Prevalence of risk factors of non-communicable diseases in a rural area of Bangladesh

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Abstract:

*Key words:
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survey.*

Background: Data on risk factors of non-communicable diseases (NCDs) are still inadequate Bangladesh. More data, especially from rural population because 70 percent of Bangladeshi people leave in rural area, are necessary to plan intervention and monitor progress of NCD control. The aim of the study was to determine distribution and prevalence of risk factors of NCDs in a rural adult population of Bangladesh.

Method: A cross-sectional study targeting one adult (15 years or older) from each of 1088 households of a village was carried out in 2008. Among them 1011 participated. Information on age and education of the respondents and risk factors such as tobacco, fruit and vegetable intake, habit of added salt while taking the meal, blood pressure and waist circumference were obtained using standardized protocol.

Results: Mean age of the subjects was 42.4 years. Age adjusted prevalence of tobacco consumption was 59.5% (smoking 31.0% and smokeless tobacco use 36.3%). More than nine in ten (92.8%) of the respondents consumed less than 5 serving of fruit and/or vegetables per day. Nine in ten (88.5%) used extra salt during meal. Prevalence of hypertension and central obesity was found 19.7% and 18.8% respectively.

Conclusion: NCD risk factors are widely prevalent even in this rural population having a traditional agricultural lifestyle. Interventions those are appropriate to this kind of community are needed to be developed in Bangladesh.

Introduction

Non-Communicable diseases (NCDs), principally cardiovascular diseases, cancer, chronic respiratory diseases and diabetes are the leading causes of death and disability globally.[1] Most of these deaths are premature, i.e., deaths before the age of 70 years. Moreover, 80% of the deaths attributed to these diseases occur in the low and middle income countries.[2]The burden of NCDs has already become a major health problem in Bangladesh.[3] More than 60% deaths in Bangladesh are happening due to NCDs.[4]

NCDs are linked to a few major risk factors. Although a few population level studies on risk factors of NCDs have been published,[5-7] we need more data points for setting the baseline and examining the trend as per global NCD monitoring framework.[8,9] For control and prevention of NCDs in Bangladesh, we need to know the distribution of established risk factors of NCDs both in urban and rural areas. More emphasis on rural population is required because more than 70% of the people of Bangladesh live in rural area. This study aims at determining the prevalence of established common risk factors for NCDs among the adult population in a rural area of Bangladesh.

Methods

A survey was conducted among residents, aged 15 years or older, of Ekhlaspur village of Matlab North Sub-district, a rural area of Bangladesh during the period of November to December 2008. The area is located on the bank of river Meghna, about 60 km south-east of Dhaka city. It is an agricultural area and it takes about two to three hours by motor launch to reach nearby small towns.[10]

Ekhlaspur Centre of Health (ECOH), a local non-governmental health promotion organization conducts periodic demographic surveys in the village and a complete list of households with demographic information of the residents was available. There were 1088 households in the village.[11] Residents aged 15 years or above living in the village were the source population for this study. All households of the villages were visited by health assistants of ECOH for selection of one respondent from each household. To have similar representation of men and women, household were

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divided into male and female households. A list of male or female residents of a household was prepared during the visit by interviewers. Then Kish table was used to select one respondent from a household. A structured questionnaire was used to collect information about age, education, tobacco use, fruit and vegetable intake and habit of salt intake while taking meal. Sitting blood pressure and standing waist circumference were measured by standardized methods.

Information on tobacco use was collected for both smoking and smokeless forms. Those who smoked or used smokeless tobacco daily within the past 30 days were considered as "current" users. Respondents were asked for the number of days they ate fruit and vegetables in a typical week, and how many servings they ate on one of those days. Servings were measured by showing pictorial show-cards (for uncooked items) or measuring cups (cooked items).

Information on treatment of hypertension was sought by checking prescriptions or medicine strips if they claimed to be on treatment of the disease. Waist circumference was measured using a plastic measuring tape midway between the lower margin of the last palpable rib and the top of the hip bone to the nearest 0.5 cm. Blood pressure was measured using ordinary aneroid sphygmomanometers (in mm of Hg) on the left arm while the participants were in a sitting position after having a rest for at least 5 min. Korotkoff phase V was taken as diastolic blood pressure. A second reading was taken after 2 min and the mean of these measurements were used in the analysis.

This survey was done as a part of routine annual examination of villagers of Ekhlaspur done by ECOH in participation of the community as a whole. Purpose of the health examination survey was explained to the community leaders and community consent was obtained. Subsequently participants' verbal consent was obtained but ethical clearance was not solicited because it was rather dictated by the community. All subjects detected to have risk factors were either counseled or brought under registry and treatment program of ECOH as per its mandate.

Statistical analyses:
Data were checked and entered in a database. Age and sex specific descriptive statistics of selected variables for all participants were calculated. Prevalence of NCD risk factors in each group was calculated. Hypertension was defined as systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg or on anti-hypertensive medication. Central obesity was defined as waist circumference ≥91 cm in men and ≥81 cm in women. Low fruits and vegetable index was defined as less than 5 serving per day. Prevalence estimates were adjusted to WHO world population.[12] All analyses were done using Statistical Package for the Social Sciences version 16.0.

Results:
In total, 1011 subjects participated in the study (response rate 93%). Of the total respondents, 46.4% were male and mean age of the subjects was 42.4 (standard deviation 16.3) years. Among the respondents 15.4% were below 25 years and 10.7% were above 64 years. Median years of schooling were 2 years. One-third (32.5%) of them had no formal education (Table I).

Table-I
Sociodemographic profile of the study participants.

	Men and Women n = 1011 n (%)	Men n=469 n (%)	Women n=542 n (%)
Age groups, years			
15-24	156 (15.4)	86 (18.3)	70 (12.9)
25-34	209 (20.7)	84 (17.9)	125 (23.1)
35-44	231 (22.8)	110 (23.5)	121 (22.3)
45-54	197 (19.5)	81 (17.3)	116 (21.4)
55-64	110 (10.9)	51 (10.9)	59 (10.9)
65+	108 (10.7)	57 (12.2)	51 (9.4)
Educational achievement			
No formal education	328 (32.5)	126 (26.9)	202 (37.3)
Any primary (grades 1 to 5)	422 (41.7)	194 (41.4)	228 (42.1)
Any secondary (grades 6 to 10)	233 (23.0)	129 (27.5)	104 (19.2)
More than secondary (grades 11 or above)	28 (2.7)	20 (4.2)	8 (1.5)

Table-II

Distribution non-communicable disease risk factors in study population.

Age groups	Fruit, servings/ day	Vegetables, servings/ day	Vegetables/fruit, servings/ day	Systolic blood pressure, mmHg	Diastolic blood pressure, mmHg	Waist circumference, cm
Men and women						
15-24	0.4 (0.3)	1.8 (0.6)	2.2 (0.7)	113.9 (10.3)	72.5 (9.1)	71.1 (8.4)
25-34	0.4 (0.3)	1.9 (0.5)	2.1 (0.7)	113.9 (11.1)	72.4 (9.5	72.2 (10.1)
35-44	0.4 (0.3)	1.9 (0.6)	2.1 (0.7)	116.5 (12.3)	74.8 (9.3)	74.8 (10.5)
45-54	0.4 (0.3)	1.8 (0.6)	2 (0.7)	120.4 (17.2)	75.8 (10.9)	73.6 (10.5)
55-64	0.4 (0.3)	1.7 (0.5)	2.1(2.2)	124.6 (16.9)	76.7 (8.6)	72.7 (11.0)
65+	0.4 (0.2)	1.8 (0.6)	2 (0.7)	133.2 (22.2)	81.3 (10.9)	72.6 (9.1)
Total	0.4 (0.3)	1.8 (0.6)	2.1 (1.0)	118.9 (15.8)	75.0 (10.1)	73 (10.1)
Men						
15-24	0.3 (0.3)	1.8 (0.5)	2.1 (0.7)	113.8 (10.3)	72.6 (9.1)	71.1 (8.4)
25-34	0.4 (0.3)	1.9 (0.6)	2.1 (0.6)	113.9 (11.1)	72.4 (9.4)	72.2 (10.1)
35-44	0.4 (0.4)	1.9 (0.6)	2.1 (0.8)	116.4 (12.4)	74.9 (9.4)	74.8 (10.6)
45-54	0.4 (0.3)	1.8 (0.6)	2.0 (0.7)	120.3 (17.2)	75.8 (11.0)	73.6 (10.5)
55-64	0.3 (0.3)	1.8 (0.6)	1.9 (0.8)	124.6 (16.9)	76.7 (8.7)	72.7 (11.1)
65+	0.4 (0.2)	1.9 (0.7)	2.1 (0.7)	133.1 (22.1)	81.2 (10.9)	72.6 (9.1)
Total	0.4 (0.3)	1.8 (0.6)	2.1 (0.7)	118.9 (15.9	75.0 (10.1)	73.0 (10.1)
Women						
15-24	0.3 (0.4)	1.9 (0.7)	2.2 (0.8)	112.5 (12.3)	71.5 (11.1)	70.1 (8.6)
25-34	0.2 (0.3)	1.9 (0.5)	2.1 (0.7)	112.3 (12.1)	70.3 (9.9)	71.5 (10.5)
35-44	0.2 (0.3)	1.9 (0.6)	2.1 (0.7)	115.3 (11.4)	714.6 (9.6)	73.5 (11.1)
45-54	0.2 (0.3)	1.8 (0.6)	2.1 (0.7)	122.8 (18.3)	76.6 (11.4)	71.2 (12.0)
55-64	0.2 (0.3)	1.7 (0.5)	2.3 (3.0	129.0 (19.3)	78.2 (8.9)	72.3 (11.0)
65+	0.2 (0.2)	1.7 0.6)	1.8 (0.7)	132.8 (19.2)	80.5 (11.1)	70.8 (9.4)
Total	0.2 (0.3)	1.8 (0.6)	2.1 (1.2)	118.9 (16.7	74.6 (10.8)	71.7 (10.7)

Results are mean (standard deviation)

Distribution (mean & SD) of risk factors are presented in Table II and prevalence of risk factors in Table III.

Table-III
Prevalence of NCD risk factors in a rural village of Bangladesh

Age group (years)	Tobacco use			Low fruit/vegetables < 5 servings	Use of antihypertensive medicine	Hypertension		Central Obesity* Men >=91 cm, Women >= 80 cm	Use of extra salt on the table
	Anyform	Smoking	Smokeless			BP>=14/90 mmHg	BP>=140/90 mm Hg and or medication		
Men and Women									
15-24	16.2	13.2	2.9	91	1.3	7.1	8.3	13.6	87.8
25-34	44.5	32.5	15.8	91.9	2.9	6.7	9.1	21.6	85.9
35-44	63.3	33.7	35.5	92.2	6.1	11.7	15.6	25.3	89.1
45-54	74.7	36.5	49.7	92.9	10.7	17.3	19.8	19.6	86.1
55-64	81.9	39.2	57.3	93.6	10.9	17.3	22.7	17.4	89.5
65+	76.3	31.1	56.5	95.4	21.3	39.8	42.6	15.1	92.5
Total crude (95% C.I.)**	59.8 (38.4-80.7)	31.8 (23.4-38.9)	35.6 (17.1-55.3)	92.6 (91.5-94.1)	7.8 (2.6-14.8)	14.6 (6.0-26.7)	17.6 (8.6-41.5)	19.7 (15.2-22.6)	88.1 (86.3-90.0)
Total age adjusted (95% CI)	59.5 (33.2-85.7)	31.0 (21.4-40.7)	36.3 (12.5-60.1)	92.8 (91.2-94.4)	8.9 (1.3-16.5)	16.7 (3.8-29.5)	19.7 (6.5-32.9)	18.8 (14.2-23.3)	88.5 (85.9-91.1)
Men									
15-24	23.7	23.7	0.0	95.3	0	3.4	3.5	1.2	88.4
25-34	65.0	60.7	11.0	90.5	2.4	9.5	10.7	6.0	83.3
35-44	75.3	63.8	22.4	91.8	6.4	10.9	14.5	11.9	90.9
45-54	83.6	72.5	33.9	93.8	7.4	11.1	14.8	11.3	80.2
55-64	90.4	66.1	48.7	94.1	7.8	5.9	13.7	8.0	84.3
65+	78.2	51.5	44.6	94.7	17.5	38.6	38.6	5.4	93.0
Total crude (95%CI)	70.4 (49.3-89.7)	58.4 (41.9-71.4)	25.8 (10.5-42.8)	93.2 (91.7-94.9)	6.2 (1.7-11.9)	12.2 (2.3-23.9)	14.7 (5.8-25.8)	7.5 (3.9-10.7)	86.8 (82.6-90.8)
Total age adjusted (95% CI)	69.4 (44.3-94.5)	56.4 (38.1-74.7)	26.8 (6.7-46.9)	93.4 (91.4-95.3)	6.9 (0.6-13.2)	13.2 (0.0-26.7)	16 (3.5-28.4)	7.3 (3.0-11.5)	86.7 (81.5-91.8)
Women									
15-24	6.7	0	6.7	85.7	2.9	11.4	14.3	11.6	87.1
25-34	22.7	2.6	20.8	92.8	3.2	4.8	8	21.0	85.6
35-44	50.6	1.8	49.4	92.6	5.8	12.4	16.5	24.2	86.8
45-54	66.1	1.7	65.0	92.2	12.9	21.6	23.3	15.8	87.9
55-64	70.2	2.4	69.0	93.2	13.6	27.1	30.5	15.3	86.4
65+	73.7	3.9	72.4	96.1	25.5	41.2	47.1	10.0	90.2
Total crude (95%CI)	47.8 (24.9-71.6)	2.0 (1.0-3.1)	46.6 (23.9-70.3)	92.1 (89.2-96.0)	9 (3.1-17.7)	16.8 (8.2-30.5)	20.1 (11.0-34.7)	17.7 (11.9-21.1)	87.1 (85.9-88.7)
Total age adjusted (95% CI)	48.3 (19.3-77.4)	2.1 (0.7-3.4)	47.2 (18.4-76.0)	92.1 (88.5-95.7)	10.4 (1.6-19.7)	19.8 (5.9-33.6)	23.3 (8.6-38.0)	16.3 (10.6-22.0)	87.3 (85.7-89.0)

*Defined by large waist circumference   **CI indicates confidence interval

Fruit and vegetables: Mean (SD) per capita consumption of fruit and vegetables was 2.1 (1.0) servings per day. More than nine in 10 (92.8%) respondents consumed less than recommended minimum 5 servings of fruit and/or vegetables per day.

Tobacco use: Smoking prevalence was very high in men whereas in women it is much lower than men in the area. Only fifteen women gave history of smoking. The overall prevalence of smoking was 31.0% (56.4% men versus 2.1% women) and Prevalence of smokeless tobacco use was 36.3% (26.8% in men and 47.2 % in women).

Salt use: We found that more than 85 percent of the people use extra salt during meal. Prevalence of daily extra salt intake during meal was 86.7% in men and 87.3% in women.

Blood pressure status: Mean (SD) systolic pressure was 118.9 (15.8) mmHg and mean diastolic pressure was 75 (10.1). Prevalence of high blood pressure (systolic blood pressure e"140 mmHg or diastolic pressure e" 90 mm Hg) was 16.7% (men; 13.2%) and women 19.8%). As per history, 8.9% respondents were taking medication for hypertension. Prevalence of hypertension defined by high blood pressure (>=140/90 mmHg) or medication was 19.7 (men 16 and women 23.3)

Central obesity: Average waist circumference (as a measure of central obesity) was 73 cm and 71.7 cm in men and women respectively. Overall, 18.8% had central obesity. Women had a higher prevalence of central obesity (16.3 % versus 7.3 %) than men.

Discussion:

In Bangladesh there are only a few studies have reported the prevalence of risk factors of NCDs. Our survey report showed a high prevalence of risk factors even in a rural area. This poses a significant threat for upcoming NCD epidemics. In specific terms high prevalence of tobacco use, hypertension, obesity, low consumption of fruit/ vegetable, and high consumption of salt while taking meal were observed.

Tobacco use is a major threat to health. The overall prevalence of smoking (31.0%) observed in the present study is quite high than STEPS survey 2010 (27%) [7]and STEPS survey 2013(17%) [8] done in Bangladesh. Smoking prevalence among men in the

present study (58.4 %.) is comparable to that of Indonesia (54%) [13] and Vietnam (58%) [14] but was higher than India (42%) [15] and Maldives (40%). [16]

In our study smoking prevalence among women was negligible (2.1%), suggesting a better influence of social norms. On the other hand, high prevalence of smokeless tobacco consumption was observed by women. It is observed that proportion of tobacco-use increased consistently with age, the highest being in 50 years and above age-group in the areas. Bangladesh has a high cultural acceptability of smokeless tobacco. Tobacco Control Act 2005 did not have any mandate to control smokeless tobacco. This might have favored easy availability and use of smokeless tobacco products such as Zarda, Pan Masala, Gul, etc.[17]

We found low per capita consumption of fruit/ vegetable per day in our study which is similar that of STEPS surveys done in 2010[7] and 2013.[8] Low consumption of fruits and vegetables probably could be due to the lack of awareness, especially in rural area. WHO attributes approximately three million deaths a year from NCDs to inadequate consumption of fruit and vegetables.[18] Consumption of adequate fruits and vegetables not only prevents nutrient deficiency disorders but also reduces the risk of cardiovascular diseases. Goyal et al[19] reported that increased consumption of fruits and vegetables is associated with a 16% lower risk of cardiovascular disease in Indian subcontinent. Availability of good-quality seeds, encouraging the farmers to grow vegetables and fruits, and public-awareness campaign about their benefits are some of the important strategies that may help increase the consumption of fruits and vegetables.

Obesity has been growing in Bangladesh.[6] Although we have not measured height and weight; it can be easily guessed from our data that obesity has already become a problem even in this rural area. About one in five of our subjects have central obesity. The age adjusted prevalence is higher in women (16.3%) compared to men (7.3%). Their physical activity level might be lower than men.[20] It is noteworthy that the central obesity is a peculiar characteristic of South Asian people that predispose them to metabolic syndrome and diabetes.[21] Interventions those are appropriate for this population needs to be identified.

High intake of sodium is one of the important contributing factors for high blood pressure. The present study found high age adjusted prevalence of hypertension in the area (19.7%). This could be due to the excessive intake of salt during meal which is very common in our sample (88.5%). It is also observed that high blood pressure is a major health problem in the elderly people. One striking feature of this sample is inadequate detection and treatment rate in spite of having a high prevalence of hypertension.

Study Limitations:
This is a single location study. Therefore the findings are not generalizable for Bangladeshi rural population at large. This study could not capture data on body mass index which is globally more commonly used as an index of obesity.

Conclusion:
Prevalence of NCD risk factors is high in this rural population. This high prevalence warrants intervention to reduce risk and to deal with the chronic diseases to which they contribute.

Conflict of interest:
We do not have any conflict of interest.

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