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Prevalence of Food Insecurity among Women in Rural Area of North West Bangladesh

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Abstract: Food insecurity is a public health concern among rural poor in Bangladesh. Food insecurity is the insufficiency of good quality foods, reduced access to foods and inadequate intake of foods to meet ones physiological demands. Food insecurity is inversely associated with health and nutritional status of rural women of Bangladesh. This cross-sectional study was conducted using an interview-based pre tested questionnaire. Data were collected from 500 women in low-income areas of Nageswari and Phulbari sub district of Kurigram district of Bangladesh; from February to October 2012. Both of them have border with India. From each of the sub district 250 women were selected for the interview. Food insecurity was assessed using the short form of the United States food security survey module. The prevalence of food insecurity was 32.4%. The socioeconomic factors that increase the risk of food insecurity are-income below the poverty line, illiteracy, women heading the household, unemployment and lack of own housing. No association was found between obesity and food insecurity. The food-insecure women with hunger had lower intake of all food-groups except grains. This study determines that the food insecurity is present in the rural area of North West Bangladesh. Food-insecure women with hunger are at a risk of malnutrition. Interventions that target reduction of the factors associated with food insecurity are necessary in the rural food insecure area of Bangladesh.

Key words: Prevalence, Body weight, Cross-sectional studies, Food insecurity, Food security, Hunger, Women, Bangladesh

INTRODUCTION

Food insecurity causes hunger and malnutrition in most countries in the world. The nutrition and health consequences of food insecurity have been documented among adults and children even in rich countries. Food security ensures that all individuals in a household, at all times, have continuous access to enough good-quality food to support a healthy and productive life (United States Agency for International Development, 2012; Carlson *et al.*, 1999). Food security exists when all people, at all times, have physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Food security has three dimensions: Availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports; access by households and individuals to adequate resources to acquire appropriate foods for a nutritious diet and use of food through adequate diet, water, sanitation and health care (United States Department of Agriculture, 2010). Hence, food insecurity is defined as lack of sustainable access to enough safe, nutritious and socially-acceptable food. Food insecurity is a major factor contributing to hunger and malnutrition. Hunger and malnutrition have remarkable negative impacts on human health and

productivity (Gulliford *et al.*, 2003; Hadley *et al.*, 2008). In Bangladesh, approximately one-half of the population is food insecure (United States Agency for International Development, 2010). Hunger and childhood malnutrition in Bangladesh are among the highest in the world (UNICEF, 2006). Approximately 31% of the rural population in Bangladesh suffers from chronic poverty which is characterized by low food consumption, lack of access to foods and under nutrition (Sen and Hulme, 2004). About 19% of rural households cannot have “3 full meals” a day and 10% survive on 2 meals or less for a number of months every year. Like other developing countries, Bangladesh may have a significant proportion of its population classified as food-insecure. Bangladesh is a small densely populated country, with inadequate supplies of water and other natural resources. Burden of high population, poverty and unemployment are fundamental problems. Forty six percent of the population of Bangladesh falls below the poverty-line of 78 Bangladeshi Taka (US\$ 1) per person per day. According to the World Food Programme (WFP), Bangladesh has several risk factors of food insecurity. The risk factors include-(a) Rapid climate change and its negative impact on crop production. (b) Frequent fluctuation of food prices (c) lack of job

opportunities; (d) degradation of agricultural land (e) Self-insufficiency in food products and unequal distribution of foods items. All these associated factors may lead to food insecurity in the rural area of Bangladesh. Like every other country across the world, women are often the first to be caught in the problem of food insecurity in rural area.

MATERIALS AND METHODS

Study subject and data collection: A cross-sectional survey was conducted among 500 women in Kurigram district of north western Bangladesh. Among these 250 women were selected from Nageswari and 250 women were selected from Phulbari: The two border sub districts of Bangladesh. Kurigram was selected as the area of study because it has the most vulnerability to food insecurity. Kurigram District is located in the northern region of Bangladesh along the border of India. The area of this district is 2, 296.10 km² and population is 2, 382, 277 (2011 national population census). This district is surrounded by Cooch Behar district of India in the north, Gaibandha district of Bangladesh in the south, Assam state of India in the east and, Lalmonirhat and Rangpur districts of Bangladesh in the west. Weather of the Kurigram district is bit different from the middle or southern part of Bangladesh. Location: 25.75°N 89.66°E. The multistage sampling was used to select the subject. Initially the sub district was selected randomly then three unions from each sub district were selected by same procedure. Finally, women are selected randomly from the house hold list provided by the union council. Women who agreed to participate in the study were asked to sign a consent form. The researcher explained the research objectives and methods to each participant. Participants suffering from chronic diseases were not eligible to participate in the study to avoid any possible interaction between illness and food-security status. An interviewer-administered questionnaire was used for collecting data which was pretested.

Statistical analysis: Descriptive statistics, including frequencies, percentages and cross-tabulations, were obtained to measure the distribution of food insecurity according to the different social and demographic factors. Odds Ratios (ORs) were obtained to identify factors responsible for increasing the odds of food insecurity. Multiple logistic regressions were used for obtaining ORs. The ORs presented in the Results section estimated the risk of having FIWOH and FIWH with regard to the study variables (age, income, education, employment, head of household, housing status, number of children and BMI). Comparison between women with different levels of food insecurity was made with regard to their average daily consumption of each food group. Means were subjected

to univariate analysis using the general linear model of the SPSS software for Windows (version 15.5) (SPSS Inc., Chicago, IL, USA). The mean comparisons were analyzed using the Least Significant Difference (LSD). The p value of <0.05 was considered significant.

RESULTS

A total of 500 women participated in the interview. Their average age of women was 37±10.8 years. Over half (53%) of the women were from families with monthly income of equal or greater than the national poverty-line. The mean income of the participants was 78.2 BDT per day per head. The number of children (aged less than 21 years) living in the household ranged from 0 to 10. All the participants were apparently healthy, with the mean BMI of 27.7±5. Of the 500 women, 338 (67.6%) were from food secure households and 162 (32.4%) were from food, insecure households of the food-insecure households, 43% were suffering from hunger. Table 1 shows the responses obtained from the short form of the food-insecurity assessment module. About 33% of the women could not afford to eat balanced meals (meals containing all food-groups in the right proportions) and about 26% ate less than what they felt is enough due to lack of money.

Table 2 shows the prevalence of food insecurity according to age, income, education, employment, head of household and housing. The Odd Ratios (Ors) of being food-insecure were estimated for each variable. Both the types of food insecurity (with or without hunger) were not associated with women's age. Income was associated with the increased risk of both the types of food insecurity. Participants with income of less than the poverty-line were four times more likely to be food-insecure. Participants who rented houses had two times higher odds of being severely food-insecure when compared with those who owned houses.

Level of education was associated with the food insecurity status. Participants who had less than 12 years of education were at a higher risk of being food-insecure compared to those who had a college degree. For instance, the ORs of food insecurity for illiterates compared to college degree-holders were 2.9 (95% confidence interval (CI) 1.1-7.6) and 9.1 (95% CI 2.7-30.8) for FIWOH (0-1 affirmative) and FIWH (2-4 affirmatives) respectively.

Having a woman as the head of a household was associated with both the types of food insecurity; the ORs were 1.8 (95% CI 1.1-3.2) and 9.1 (95% CI 1.1-2.6) for FIWOH and FIWH respectively. There was little evidence of linking the number of children (members aged less than 21 years) in the household with either type of food insecurity (p = 0.08); however, none of the ORs was significant.

Table 1: Responses to individual items on the food-security questionnaire (n = 500)

Affirmative response to individual item	No.	(%)
In the last 12 months I cut the size of my meals or skipped meals because there was not enough money for food	104	21
If yes, how often did this happen? (almost every month/some months)	102	98*
I ate less than I felt I should because there was not enough money for food	131	26
I was hungry but did not eat because there was not enough money for food	84	17
The food that I bought just did not last and I did not have money to get more (often/sometimes)	124	25
I could not afford to eat balanced meals (often/sometimes)	166	33

*Proportion calculated out of 104; respondents to this item only were those who responded 'yes' to the previous item.

Table 2: Distribution of food insecurity according to social and demographic factors*

Variable	FIWOH No. (%)	Odds ratio (95% CI)	FIWH No. (%)	Odds ratio (95% CI)
Age (years)				
<35	37/222 (17)	1.3 (0.5-3.7)	22/222 (10)	1.0 (0.3-3.1)
35-44	31/146 (21)	2.0 (0.7-5.8)	26/146 (18)	2.1 (0.7-6.7)
45-54	19/93 (20)	2.0 (0.6-6.0)	18/93 (19)	2.4 (0.7-7.7)
=55	5/39 (13)	-	4/39 (10)	-
Income				
<poverty-line	63/233 (27)	4.2 (2.5-6.9)	56/233 (24)	7.7 (4.1-14.5)
=poverty-line		29/265 (11)	14/265 (5)	-
Education				
Illiterate	26/158 (17)	2.9 (1.1-7.6)	40/158 (25)	9.1 (2.7-30.8)
Secondary School	48/197 (24)	3.8 (1.5-9.3)	17/197 (9)	2.7 (0.7-9.5)
High school	12/71 (17)	2.5 (0.9-7.3)	10/71 (14)	4.2 (1.1-16.4)
College	6/72 (8)	-	3/72 (4)	-
Employment**				
0	5/19 (26)	7.3 (1.1-46.2)	8/19 (42)	9.1 (0.8-97.7)
1	46/327 (20)	1.2 (0.2-5.7)	48/327 (15)	3.2 (0.4-25.8)
2	18/109 (17)	0.5 (0.1-2.8)	8/109 (7)	2.3 (0.2-19.6)
3	4/29 (14)	1.0 (0.1-6.7)	4/29 (14)	2.1 (0.2-21.1)
=4	1/14 (7)	-	2/14 (14)	-
Head of household				
Man	66/393 (17)	-	49/393 (13)	-
Woman	26/105 (25)	1.8 (1.1-3.2)	21/105 (20)	2.0 (1.1-3.6)
Housing				
Owned	76/427 (18)	-	54/427 (13)	-
Rented	16/71 (23)	1.6 (0.8-3.0)	16/71 (23)	2.2 (1.1-4.3)
No. of children				
0	14/71 (20)	-	8/71 (11)	-
1	5/47 (11)	0.5 (0.1-1.6)	8/47 (17)	1.4 (0.4-4.2)
2	16/86 (19)	0.9 (0.4-2.2)	12/86 (14)	1.2 (0.4-3.3)
3	10/72 (14)	0.7 (0.3-1.6)	10/72 (14)	1.1 (0.4-3.2)
=4	46/221 (21)	1.1 (0.5-2.2)	32/221 (14)	1.3 (0.5-3.1)

*Figures are frequency (percentage). **No. of full-time employees in the household.

CI = Confidence interval. FIWH = Food insecurity with hunger.

FIWOH = Food insecurity without hunger.

Table 3: Distribution of food insecurity according to BMI

BMI	FIWOH	Odds ratio (95% CI)	FIWH	Odds ratio (95% CI)
Under weight	0/12	Zero cell count	12-Jan	0.5 (0.1-4.6)
Normal weight	22/153	-	18/153	-
Over weight	37/170	1.7 (0.9-3.0)	21/170	1.1 (0.6-2.3)
Obesity	29/155	1.3 (0.7-2.5)	28/155	1.7 (0.9-3.4)

The World Health Organization's cut-off points were used for classification: Underweight (BMI <18.5 kg/m²), normal weight (BMI 18.6-24.9 kg/m²), overweight (BMI 25-29.9 kg/m²) and obese (BMI = 30 Kg/m²).

BMI: Body mass index; CI: Confidence interval; FIWH: Food insecurity with hunger; FIWOH: Food insecurity without hunger.

Table 3 shows BMI classification according to the level of food insecurity. None of the ORs was significant;

hence, there was no significant association between food insecurity and body-weight among the rural women.

Table 4: Comparison of women's servings per day from each of the food-groups with their household food-security status (mean±SD)

Food-group	Food-secure	FIWOH	FIWH
Servings*	n = 328	n = 91	n = 70
Cereal	3.7±0.05a	3.8±0.1a	3.5±0.12a
Vegetables	1.3±0.03a	1.2±0.06 a, b	1.1±0.07b
Fruits	1.2±0.7a	0.9±0.7b	0.5±0.4c
Milk and milk products	1.5±0.05a	1.3±0.09a, b	1.1±0.1b
Meat	3.2±0.09a	3.1±0.2a	2.3±0.2b
Sweets	1.6±0.5a	1.4±0.1a	1±0.1b

Values within the row with different superscripts are significantly different. The level of significance was $p < 0.05$. *Serving-sizes used are the foods guide pyramid serving-sizes; FIWH: Food insecurity with hunger; FIWOH: Food insecurity without hunger; SD: Standard deviation.

However, there was a trend of increasing odds of food insecurity among overweight (OR = 1.7, 95% CI 0.9-3.5) and obese (OR = 1.7, 95% CI 0.9-3.4) women.

The mean values for women's daily consumption of different food-groups are presented in Table 4. The food-secure women had the higher mean intakes of fruits, milk and meat than those with food insecurity. With respect to grains, no differences in the intakes were observed among the food-secure women, FIWOH and FIWH ($p = 0.2$). The food secure women consumed higher quantities of fruits than women in the FIWOH and FIWH groups. The food-secure women consumed higher quantities of vegetables, milk and milk products and meat compared to the food-insecure women with hunger.

DISCUSSION

Approximately one-third (32.4%) of the women in north western district of Kurigram were food-insecure. This percentage is considerably higher than that found for women in urban and city area of the country. The association found between income and food insecurity is consistent with that reported in other studies (Gulliford *et al.*, 2003; Kruger *et al.*, 2006). Other socioeconomic variables that were associated with the increased risk of food insecurity included level of education, head of household and ownership of house. In the present study, women who did not hold a college degree were more likely to be suffering from hunger. There are increased rates of unemployment among women without a college degree of employed Bangladeshi, 55% of men have an educational level lower than secondary while over two-thirds of female workers have a higher educational qualification (37% have a bachelor's degree or higher and 31% a college or intermediate diploma). In Bangladesh, professional jobs are more culturally acceptable, especially for women. In most cases, these kinds of jobs require higher level of education. Locally speaking, men have more choices of jobs that do not require higher level of education; thus, "having a man as the head of household" appears to be a common protective factor against food insecurity. Gulliford *et al.* reported the same trend (Tarasuk and Beaton, 1999). The relationship between food insecurity and gain in

weight has been studied but the magnitude and nature of the relationship are still not clear. The results of our study suggest a trend of a relationship between body-weight and the state of food insecurity. All the ORs obtained for overweight and obesity (considering normal weight range as a reference) were greater than 1 for both the types of food insecurity. However, none of the ORs was significant. Olson studied this relationship among 193 low-income women. The study found that women who suffered from mild food insecurity had higher BMI than food-secure women (Tarasuk and Beaton, 1999). The same association in women was reported later by Townsend *et al.* using secondary data from the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII).

In our study, the intakes of fruits, milk and meat were higher among the food-secure women than among the food-insecure women with hunger ($p < 0.05$). In another study, food-insecure individuals were less likely to report "eating fruits and vegetables at least 5-6 days a week" compared to food secure individuals (Kruger *et al.*, 2006). The consumption of fruits was positively related to income. In a study on preschool children, recipients of food stamps with low income reported significantly lower consumption of fruits (Kebdall *et al.*, 1996). No difference was found in terms of consumption of grains. Grains (wheat and rice) are considered staple foods in Jordan. Prices are low as the Government co-pays the cost, along with the consumer (Kruger *et al.*, 1999).

In summary, food insecurity is prevalent among women in north western Bangladesh. The finding that about one-third of the rural women in Kurigram are food insecure which is alarming. The factors that had impact on food insecurity in north western Bangladesh included: Income, education, employment and women heading the household. No evidence was found in the present study to support the association between food insecurity and the increased risk of overweight and obesity. The consumption of fruits decreased as the severity of food insecurity increased.

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