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Food security and morbidity of elderly in disadvantaged rural Bangladesh

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Abstract

The study was undertaken to assess the food consumption level, prevalence of food insecurity and health status of elderly in the disadvantaged rural area of Bangladesh. Data were collected from fifteen villages in three vulnerable regions (river-flooded, hilly and coastal) through self-completed questionnaire. Descriptive statistics of socio-demographic characteristics of 282 households, food frequency and overall health status of elderly were measured. Economic, demographic and some other household characteristic factors influencing food insecurity of elderly people was estimated using binary logistic regression model. Socio-demographic factors influencing morbidity of elderly people were estimated using Chi-square statistics. Socioeconomic conditions of the studied areas were poor and they spent above 83% of their income for food. Rice, wheat, pulses and vegetables were the highly consumed and fruits and sweets were the less consumed foods by the elderly people. One-fourth and two-third of the elderly people had eaten fish and meat, respectively less than a week. Food insecurity was inversely associated with household income and level of education of elderly people and positively associated with number of household member. Food security was 3.5 times more likely to the oldest elder (≥ 75 years) as compared with older elder (< 75 years). Elderly people of age group 75 years and over were more prevalence of morbidities and 23.8% elders were suffering from severe morbidity. Also they suffered from treatment facilities. Higher age, low income, food insecurity and anxiety were the major causes of their morbidity. No significant morbidity differentials existed among different sexes, farm size and study locations. Proper intervention programs should be designed and implemented to control the prevalence of health and food availability for the elderly.

Key words: Food security, Elder Morbidity, Health status, VGF card

Introduction

In most gerontological literature, people above 60 years of age are considered as “old” and taken to be the “elderly” segment of the population of a country. Population above the age of sixty has reached over 7.2 million in 2005, percentage was nearly 6% in 2000 and it will be increase to 8.4 and 16% in 2025 and 2050, respectively in Bangladesh (Saleheen, 2005). Most of the older people in Bangladesh, particularly the poor, are not defined old according to chronological age. In general older people are defined “old” according to physical characteristic and limitations that affect their ability to function in daily life in both household and income generation work (Saleheen, 2005). The common sentiment of Bangladeshi people is that elders are unable to earn money, are dependent on their families for survival, and therefore, are a burden. In rural areas, many younger people do not value the contributions of older people to the family and community.

Nutritional evaluations indicate that older persons are at significant risk for poor access to nutritionally adequate diets and that food assistance programmes are not keeping pace with their needs (Codispoti and Bartlett, 1994). Food insufficiency may affect metabolic markers of poor nutrition, especially in high risk elder persons. Malnutrition is a risk factor for several specific health conditions common in older persons. For example, malnourished older persons are at greater risk for osteoporosis, caused by inadequate calcium intake, which leads to increased risk of hip fracture (Ensrud *et al.*, 2000). Therefore, investigating the health consequences of food insufficiency may lead to a better understanding of the public health risks associated with inadequate nutritional services to the elderly (Klesges *et al.*, 2001). In this study, we sought to increase our knowledge of food sufficiency problems by reporting the food frequency and the prevalence of food insecurity of elderly in the disadvantaged rural Bangladesh. Low level household income, a large number of family members or number of children, lack of education and some other socio-demographic factors are the main constraints on food security of elderly people in Bangladesh. Thus, affects of these factors are needed for the development of policies and programmes to ensure their food security.

The disease state of an individual or the incidence of illness in a population is termed as morbidity. Elderly persons experience a higher rate of morbidity and mortality than their counterparts (Khaw, 1997). Perceived health and chronic illness are major elements of health status in the elderly, because perceived health declines with age and chronic health problems increase with age. Age, household income, household food availability, depression are the vital factors affecting the morbidity of elders. Morbidity is at the extremes of age above 60 years (Kutty and Thankapoan (1994) and education is inversely related to morbidity (Duraiswamy, 1998). Therefore, evaluations of the related factors are required to improve the delivery of health care to the elderly. In the course of growing old, in addition to declining health, some elderly persons are exposed to the loss of significant relation, separation from children, reduced income status, or identity (Chi and Chow, 1997) and these losses may have detrimental effects on an elderly person's health exacerbating psychosocial, behavioural, and environmental risk factors for poor health in the later years of their lives (Chow and Chi, 1997; Rake, 1999; Williams, 1996). Many studies have documented that greater economic resources correlate with lower rate of morbidity and mortality (Blane, 1995; Blane *et al.*, 1997; Fraser *et al.*, 2001). Mostafa and van Ginneken (2000) found that in Bangladesh, elderly persons of high socioeconomic status were likely to be longer than those of lower socioeconomic status. Furthermore, elderly persons of higher social position are less likely to be disabled and need care (Melzer *et al.*, 2000).

Hence, a study was carried out in the disadvantaged rural areas in Bangladesh with the aim of evaluating household's socio-demographic characteristics, frequency of major foods intake, prevalence of their food insecurity, and health and morbidity status of elderly people. The study will provide a better understanding of measure food insecurity level in disadvantaged poor elderly people and provide information to reduce food insecurity of elders. This study will reflect an exploratory investigation, the strongest empirical evidence and expands knowledge of the relative importance among the elderly heads and may lead to a better understanding of the public assistance requirement to the elderly. The specific objectives were: (i) to know the household characteristics and reception of public assistance; (ii) to investigate the food intake level of elderly; (iii) to determine the factors affecting food insecurity; and (iv) to make an association between morbidity status of elderly people with their socio-demographic and other related factors.

Materials and Methods

Study design and data collection

The study was conducted in three ecologically contrasting disadvantaged regions (river flooded, hilly/forest and coastal) of the country. The regions were selected purposively on the basis of the nature and vulnerability. For the first region, Brahmaputra river-flooded area in Mymensingh district was chosen and two different sub-districts Mymensingh sadar and Gauripur were selected as two strata. Similarly, for the second region, two different districts were chosen, Nalitabari sub-district under Sherpur district as hilly area and Madhupur sub-district under Tangail district was selected as forest area. Finally, Dumki sub-district under Patuakhali district was selected as coastal area. Thus, three regions were divided into five strata. Three adjacent villages were selected from each stratum. The next stage was a selection of households using simple random sampling technique. A complete listing of households residing in each selected village was carried out. The lists of households obtained were used as the frame of sampling. Households having at least an elder were eligible to be interviewed and 20 households were targeted to interview from each village (villages are quite small).

A questionnaire was developed based on the objectives of the research. A qualified primary healthcare person was recruited and trained to conduct the field survey over six months and researcher shared in most of the time. Questionnaire was self-completed by the field surveyor with elderly person and or household head and or housewife. The questionnaire included sex, age and education of the elders; family member, farm size, per capita income of households and elderly allowance (if received). The questionnaire also included the frequency level of food intake, general health condition and morbidity status of elders. A set of food frequency questionnaires was developed for elders. Subjects were asked how often they ate the general meals and what kinds of foods were included in the meals. Food frequency categories used were more than once a day, once a day, 4-7 times a week, 1-3 times a week, at least once a month, less than once a month. The six-item short form of food security scale was developed in the form described by Blumberg *et al.* (1999). The interview took place in the participants' home, and informed consent was acquired. Household head or elderly people were asked the questions. A few numbers of households were absent and some cases household head or housewife refused to interview and finally, a few number of questionnaire found to incomplete information. Thus, out of 300 target households, 282 completed questionnaires were taken for analysis. Data were collected from January to June 2009.

Measurement

The six-item short form of questions were: (i) elderly people often or sometimes relied on a few kinds of low-cost food or imbalanced meal because they were running out of money to buy food; (ii) the elderly were not eating enough because they just couldn't afford enough food; (iii) they cut the size of meals because there was not enough money for food; (iv) they were skipping meal once or twice in most of the days; (v) they were hungry but they couldn't afford more food; and (vi) elderly were not eating for whole day. Each question had four response options: never, rarely, sometimes and often, which were coded in order of increasing frequency from 0-3. An elderly was classified as food insecure if the household head or elderly reported experiencing any of the six conditions within the recall period (i.e. if the answer to any of the questions was rarely, sometimes or often), otherwise he or she was classified as food secure.

To classify physical health condition of the elderly, a single question was asked "how do you think about your health" with 4 possible responses: very good, good, fair and poor. Anxiety (depression) is a major psychological disorder that affects the quality of the elderly (Sun *et al.*, 2007). Thus, status of anxiety was assessed by examining level of anxiety in the study population. Self-rated severity of diseases (morbidity) was also assessed with 3 possible responses: (1) severe morbidity if any chronic disease including hypertension, cardiovascular diseased, diabetes, stroke, etc; (2) moderate morbidity if elder had been suffering from any mild or moderate diseases; and (3) healthy if no moderate or severe diseases or no mild diseases for long time.

Statistical analysis

Binary logistic regression analysis was carried out to study the chances of food insecurity. In this analysis, food insecurity status was considered as dependent variable (dichotomous: 1 for food insecure elder and 0 for food secured elder). Independent variables were categorical and they were the study areas, sex, age category, education level of elders, number of people in the household, farm size and income category of households, current use of elderly allowance, etc. Odds ratios for outcome categories taking into account the ordering of outcomes categories and 95% confidence intervals were calculated to test the significance of odds ratios. Association of morbidity status with socio-demographic and other related factors was estimated from contingency table and Chi-square statistic was used to verify the significance of associations. Data analysis was carried out using the SPSS for Windows software version 11.5. Binary logistic regression analysis was carried out to determine the likelihood ratio of socio-demographic factors with food insecurity of elderly people. The logit function was as follows:

$$\text{Logit}(E(Y_i)) = \text{Log}\left(\frac{p_i}{1-p_i}\right) = \text{Intercept} + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + U_i$$

Where $E(Y_i) = p_i$ implies that the expected value of (Y_i) equals the probability that $Y_i = 1$;

X_1 = Study area; 0 for river-flooded area, 1 for Hills and 2 for coastal area;

X_2 = Sex of elder; 0 for male and 1 for female;

X_3 = Age of elder; 1 for elderly people of 75 years and above and 0 otherwise;

X_4 = Level of education of elders; 0 for illiterate, 1 for can read and write only and 2 for having formal education;

X_5 = Number of people in the household; 1 for 1 to 5 members and 0 otherwise;

X_6 = Farm size of household; 2 for landless, 1 for marginal and 0 otherwise;

X_7 = Having elderly allowance; 1 for having elderly allowance and 0 otherwise;

X_8 = Level of income; 1 for below average income and 0 otherwise;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ are the coefficients;

U_i is the error term; and

$$\frac{p_i}{1-p_i} = \text{Odds ratio associated with each predictor value.}$$

Results and Discussion

Household Characteristics and Reception of Public Assistance

Table 1 presents the average features of household characteristics according to income classes and study locations. Family size, number of children and school going children per household has an increasing trend with the increase of income of the family and the average size was 6.3, 2.5 and 1.1, respectively. There was no far difference of these three measures in three study locations. The average landholdings was 0.20 hectares (standard deviation 0.303 and range 0–2.43 hectares). The households of above average income had land holdings 2.4 times and per capita bedroom 1.5 times higher than the households of below average income. Both these characteristics were better in hills and forests as compared with river-flooded and coastal regions. Similarly, per capita income of the households of below average income group was 40% of the above average income group and this figure was very low in the river-flooded area as compared with other two areas. Per capita food expenditure of the low-income group was half that of the high-income group and this figure was less in the river-flooded area compared to the other areas. They spent major portion of their income for food and the ratio of food cost to income was higher for the low-income group as compared with high-income group.

Public assistance for the poor people in the vulnerable regions of Bangladesh is devoted under the programme of 'Social Safety Nets Programmes (SSNP). Elderly allowance, vulnerable group feeding (VGF) and subsidy to buy rice and wheat are the main sources of public assistance. In this study, out of 282 surveyed households 61 i.e., about 21.6% households were found to receive public assistance whereas 11% households received elderly allowance equalizing Tk.250 per month per household. About 7% households had a VGF card and each of them received 5 to 30 kilograms rice (average 19.3 kilograms per month) but it was missed once or twice per year. Only 5 households received the price subsidiary for rice only and each of them received rice up to 50 to 60% subsidy. In 2005, 13.06% of the households received benefits from SSNP with 15.64% households in rural areas and 5.45% in urban areas and the average amount were received from old age allowance Tk.1429 and from VGF Tk.439. Among the households covered by SSNP, the highest proportion benefits from VGF 33.86% followed by old age pension 17.91% and VGD 17.59% (HIES, 2005). According to opinion of some respondents, public assistance programmes were helpful for the poor, but selection of households was not proper, especially, for VGF cards and the amount of elderly allowance were inadequate.

Table 1. Average features of household characteristics according to income classes and locations

Characteristics	Income Groups		Locations			All
	Below Average	Above average	River Flooded	Hills/ Forest	Coastal	
Family Size	6.1	7.1	6.2	6.4	6.4	6.3
Number of Children / HH	2.5	2.7	2.6	2.7	2.3	2.5
Number of School Going Child / HH	1.0	1.5	1.0	1.25	1.2	1.1
Land / HH (ha)	0.15	0.36	0.19	0.23	0.19	0.20
Size of Bedroom per Capita (sq. m)	5.0	7.6	5.3	6.2	5.9	5.7
Income per Month / HH (Taka)	3030	8956	4035	4880	5095	4540
Income per Month per Capita (Taka)	521	1308	615	827	801	721
Food Expenditure / HH (Taka)	2588	5981	2918	3745	4111	3453
Food Expenditure per Capita (Taka)	444	892	467	628	650	558
Ratio of Food Cost and Income	0.86	0.74	0.83	0.82	0.85	0.83

Source: Field Survey, 2009

Note: HH means household

Food Intake Level

Rice, wheat, pulses and vegetables were the highly consumed food of the elderly people in the study areas. About 23.4% elderly had eaten rice and or wheat once a day and no any elder had eaten less than once a day. About 27.3% elderly had eaten pulses in their meals once a day and 17.7% of them had eaten 3 to 7 times per week (Table 2). They had eaten leafy vegetables more frequently than other vegetables. Moderately consumed foods of the elderly in the vulnerable regions were fish, meat, eggs and milk. About 16.3% elderly had eaten fish every day, 56.7% had eaten 1 to 7 times per week and 23.8% had eaten 1 to 4 times in a month. No elderly had eaten meat every day, 30.8% of them had eaten 1 to 7 times in a week and 69.2% of them had eaten meat less than a week. They had eaten eggs less frequently than meat. Most of the elderly had drunk milk a few times monthly or a less than a month. A little proportion of elderly had never eaten protein foods. The elderly people of the vulnerable region had eaten sweets and fruits in very rare.

Table 2. Frequency distribution of 10 major food items according to consumption level of elders

	Level of food consumption						
	2-3 times per day	once a day	3-6 times per week	Once a week	1-4 times / month	Less than a month	Never
A. Highly consumed foods							
Rice / wheat	216 (76.6)	66 (23.4)					
Pulses	155 (55.0)	77 (27.3)	50 (17.7)				
Leafy vegetables	193 (68.4)	61 (21.6)	28 (10.0)				
Vegetables	122 (43.3)	116 (41.1)	44 (15.6)				
B. Moderately consumed foods							
Fish	07 (2.5)	39 (13.8)	54 (19.1)	106 (37.6)	67 (23.8)	09 (3.2)	
Meat			26 (9.2)	61 (21.6)	102 (36.2)	85 (30.2)	08 (2.8)
Eggs			21 (7.5)	53 (18.8)	88 (31.2)	113 (40.0)	07 (2.5)
Milk		11 (3.9)	20 (7.1)	53 (18.8)	89 (31.5)	100 (35.5)	09 (3.2)
C. Less consumed foods							
Sweets				25 (8.9)	64 (22.7)	175 (62.0)	18 (6.4)
Fruits			14 (5.0)	27 (9.6)	69 (24.5)	156 (55.3)	16 (5.6)

Source: Field Survey, 2009

Figures in the parentheses indicate percent

Self-reported frequency of eating various foods is a simple form of dietary assessment (Schlettwein-Gsell, 1989 and Natarajan *et al.*, 1993), but it does not allow accurate calculation of daily nutrient intake which could be compared with international recommendations. The consumption frequencies of protein foods such as meat, fish and eggs in most of the participants were not good, although a large proportion did not drink milk (38.7%) and fruits (61%) in a month. In the present study, inadequate intake of protein foods and fruits was associated with unfavourable economic conditions and low purchasing power. The overall food consumption patterns showed a low frequency of fruit and milk intake and these results followed by Olayiwola (2009) and Kabir *et al.* (2010), respectively. Low level of schooling can also influence consumption due to the adoption of inadequate dietary habits and due to the higher frequency of related problems (Seabra, 2007).

Prevalence and Factors Affecting Food Insecurity

Table 3 shows the prevalence of food insecurity according to socio-demographic and household characteristics of the elderly people. River-flooded area was more food insecure as compared to hills/forest and coastal areas. The prevalence of food insecurity was higher among elderly female compared to elderly male and oldest elders (75 years and above) than older elders (60-74 years). The prevalence of food insecurity was higher (78%) among elderly people having more than 5 people in the household compared to elderly people having 1 to 5 people in the households (59%). Food insecurity was significantly associated with the study location, level of education of elderly people, number of people in household, farm size of household and level of household income.

Table 3. Prevalence of food insecurity of elderly people and results of logistic regression analysis

Variables	Category	Number in category	Insecure %	Odds Ratio	95% CI	p- values
Study location	River-Flooded*	132	83			
	Hills/ Forests	78	64	0.26	0.11- 0.64	0.003
	Coastal	72	61	0.39	0.16 – 0.93	0.034
Gender	Male*	159	70			
	Female	123	76	1.08	0.55 – 2.14	0.813
Age group	60 – 74 year*	195	68			
	75 years and above	87	90	3.54	1.50 – 8.36	0.004
Level of education	Illiterate*	169	77			
	Can read and write only	71	66	0.79	0.35 - 1.77	0.572
	Having formal education	42	62	0.33	0.12 – 0.92	0.033
Number of people in HH	1 to 5 members*	96	59			
	More than 5	186	78	3.32	1.66- 6.64	0.001
Farm size of Household	Small /Medium (0.40 ha+)*	47	55			
	Marginal (0.05 – 0.40 ha)	135	73	1.83	0.80 – 4.19	0.152
	Landless (<= 0.05 ha)	100	79	2.61	1.01 – 6.75	0.047
Having elderly allowance	No*	248	69			
	Yes	34	91	2.97	0.67 – 13.10	0.151
Level of income	Above average income*	84	42			
	Below average income	198	85	9.15	4.44 – 18.86	0.001

Source: Field Survey, 2009

Note: HH – household; CI – confidence interval and * indicates reference category

The prevalence of food insecurity was higher among elderly people receiving elderly allowance compared with elderly people not receiving elderly allowance. Because they are very poor; and poor amount of allowance are not sufficient to reduce food insecurity. Furness *et al.* (2005) found similar pattern of food insecurity prevalence in case of receiving public assistance in Los Angeles country. Low income, illiteracy and higher family size were strongly associated with food insecurity support the need to increase availability and acceptability of services to those at high risk for problems of food access such as elders having very low household income. Ill health is a major factor in the ecology of food insecurity in rural areas and hence the provision of health care at an affordable cost is central to promoting food security in rural setting are needed (Olson, 2005). The present study showed higher food insecurity status of aged persons in compare to other studies (Frongillo *et al.*, 2003 and Gulliford *et al.*, 2003) because the study sample was from highly disadvantaged rural areas and very low socioeconomic families in Bangladesh. Food insecurity affects people of all ages, but this study is of particular concern of aged person only.

Odds ratios illustrate that food insecurity was 8.6% more likely to female as compared to male (Table 3). Food insecurity was 3.5 times more likely to the oldest elders (OR=3.54; 95% CI=1.50 – 8.36) as compared to older elders. Food insecurity was 21% less likely among the elders who could read and write only and 67% less likely (significantly) among the elders having formal education as compared to illiterate elders. Food insecurity was significantly higher (OR=3.32; 95% CI=1.66-6.64) among elderly people having 6 or more members in the household as compared to elders having 1 to 5 members in the household. Similarly, elders of the household having below average monthly income were significantly

higher food insecure as compared to elders' household having above average income. Food insecurity was significantly higher (OR=2.61; 95% CI=1.01-6.75) among elderly people having landless as compared to elders having small/ medium farm holdings. Elders having elderly allowance were more food insecure than the elders having no elderly allowance.

Morbidity status of elders

Self-assessed health status of most of the elders was good (33%) or fair (44%) and there was no far difference between men and women. About 50% elderly people had suffered from low level of anxiety and 30.1% elderly people had suffered from high or extremely high level of anxiety. About 23.8% elders were suffering from severe morbidity of which men 26.4% and women 20.3% whereas, 48.9% were suffering from moderate morbidity and 27.3% of them were healthy (Table 4). About 85% of the rural elders could not take treatment properly due to lack of money or absence of treatment facilities near them. Physical health condition of most of the elders was good or fair and the majority of the elderly indicated that they had reduced ability to function. There was no much difference in health conditions among the males and females but males were much better in respect to very good health. Having no or low anxiety was higher for female than that of male whereas high and extreme high anxiety was higher for male interpret that males are more responsible for their family maintenance. A large portion of elderly people could not take treatment because of lack of money and absence of treatment facilities easily accessible.

Table 4. Percentage distribution of elder's overall health and treatment conditions

Health / Treatment Characteristics	Percentage value		
	Men N=159	Women N=123	All N=282
Self-assessed health status			
Very Good	6.3	5.7	6.0
Good	33.3	32.5	33.0
Fair	44.7	43.1	44.0
Poor	15.7	18.7	17.0
Level of Anxiety			
No	15.7	25.2	19.9
Low	42.8	59.3	50.0
High	29.6	13.0	22.3
Extreme	11.9	2.5	7.8
Morbidity			
Severe	26.4	20.3	23.8
Moderate	51.6	45.5	48.9
Healthy	22.0	34.2	27.3
Level of Treatment			
Good	13.8	15.5	14.5
Fair	39.6	40.7	40.1
Poor	32.7	31.7	32.3
No	13.8	12.9	13.1

Source: Field Survey, 2009

Results of association between morbidity level of elderly people and their socioeconomic factors are shown in Table 5. The result shows that age group, level of food security, level of anxiety and household income category were significantly associated with morbidity level. There were no significant morbidity differentials among different sexes, farm size and study locations and they were not major factors in determining morbidity status in the study area. In this analysis, it shows that illiterate elders had highest morbidity level compared to other groups, elderly having below average household income had higher morbidity compared to above average income and elders aged 75 years and older are more likely to report illness than that of aged 60-74 years. Thus, it may suggest that these three factors (age, income and education) are the significant determinants of morbidity status of rural elderly people i.e. elders of

above age but illiterate and low earning families had a greater risk to severe morbidity. Similarly, food insecurity and higher level of anxiety had a significant greater risk to severe morbidity. The key factors affecting the health profile of the elderly were incidence and timing of onset of chronic illnesses and disability and levels of mortality (Pilloni et al., 2000). Physical health condition, level of anxiety and morbidity of elders were self-reported by the subjects and these were focused on lifestyle-related illness, those might affect the accuracy of information and weaken the effect of level of morbidity. As this study is a cross-sectional design, it is difficult to draw conclusions about any casual relations between morbidity and the factors identified in the study. All findings need to be confirmed in a longitudinal study.

Table 5. Demographic, economic, health and food security characteristics of the respondents according to level of morbidity

Characteristics	Morbidity			Total (%)	Value of χ^2	p-value
	Healthy n = 77	Moderate n = 138	Severe n = 67			
Gender					0.013	0.99.3
Men	43	78	38	159 (56.4)		
Women	34	60	29	123 (43.6)		
Age					48.095	0.001
60 – 74 years	71	97	27	195 (69.1)		
Above 74 years	06	41	40	87 (30.9)		
Level of education					3.346	0.502
Illiterate	44	87	38	169 (59.9)		
Can read and write	24	31	16	71 (25.2)		
Literate	9	20	13	42 (14.9)		
Level of food security					52.487	0.001
Food secure	45	29	5	79 (28.0)		
Food insecure	32	109	62	203 (72.0)		
Anxiety					82.496	0.001
No	29	20	7	56 (19.8)		
Low	42	86	13	141(50.0)		
High	6	32	47	85 (30.2)		
Family size					5.583	0.061
=< 5	33	38	25	96 (34.0)		
> 5	44	100	42	186 (66.0)		
Farm size					3.151	0.553
Small / Medium	12	26	9	47 (16.7)		
Marginal	36	61	38	135 (47.9)		
Landless	29	51	20	100 (35.4)		
Household Income category					6.699	0.035
Above average income	30	41	13	84 (29.8)		
Below average income	47	97	54	198 (70.2)		
Area of residence					7.084	0.132
River flooded	31	61	40	132 (46.8)		
Hills/ Forests	22	40	16	78 (27.7)		
Coastal	24	37	11	72 (25.5)		

Source: Field Survey, 2009

Conclusion

Findings of this paper confirm that food insecurity is an important public health and equity issue among elderly people in the disadvantaged rural Bangladesh that can be addressed through implementing appropriate income and social support policies. These results suggest that much more attention needs to be placed on reducing household poverty to increase food resources for the elderly people. The programmes should be directed to control health problems associated with inadequate or improper dietary intake. However, nutrition education efforts may focus on improving food diversity with targeting rural elderly. The rate of elderly allowance should be increased and assistance through VGF cards and

food subsidy for elderly people should be provided in regular basis. Further investigations are needed on the specific health problems that the elderly have and the extent of their inability to function. Assessment of the economic and physical reasons for these changes would be necessary prior to designing any national intervention. Also, health and nutrition intake of this population should be further investigated relative to life experiences before national recommendations are developed. In addition to our preliminary findings, further evaluation of the relations between food insufficiency and nutritional status may help to improve methods to ensure adequate food access and dietary intake in older persons.

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