



## Impact of Socioeconomic and Risk Factors on Cardiovascular Diseases among People in Bangladesh: A Cross-sectional Health Survey

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### Authors' contributions

This work was carried out in collaboration between all authors. Author MUH designed the study, performed the statistical analysis, wrote the protocol and first draft of the manuscript and managed the final submission of the manuscript. Author MSK managed the literature searches, coordinated the survey and analyzed the study data. Authors SMAB, MRI, MNI and MRI conducted the survey and accumulated all the data of survey. All authors read and approved the final manuscript.

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### ABSTRACT

**Aims:** The burden of non-communicable diseases especially cardiovascular diseases (CVDs) are rising rapidly in the developing countries particularly in Bangladesh. Therefore, the present study was undertaken to assess the impact of socioeconomic and risk factors affecting cardiovascular diseases among people in Bangladesh.

**Study Design:** We conducted this study with standard structured questionnaires following WHO STEPS Surveillance Manual.

**Place and Duration of Study:** Department of cardiology, ward number 32, Rajshahi Medical

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College Hospital, Rajshahi, Bangladesh, from July to December 2015.

**Methodology:** We enrolled 650 patients randomly (469 men, 181 women; age range 11 to 70 years) with cardiac complications. Data were collected via interview of the patients/guardians and medical records using WHO-NCD STEP wise approach questionnaires. Descriptive statistics was applied to analyze the data.

**Results:** In this study we found that the prevalence of CVDs was more among rural people (61.5%) than urban residence (38.5%). Majority of participants (74.6%) came from lower socio-economic class, patients of age 50-60 years (30%) had greater risk than others, male (72.1%) had greater risk of suffering from CVDs than female (27.9%), families with low income (10000-20000 taka) 44.3%, family members (4-5) 46.8%, high cholesterol diet 75.2%, hypertension 79.1%, patients with no physical exercise 45.7% were commonly suffering from cardiovascular diseases.

**Conclusion:** Our present study showed that CVDs risk factors such as habit of salt intake during meals in the table, high cholesterol diet, smoking, hypertension, heredity, obesity, diabetes & no physical exercise was persistent among the study populations. Therefore social awareness should be developed among people of Bangladesh especially in rural community through educational programs & by mass media.

*Keywords: Behavioral risk factors; cardiovascular diseases; rural and urban community; Bangladesh.*

## 1. INTRODUCTION

Cardiovascular disease (CVD) is the class of disease which occurs due to impaired heart function, considers one of the major health problems in the world responsible for 30% of all global deaths [1]. The epidemiology of CVDs is now wildly spreading in developing countries particularly low and middle income countries (LMICs) contributing more than three-quarters of all CVD deaths in the world [2]. Rapid urbanization, poor literacy rates and lack of awareness and changing lifestyle pattern contributed to the rising burden of cardiovascular diseases in the developing countries [3-5]. In the last few decades epidemiological transition was observed from communicable to non-communicable diseases (NCDs) in Bangladesh [6,7]. Among the non-communicable diseases CVDs are being considered one of the major causes of mortality and morbidity among people of Bangladesh due to rapid urbanization, changing food habit & lifestyle, excessive fast foods and beverages intake, rising smoking habit, increase buying power and physical inactivity [8-13].

The most important risk factors of heart diseases are high cholesterol diet, physical inactivity, smoking, alcohol intake, stressful lifestyle, hypertension, hyperlipidemia and diabetes. Among these risk factors smoking contributes 10% of CVDs whereas lack of physical exercise and obesity responsible for (6%) & 5% of CVDs respectively in the world [14]. Some previous works showed high prevalence of cardiovascular diseases risk factors among people of India,

Malaysia, Nepal and Nigeria which increases in future [15-21]. A study conducted by Joshi et al showed that the highest prevalence of CVD risk factors among Bangladeshi people were current and former smoking (59.9%), overweight & obesity (43.3%), hypertension (14.3%), depression (43%), and elevated ApoB100/Apo-I ratio (59.6%) whereas regular physical activity (1.3%) and daily intake of fruits and vegetables (8.6%) were lowest prevalent [22].

Cessation of tobacco use, reduction of salt in the diet, consuming lot of fruits and vegetables, regular physical activity, control blood pressure & diabetes and avoiding harmful use of alcohol could reduce the risk of cardiovascular disease among people of Bangladesh. In Bangladesh there is lack of studies related to risk factors of cardiovascular diseases. Such kinds of studies are urgently needed to overcome the burden of CVDs and to determine the overall scenarios of risk factors responsible for development of cardiovascular complications among Bangladeshi people. Therefore, the present study aimed to evaluate the extent of CVDS risk factors among people of Bangladesh & to suggest possible ways to overcome the load of cardiovascular diseases.

## 2. MATERIALS AND METHODS

### 2.1 Study Site and Population

This was a descriptive cross-sectional study conducted in Rajshahi medical college hospital, Rajshahi. Study site is available for the treatment

of diseases for both rural & urban people. Patient of four districts of Rajshahi division that is Rajshahi, Chapainawabganj, Naogaon and Natore came here for their treatment of diseases. We enrolled 650 patients (469 men, 181 women; age range 11 to 70 years) randomly from the cardiac ward of Rajshahi medical college hospital for this health survey.

## 2.2 Study Tool

We followed the WHO-NCD STEP wise approach to surveillance questionnaires for collecting demographic information, behavioral and anthropometric measurements [19]. It contains core and extended questionnaires related to age, sex, occupation, education level, family monthly income (BDT), family member & marital status, habit of salt intake during meals in the table, high cholesterol diet, smoking per day, alcohol consumption, heredity, hypertension, obesity, diabetes, habit of physical exercise.

## 2.3 Data Collection

This cross-sectional health survey was carried out with a self-designed standard questionnaire by directly interviewing the 650 CVDs patient. About twenty B. Pharm. (Honors) students of Varendra University were assigned and trained up to conduct this study. No financial or material incentive was offered to participants. A structured questionnaire was designed by the research team for the study. The questionnaires were self-administered and where necessary, were administered on the patients by the research team with the aid of the assistants who had been trained for the study. Written consent was taken from each patient during this study. In case of unconscious patient consent was taken from their guardian. The questionnaire took about 20 minutes to complete and contained mainly close ended questions.

We recorded age, sex, occupation, educational level, family income, family members, marital status via questionnaires with the help of the admitted patient/guardian & hospital record of the patient. Smoking and alcohol consumption were considered as present if participants had habit of taking them until the past 30 days of interview. Hypertension & diabetes were recorded by the hospital history of the patient. Habit of salt intake during meals in the table & physical exercise were recorded with discussing the patient by self-recognition process.

## 2.4 Statistical Analysis

Descriptive statistics were applied to the collected data using Microsoft Excel software-2007. Results are expressed in frequency distribution and percentages.

## 2.5 Ethics Statement

The study was conducted following the general principles (section 12) of WMA declaration of Helsinki. The survey protocol and questionnaires was reviewed by the Pharmacy department, University of Rajshahi and approved this survey. As the human subjects only participated in the interview session & they were not subjected to any hazardous materials or chemicals so no further approval was taken from any institutional ethics committee to conduct this survey.

## 3. RESULTS

This study was conducted within 650 sample patients selected randomly from cardiac ward of Rajshahi medical college hospital, Bangladesh with standard structured questionnaires following WHO guidelines. In this study we found that rural people (61.5%) were most affected in cardiovascular diseases than urban populations (38.5%). The most prevalent (30%) age group was 51-60 years followed by 41-50 years (27.8%) and above 60 years (18.6%). The least affected people lied in the aged group between 31-40 years (16.2%), 21-30 years (6.9%) and 11-20 years (0.5%). Moreover, in case of cardiovascular diseases male patient (72.1%) was higher than female patient (27.9%). About 27.5% patients were farmer, 23.2% were housewife, 14.9% were businessman and 3.5% were student. Besides this, 16.5% patients were employed whereas 14.3% were unemployed. We also found that an incredible number of patients were either illiterate (24.5%) or completed their primary (35.2%) & secondary (27.4%) educations. Only 12.9% patients were completed tertiary education. A great number of participants (30.3%) came from poor family (<10000 BDT per month) whereas only 1.7% patients were rich (>50000 BDT per month). Also 44.3% patients came from low income family (10000-20000 BDT per month), 15.8% from medium income family (21000-30000 BDT per month), 4.6% from high income family (31000-40000 BDT per month) and 3.2% patients family income was 41000-50000 BDT per month. We observed that a great portion of participants lived in extended family

that is 4-5 family members was persistent in 46.8% patients and 44.3% patients having family member above 5 whereas only 8.9% patients came from nuclear family (2-3 member). Interestingly majority of patients (92.8%) were married but 7.2% were unmarried, shown in Table 1.

In our study we observed that habit of salt intake during meals in the table was found in 37.4% patient, high cholesterol diet in 75.2% patient, smoking in 61.2% patient, alcohol consumption in 5.7% patient, heredity in 56.8% patient, hypertension in 79.1% patient, obesity in 22.3% patient, diabetes in 35.2% patient. Details data were showed in Table 2.

In this health survey we tried to co-relate between physical exercise and CVDs. We found that people nothing done physical exercise were

the mostly affected persons (45.7%) and people done physical exercise more than 2 hours a day were the less affected ( 6.6%) shown in Table 3.

#### 4. DISCUSSION

Our study presented the CVD risk factors burden among rural& urban population of Bangladesh and showed that smoking, alcohol consumption, habit of salt intake during meals, obesity, hypertension, heredity and no physical exercise were important risk factors for suffering from cardiovascular diseases.

In this study we found that the prevalence of cardiovascular diseases was more among rural residence (61.5%) than urban people (38.5%) which is similar with previous studies [23,24]. One possible reason is that cardiovascular diseases mainly affected the poorest people [25].

**Table 1. Sociodemographic characteristics of the study populations**

Variables	Response pattern	Frequency (n=650)	Percentage (%)
Residence	Urban	250	38.5
	Rural	400	61.5
Age	11 – 20	03	0.5
	21 – 30	45	6.9
	31 – 40	105	16.2
	41 – 50	181	27.8
	51 – 60	195	30
	>60	121	18.6
Sex	Male	469	72.1
	Female	181	27.9
Occupation	Subsistence farming	179	27.5
	Business	97	14.9
	Employed	107	16.5
	Unemployed	93	14.3
	Student	23	3.5
	Housewife	151	23.2
Education level	Illiterate	159	24.5
	Primary	229	35.2
	Secondary	178	27.4
	Tertiary	84	12.9
Family monthly income (BDT)	<10,000	197	30.3
	10,000-20,000	288	44.3
	21,000-30,000	103	15.8
	31,000-40,000	30	4.6
	41,000-50,000	21	3.2
	>50,000	11	1.7
Family members	<2	00	0
	2-3	58	8.9
	4-5	304	46.8
	>5	288	44.3
Marital status	Married	603	92.8
	Unmarried	47	7.2

**Table 2. Prevalence of risk factors of cardiovascular diseases (CVDs) among people of Bangladesh**

Variables	Response pattern	Frequency (n = 650)	Percentage (%)
Habit of salt intake during meals in the table	Yes	243	37.4
	No	407	62.6
High cholesterol diet	Yes	489	75.2
	No	161	24.8
Smoking	Yes	398	61.2
	No	252	38.8
Alcohol consumption	Yes	37	5.7
	No	613	94.3
Heredity	Yes	369	56.8
	No	281	43.2
Hypertension	Yes	514	79.1
	No	136	20.9
Obesity	Yes	145	22.3
	No	505	77.7
Diabetes	Yes	229	35.2
	No	421	64.8

**Table 3. Relationship between physical exercise and cardiovascular diseases (CVDs) among the study people**

Variables	Response pattern	Frequency (n=650)	Percentage (%)
None exercise	Yes	297	45.7
	No	353	54.3
Physical exercise <1 hours/day	Yes	209	32.2
	No	441	67.8
Physical exercise 1-2 hours/day	Yes	101	15.5
	No	549	84.5
Physical exercise >2 hours/day	Yes	43	6.6
	No	607	93.4

Another explanation is that rural people are not enough concern about cardiovascular diseases as like urban people. We also observed that male cardiac patient (72.1%) was higher than female (27.9%) and most prevalent (30%) age group was 51-60 years which were logically supported due to the male people leading more stressful lifestyle than female for outside works, business, jobs, family affairs and social needs.

Here we showed that cardiovascular diseases were common among people in low income, illiterate, increased family members and with positive marital status. We found that 24.5% patients were illiterate, 35.2% & 27.4% completed their primary & secondary educations respectively but minimum number of patients (12.9%) completed tertiary education. A large number of patients (30.3%) came from poor family, 44.3% patients came from low income family and 92.8% of patients were married. About 47% & 44.3% patient came from family where

the family members 4-5 and more than 5 respectively. Similar result was found in a study conducted by Khan et al in Pakistan, 66% participants were living in an extended family system [26]. The people living in combined families are comparatively poor, less educated, suffering from tension and apprehension and thus more susceptible towards CVDs than nuclear families [27]. There was a good relationship between the level of education and cardiovascular diseases among the study people similar to other previous studied [28-31]. This result indicates the need educational program or health campaign for enhancing level of knowledge about CVDs risk factors of less educated people in Bangladesh.

We observed that the prevalence of cardiovascular risk factors was high among our study populations; habit of salt intake during meals in the table was found in 37.4% patient, high cholesterol diet in 75.2% patient, smoking in

61.2% patient, alcohol consumption in 5.7% patient, heredity in 56.8% patient, hypertension in 79.1% patient, obesity in 22.3% patient and diabetes in 35.2% patient. Our result was similar with previous studied conducted in Nepal, Pakistan and UAE [16,26,32].

Physical inactivity increases the risk of heart disease. It is one of the major modifiable risk factor for heart disease recently highlighted by American Heart Association [33]. We found that people nothing done physical exercise were the mostly affected by CVDs (45.7%) similar with previous study [34]. In addition of changing food habits & lifestyle, drug treatment of diabetes, hypertension and high blood lipids may be necessary to reduce cardiovascular risk among Bangladeshi people. Health policies that create conducive environments for making healthy choices affordable and available are essential for motivating people to adopt and sustain healthy behavior.

There are few limitations in our study. Firstly, since the data our study was collected from the participants via questionnaires we cannot be certain that we received all the relevant information related to the risk factors of CVDs. Such bias may affect our results, but is difficult to avoid in questionnaire based studies. Secondly, the study covered only four districts of Bangladesh and small sample size (650 only) cannot be generalized to the whole population of Bangladesh. To better study this issue, future research should involve the patients as much as possible. Despite these limitations, our study successfully determined the prevalence of risk factors of cardiovascular diseases among people of Bangladesh that could help the health authorities to take necessary steps for prevention of cardiovascular diseases.

## 5. CONCLUSIONS

In our study we observed that rural people was being most affected in CVDs than urban populations specially in illiterate, farmers, extended family members & poorer people. We also found that the prevalence of CVDs risk factors such as habit of salt intake during meals in the table, high cholesterol diet, smoking, hypertension, heredity, obesity, diabetes & no physical exercise was high among the people of Bangladesh. Therefore social awareness should be developed among people of Bangladesh especially in rural community through educational programs & by print/visual media.

The health ministry of Bangladesh should take necessary measures to build up awareness among people about the balanced diet, food habit & physical exercise through health campaign.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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