Factors Responsible for Non-Communicable Diseases Except Diabetes among Bangladeshi Adults

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Abstract

Except diabetes there are 3 groups of non-communicable diseases which depend on lifestyles and socioeconomic factors. Due to these diseases annually 41 million people die worldwide and 85 percent of this deaths occur in low-and middle income countries. Bangladesh is now a middle income country, and it has a burden of almost half of the annual mortality due to non-communicable diseases. In this paper, attempt was made to identify the factors responsible for different types of non-communicable diseases except diabetes among Bangladeshi adults. For the purpose, 808 adults were investigated and observed that 31.7 percent of them were of ages 50 years and above and 31.3 percent of them were suffering from one or more of the NCDs excluding diabetes against the overall 21.9 percent sufferers from the NCDs. The other associated variables with the diseases were residence, marital status, education, occupation, BMI, smoking habit, habit of taking restaurant and can food. But as major factors responsible for the diseases, the factor analysis identified the variables age, education, occupation and marital status .

Keywords : *Prevalence of different diseases, socioeconomic factors, risk ratio, factor analysis.*

INTRODUCTION

There are 4 groups of non-communicable diseases (NCDs). These 4 groups are (i) cardiovascular diseases (like heart attack and stroke), (ii) cancer, (iii) chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma), and (iv) diabetes. The diseases are referred to lifestyle diseases, because maximum of these diseases are preventable illness. The most common causes for NCDs include tobacco use, alcohol abuse, poor diets (high consumption of sugar, salt, saturated fats, and trans fatty acids) and physical inactivity [1].

The sources of NCDS indicate that these diseases are associated with economic development and thus these are the diseases of the rich'. Currently NCDs kill 41 million [2] people annually and this amount is equivalent to 71 percent of all deaths in a year. Each year, 15 million die from NCDs between the ages 30 to 69 years ; over 85 percent of these premature deaths occur in low and middle income countries [2]. Cardiovascular disease account for most deaths or 17.9 million people die annually, followed by cancers (9.0 million), respiratory diseases(3.9 million) and diabetes (1.6 million).

In some studies, It was reported that 7.4 percent Bangladeshi adults of ages 20 -79 years were suffering from diabetes [3,4]. The risk of diabetes was reported in both home and abroad [5,6,7] and it has some economic consequences [8,9]. Earlier studies provided the information that diabetes was the major health problem among Bangladeshi adults [10,11,12]. But, there was no separate estimate or information about the mortality due to NCDs excluding diabetes. Socioeconomic variables responsible for different types of NCDs were also reported in both home and abroad [5, 6, 10,11,12,13]. But, responsible variables for NCDs excluding diabetes were not reported. In the present analysis , attempts were made to identify the responsible variables for different non-communicable diseases excluding diabetes. The specific objectives were (i) to measure the risk of socioeconomic variables in enhancing the NCDs except diabetes, (ii) to identify the responsible variables for NCDs excluding diabetes.

METHODOLOGY

The present analysis was done using the data collected from 808 adults of ages 18 years and above from urban and rural areas of Bangladesh. The data were collected by some doctors and nurses from and nearby their working places according to their convenience during academic session 2016-2017 when the investigators were completing their M.P.H. degree. The data were recorded through a pre-designed and pre-tested printed questionnaire. The collected information from all the investigated adults were related to different socioeconomic variables including family income, family expenditure and prevalence of non-communicable diseases. Some of the variables were qualitative in nature. But for the analytical purpose all the variables were recorded in nominal scores.

In some studies, both in home and abroad, it was noted that NCDs were associated with body mass index (BMI)[10,11 – 18]. The body mass index was measured by weight in kg / height in $(m)^2$[19]. The adults were classified as underweight [BMI< 20], normal weight [BMI = 20 - < 25], overweight [BMI= 25 - < 30] and obese [BMI > 30] [1]. The association of level of obesity and other socioeconomic variables was investigated by (x^2)test and significant association was decided when P (x^2) ≤ 0.05. In all cases the risk ratios for the diseases due to socioeconomic variables were calculated [20].

Factor analysis [10,21,22,23] was done to identify the most responsible factors for the variation in the data set of adults suffering from NCDs excluding diabetes. The responsible variables were identified observing the factor loadings. The most responsible variable was one for which the value of factor loading was highest.

RESULT

Out of 808 investigated adults 21.9 percent were suffering [Table 1] from at least 2 diseases excluding diabetes. Among the adults 84.2 percent were from urban area and 19.7 percent of them were suffering from non-communicable diseases excluding diabetes. Significant differences in proportions of prevalence of diseases according to residential variation was noted [x^2 =12.318, p –value=0.002]. The risk ratio 1.70 indicated that the rural adults were at 70 percent more risk of prevalence of the diseases compared to the risk of urban adults.

There were 69.7 percent male respondents and 21.5 percent of them were suffering from the diseases. The corresponding percentage among female adults was 22.9. Male and female adults had almost similar risk of prevalence of the diseases[R.R = 0.94] and there was no association between gender variation and prevalence of the diseases [x^2 =4.083, p- value = 0.130].

In the sample 89.9 percent were Muslims and 20.9 percent of them were suffering from the diseases. The corresponding percentage among non-Muslim adults was 30.5Significant differences in the prevalence of the diseases according to religion was also not observed [x^2 =4.308, p- value= 0.116]. But the risk ratio 1.46 indicated that the non-Muslim adults were at higher risk of prevalence of the diseases compared to the risk of Muslims adults.

Among the investigated units 51.1 percent were found married during the investigation period and 48.9 percent were single. More married persons (28.2%) were suffering from different diseases compared to the patients among single adults (15.2%). Significant difference in prevalence rate of diseases among married and single adults was noted[x^2 = 41.748, p-value = 0.000]. The married adults were at more risk of 84 percent compared to the risk of single adults [R.R= 1.84].

The total investigated adults were classified into 5 classes according to their age. One group was of age less than 20 years and they were 4.5 percent. But 22.2 percent of them were suffering from different diseases. This was the third highest group of patients who were sufferingfrom other diseases. The highest group of patients of other diseases were of ages 50 years and above and they were 31.7 percent in the sample. Majority (38.6%) of the investigated units were of ages 20 years to less than 30 years but lowest proportion (0.141) of them were patients of other diseases. The differential proportions of adults according to different age groups and different types of diseases were significant [x^2 = 51.992, p-value = 0.000]. The adults of ages 40 years and above were at 86 percent more risk than the risk of adults of other ages.

Most of the investigated adults were higher educated (74.4%) but lowest proportion of them (0.19) were suffering from other diseases.

Table 1. *Distribution of adults by different socioeconomic variables and different types of non-communicable disease.*

Socioeconomic variables	Prevalence of different diseases						Total	
	None		Diabetes		Others			
	n	%	n	%	n	%	N	%
Residence								
Rural	53	41.4	32	25.0	43	33.6	128	15.8
Urban	354	52.1	192	28.2	134	19.7	680	84.2
Gender								
Male	296	52.6	146	25.9	121	21.5	563	69.7
Female	111	45.3	78	31.8	56	22.9	245	30.3
Religion								
Muslim	368	50.7	206	28.4	152	20.9	726	89.9
Non-Muslim	39	47.6	18	22.0	25	30.4	82	10.1
Marital status	164	39.9	131	31.9	116	28.2	411	51.1
Single	243	61.2	93	23.4	61	15.4	397	48.9
Age (in years)								
< 20	17	47.2	11	30.6	8	22.2	36	4.5
20 – 30	187	59.9	81	26.0	44	14.1	312	38.6
30 – 40	45	68.2	9	13.6	12	18.2	66	8.2
40 – 50	70	50.7	35	25.4	33	23.9	138	17.1
50+	88	34.4	88	34.4	80	31.2	256	31.7
Education								
Illiterate	7	31.8	9	40.9	6	27.3	22	2.7
Primary	21	37.5	21	37.5	14	25.0	56	6.9
Secondary	52	40.3	34	26.4	43	33.3	129	16.0
Higher	327	54.4	160	26.6	114	19.0	601	74.4
Occupation								
Agriculture and unskilled labor	15	42.9	3	8.6	17	48.6	35	4.3
Business and skilled labor	31	40.8	26	34.2	19	25.0	76	9.4
Service	101	55.2	44	24.0	34	20.6	183	22.6
Housewife, student and others	260	50.6	151	29.4	103	20.0	514	63.6
Income(in 000 taka)								
< 30	96	60.4	36	22.6	27	17.0	159	19.7
30 – 60	55	47.4	33	28.4	28	24.1	116	14.4
60 – 90	23	37.1	21	33.9	18	29.0	62	7.7
90+	233	49.5	134	28.5	104	22.0	471	58.3
Total	407	50.4	224	27.7	177	21.9	808	100.0

Table 1. *Continued*

Socioeconomic variables	Prevalence of different diseases						Total	
	None		Diabetes		Others			
	n	%	n	%	n	%	n	%
Level of obesity								
Underweight	73	68.2	23	21.5	11	10.3	107	13.2
Normal	211	52.1	108	26.7	86	21.2	405	50.1
Overweight	111	42.5	79	30.3	71	27.2	261	32.3
Obese	12	34.3	14	40.0	9	25.7	35	4.3
Utilization of time								
Academic work	120	58.8	45	22.1	29	19.1	204	25.2
Reading and watching T.V.	100	58.1	42	24.4	30	17.5	172	21.3
Games and sports	27	48.2	21	37.5	8	14.3	56	6.9
Paper reading and use of mobile phone	80	35.9	69	30.9	74	33.2	223	27.6
Use of T.V. and mobile phone	80	52.3	47	30.7	26	17.0	153	19.0
Physical exercise								
Yes	217	52.4	102	24.6	95	22.9	414	51.2
No	190	48.2	122	31.0	82	20.8	394	48.8
Smoking habit								
Yes	70	49.3	31	21.8	41	28.9	142	17.6
No	337	50.6	193	29.0	136	20.4	666	82.4
Habit of taking restaurant food								
Yes	257	54.1	124	26.1	94	19.8	475	58.8
No	150	45.0	100	30.0	83	24.9	333	41.2
Use of can food								
Yes	283	54.2	130	24.9	109	20.9	522	64.6
No	124	43.4	94	32.9	68	23.8	286	35.4
Total	407	50.4	224	27.7	177	21.9	808	100.0

The differentials in proportions in the Different levels of education were significant as x^2=22.135 with p–value= 0.001. The risk ratio [R.R = 1.60] indicated that illiterat, primary educated and secondary educated adults had 60 percent more risk of affecting by other diseases compared to the risk of higher educated adults.

One of the reason of overweight and obesity and hence NCDs is physical inactivity [24]. Housewives, students and unemployed persons are not directly involved in physical labor [25]. Same fact is true for business persons, government employees and skilled workers. Only farmers and unskilled workers are directly involved in physical labor. In the light of this statement, the investigated adults of this study were divided into 4 occupational groups Viz. (i) agriculturists and unskilled labors, (ii) Business persons and skilled workers, (iii) service persons, and (iv) housewives, students and others. The number of respondents in these groups were 35, 76, 183 and 514, respectively. The last group was the biggest group (63.6%) and 20.0

percent of them were suffering from different diseases. This percentage was the lowest.The worst sufferers were observed (48.6%)among the farmers and unskilled labors. With the variation in the level of occupational patterns there was significant variation in the levels of NCDs [x^2 = 22.431, p-value = 0.001]. Housewives, students and others had less risk of affecting by other diseases [R.R = 0.80].

Majority (58.3%) of the investigated adults were coming from rich families (monthly income Tk. 90 thousand and above) and 22.1 percent of them were suffering from at least one of the NCDs. Highest (29.0 %) affected people was observed in those families having monthly income Tk. 60 – 90 thousand. Least affected people (17%) was noted in lower income group of adults.Around 20 percent adults were from this group of families. Levels of suffering from other diseases according to different levels of income were not significantly different as was observed by Chi-square test [x^2 =11.513, p –value = 0.074]. However, higher two income groups of adults were at higher risk of affecting by the diseases by an amount 14 percent compared to the risk of adults of lower two income groups of adults [R.R = 1.14] Very few(4.3 %) of the adults were obese. But 25.7 percent of them were suffering from other diseases. The percentage of overweight and obese adults was 36.6 and 27.0 percent of them were suffering from different diseases. There were significant differences in the proportions of prevalence of different diseases according to different levels of obesity as was observed by Chi-square test

[x^2 =26.428, p-value = 0.000]. The overweight and obese adults had 43 percent more risk of affecting by different diseases excluding diabetes [R.R.= 1.43].

Among the adults 17.6 percent were smokers and 28.9 percent of them were suffering from different diseases. This corresponding percentage among non-smokers was 20.4. But there was significant association between smoking habit and level of different diseases [x^2 =6.014, p-value = 0.049]. The risk ratio (1.41) indicated that the risk of prevalence of other diseases among smokers was 41 percent more compared to the risk of non-smokers.

A big group (58.8%) of respondents were habituated in taking restaurant foods. But the prevalence rate of other diseases among them was lower (19.8) compared to the prevalence rate among adults who did not take restaurant food. There was significant differences in the proportions of adults classified by habit of taking restaurant foods and prevalence of at least one of theother diseases excluding diabetes [x^2 =6.635, p-value=0.036]. However, the risk of prevalence of any of the other diseases irrespective of taking or not taking restaurant food was almost similar [R.R = 0.79]. But higher income(TK.60,000.00 and above) and habit of taking restaurant food was significantly associated as was observed by x^2 test, where x^2 =10.193, p-value=0.017 [Table 2]

This study indicated that there was a joint impact of higher income and habit of taking restaurant food on prevalence of different diseases.

Table 2. *Distribution of adults according to income and habit of taking restaurant food.*

Habit of taking restaurant food	Income (in 000 taka)				Total	
	<30	30 -60	60 - 90	90+	.n	%
Yes n	79	63	42	291	475	58.8
%	48.7	54.3	67.7	61.8		
No n	80	53	20	180	333	41.2
%	51.3	45.7	32.2	38.2		
Total n	159	116	62	471	808	100.0
%	19.7	14.4	7.7	58.3		

Among the adults, 64.6 percent were used to take can food including soft drinks and 20.9 percent of them were affected by at least one of the diseases. The rate of prevalence of other diseases was higher (0.0.238) among the adults who did not take can food. There was significant differences in the proportions of adults suffering from different diseases according to

the habit of taking can food [x^2 = 9.257, p- value = 0.010]. However, used to take can food did not lead the adults tosuffer from different diseases. This was noted from risk ratio where R.R.= 0.88.].

It was also noted that 51.2 percent adults were used to do some sorts of physical exercise and 22.9 percent of

them were suffering from other diseases. Those who did not do any physical exercise 20.8 percent of them were suffering from different diseases. There was no significant association between habit of doing physical exercise and prevalence of other diseases [x^2 =4.039, p- value = o.133].

Factor Analysis

According to the second objective of the study factor analysis was done to detect the most responsible variables for the variation in the data of adults suffering from diseases excluding diabetes. The most responsible

variable was identified by the highest value of the coefficient of a factor. For factor analysis the variables included were residence, gender, age, religion, marital status, education, occupation, income, BMI, smoking habit, habit of taking restaurant food, habit of taking can food, utilization of time and physical exercise. These variable Were sufficient for the factor analysis as KMO=0.597 giving x^2 =554.716,p-value=0.000.

The KMO statistic is used to justify the use of the variables for factor analysis. The results of factor analysis were presented in Table 3.

Table 3. *Results related to factor analysis*

Variable	Communality	Coefficient of factor
Residence	0.506	0.417
Age	0.710	-0.697
Gender	0.592	-0.088
Marital status	0.623	0.752
Religion	0.426	-0.096
Education	0.394	0.523
Occupation	0.737	0.603
Income	0.585	0.308
Smoking habit	0.633	0.357
Habit of taking restaurant food	0.674	-0.454
Habit taking can food	0.566	-0.317
Utilization of time	0.434	-0.309
Physical exercise	0.446	0.259
BMI	0.504	-0.388

It was observed that the highest coefficient of factor was for the variable marital status followed by age, occupation and education These 4 variables were most responsible for the suffering of the adults from different diseases other than diabetes.

DISCUSSION

The findings presented in the paper were the analytical results of the data collected from 808 Bangladeshi adults of age 18 years and above. The objective of the study was to detect the responsible variables for different non-communicable diseases excluding diabetes. The prevalence of NCDs is the cause of premature death of many adults [1,2,3,] . The risk of death is at increasing trend in the world and is more in low-and middle income countries. The risk of the disease was reported in both home and abroad [4,5,6,7]. Some of the socioeconomic variables were reported as significantly associated with NCDs [6, 10, 11, 15. 16. 17. 18].

It was evident from the present analysis also that most of the socioeconomic variables under study were the cause of different diseases , specially age, income, marital status , occupation , habit of taking restaurant food and can food, physically in-activity, etc. Marital status, age, occupation and education were detected as most responsible variables for the variations in the levels of disease. These variables were identified by factor analysis. The risk of prevalence of different diseases was higher for rural adults,non-Muslims, married persons, adults of ages 40 years and above, businessmen and skilled labors, lower level educated people, overweight and obese groups of adults ,adults of higher income group , and aged adults .

CONCLUSION

The present analysis was done using the data collected from 808 adults of ages 18 years and above by some doctors and nurses from and nearby their working

places covering both rural and urban residents. But most of the adults were from urban area (85.2%) but their risk for affecting by the diseases was lower. Male (69.7%) and female were similarly exposed to the diseases. Married adult was at higher risk of the diseases compared to the risk of single adults. The risk of affecting by the diseases was more for the aged and lower level educated adults. Lower risk was observed for housewives, students and others. The risk of affecting by the diseases was more for overweight and obese adults. Risk was also more for smokers and physically inactive adults. Habit of taking can food and restaurant food were significantly responsible for the diseases. Though income was not an influencing variable for enhancing the diseases, but it enhanced the use of restaurant food. So, it could be said that income had an indirect impact on the prevalence of other diseases. By factor analysis most responsible identified variables for the diseases were marital status, age, occupation and education.

The results indicated that some social factors were responsible for different types of non-communicable diseases. So, it cannot be avoided but its prevalence can be controlled if people play active role to reduce the influences of the identified responsible variable in enhancing the prevalence of different diseases. For this, the people are to be motivated so that they can avoid sedentary behavior and can develop the self–care behavior in favor of better health management. For this Government and health planners can introduce some rules and regulations so that those rules and regulations do not hamper the normal life of the people, rather the rules will be implemented easily. The following aspects can be considered and action can be taken accordingly.

(i) people are to be motivated to join the campaign for detection, screening, and treatment of different non-communicable diseases,

(ii) patient can play active role to control diet, smoking habit, and can use the medicine regularly under the treatment of a senior doctor,

(iii) people are to be encouraged to take more fruits and vegetables and fewer foods high in sugar, salts and saturated fats,

(iv) people should be advised to take more water instead of sugary drinks,

(v) People are to be suggested to limit watching television and to limit the use of smart phone,

(vi) people are to be motivated to be engaged in some sort of physical labor and to do some sorts of physical exercisewhenever these are possible to do.

(vii) Urban or rural people should develop a habit of morning / evening walk every day.

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