisms of the households in a rural community setting. This study indicated that household food insecurity was prevalent in the study area. Nearly 80 per cent households were food insecure which is quite paranormal for any community. Foremost reason is the lack of access to resources and lack of proper employment in the households. More than 60 per cent sample households were landless and more than half of the study population survive their livelihood working as labour either in agriculture or in other sectors. Demographic characteristics of head of the household have significant role in determining the household food security condition. The present study shows a significant and positive association between age and education level of the head of household with the household food security status. This finding is found consistent with another study conducted in Ethiopia (Tefera & Tefera, 2014). In general, food insecure households were characterized with larger family size (Zalilah & Geok, 2008) but contrary to Zalilah et al.'s finding, this study reveals that bigger families were more food secure than the smaller families. Though, this finding is very much similar to Rahim et al.'s (2011) finding, which showed a positive association between the size of household and household food security status. Typically, larger family size has significant relationship with greater risk of poverty. An increase of family size will reduce per capita accessibility of resource, say food, only when household's resource is constant. On the contrary, larger family size may play counteracting role in determining the household food security status as indicated in this study. In general, bigger families possess larger landholding; they can utilize more labour capital to earn more for the family. These have potential to foster the accessibility of food in the household. Castes differential in household food security status is an another dark flank in social wellbeing. Prevalence of food secure households were significantly low among Scheduled Tribe and Schedule Caste households. General caste households were 2.3 time more likely to be food secure than the Schedule Caste household. Deprivation in physical, social and economic resources among Scheduled Tribe and Schedule Caste households make them more vulnerable in food access at household. The present study shows that likelihood of being food secure household increases with the rise of MPCE in the household. Previous studies also support this positive relationship between household's MPCE and food security status (Olayemi, 2012; Zalilah & Geok, 2008). The present study listed coping behaviour of household during the time of food shortage to minimize the risk of food insecurity. These strategies were categorised into consumption copping strategies and livelihood coping strategies. Similar to other findings, this study also shows that households opt less severe mechanisms at initial stage of food insecurity but successively they go for highly severe mechanisms as with food insecurity condition become worst (Zalilah & Geok, 2008; Ziaei et al., 2013; Tefera & Tefera, 2014). Most common consumption coping behaviours were consumption of less preferred and less expensive food; borrowed food from relatives; reduce number of meals in a day. On the other hand, livelihood coping strategies were: use of past saving cash; reduce spend on other expense; reduction on health expenditure for household members. In conclusion, the study shows that source of income and household MPCE were very much important factors to determine the household food security condition. Government policy should focus on employment generation

in the household in order to enhance the household purchasing power capacity and to sustain the household food security status. Further, access to resource endowments of households has potential to minimize the severities of coping mechanisms at the time of food shortage.

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