Original Research Article

Association between behavioural, metabolic risk factors of non-communicable diseases and socio-demographic factors among Bihari population in Bangladesh

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INTRODUCTION

Non-communicable diseases (NCDs) are the most leading public health threat for the current world. The major NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. NCD is responsible for 71% of all global deaths every year and the low- and middle-income countries are suffering most which accounts over 85% of total premature deaths.1

According to World Health Organization (WHO), Western Pacific Region, South-East Asia Region and European Region are the most vulnerable for NCD deaths.2

Among the identified risk factors of NCDs, the major behavioural risk factors are- tobacco use, harmful use of alcohol, unhealthy diet (insufficient fruit and vegetable intake), excessive dietary salt intake and inadequate
The targeted population of this study was Bihari, the Urdu speaking non-native Muslim community living in Bangladesh for more than four decades. ‘Bihari’, originally a Hindi word, literary means a person from Bihar state of India. In 1947, during the independence of Indian subcontinent from British colonial, the countries India and Pakistan (East Pakistan and West Pakistan) were created based on religious issue. Majority of Bihari Muslims migrated from India to East and West Pakistan. Later on, in 1971, during the independence war of Bangladesh (former East Pakistan) from Pakistan ruling, a large proportion of Binaries’ could not get back to Pakistan therefore, became stranded. Now, this community is comprised of over 250,000 and have been living in 66 squaidal camps with poor facilities scattered in several areas of Bangladesh. Although they are residing in ‘refugee camps’, the united nations high commissioner for refugees (UNHCR) does not recognize them as refugees. Therefore, they are deprived of the benefits and opportunities extended to the refugees by the UNCHR. As a consequence, the stranded binaries’ in Bangladesh face multiple problems especially underprivileged socio-economic backgrounds.

This community is considered as vulnerable for not having adequate health care facilities, access to health services and other fundamental rights. Studying on this population is important to know about the health-related situations that can be comparable to the general population as well as other minorities of the country. This step is essential to aware the policy planners and other health work force to pay attention on the health of immigrants and ethnic communities.

A recent study, conducted among Bihari population of Mirpur camp in Dhaka city, reported the prevalence of type-2 diabetes mellitus (DM), impaired glucose tolerance (IGT) and impaired fasting glucose (IFG) were estimated as 10.11%, 8.74% and 4.55% respectively along with 41% of smoker and 5% of alcohol consumers. However, overall distribution of the NCD risk factors among this group and the knowledge about any association between behavioural, metabolic risk factors of non-communicable diseases and socio-demographic factors among the selected community in Bangladesh is still unknown.

It is important to generate the evidence to see how different their lifestyle is from the general population of Bangladesh and the risk factors that might leads to premature NCDs among this vulnerable people. Therefore, current study was conducted to explore all of the behavioural and metabolic risk factors of NCDs among the Bihari population living in Geneva Camp in Dhaka city in Bangladesh.

METHODS

It was a community based cross-sectional study conducted from December 2015 to December 2016. A purposive sampling of 183 Bihari people living in Geneva camp have been included in the study after taking voluntary written consent from each participant. We conducted data collection in a camp setting with in the selected population. We enrolled both men and women aged 30 years and above.

A semi-structured questionnaire was adopted from WHO STEPS Instruments (developed for assessing non-communicable disease risk factors) and that was pretested before final use. The questionnaire comprised of socio-demographic factors (sex, age, education, occupation and monthly family income), behavioural risk factors (tobacco use, alcohol consumption, insufficient fruit and vegetables intake, inadequate physical activity and added salt intake during meal) and metabolic risk factors (overweight and obesity, hypertension, hyperglycaemia and hyperlipidaemia).

Data were collected by face-to-face interview by well-trained research personnel. The respondents were asked about their socio-demographic factors and behavioural risk factors. Fruit and vegetables intake were assessed in serving size (1 standard serving = 80 grams of fruit and vegetable) using serving size show-card of WHO STEPS Instruments. Level of physical activity was assessed in total minutes for both moderate and vigorous types. Physical measurements (height, weight and blood pressure) were taken appropriately maintaining standard procedures. Blood (venous) samples were collected by trained phlebotomist for biochemical measurements (fasting blood glucose and fasting total cholesterol). Blood samples were collected and then transported to laboratory of Bangladesh Institute of Health Science (BIHS) by maintaining the cold chain following standard protocol. Blood pressure was measured two times in sitting position with Omron digital blood pressure machine by maintaining standard procedure. A 10-minute
of rest was maintained between two measurements. The average of two readings was taken as the final blood pressure following the NICE guidance for diagnosis of hypertension.12

Presences of risk factors among the respondents were defined following the guideline of WHO STEPS manual.13 Fruit and vegetables (FAVs) intake were defined as insufficient when it was <5 servings/day. Level of physical activity (PA) was defined as inadequate when it was <150 minutes of moderate-to-vigorous physical activity per week. Overweight and obesity was defined when body mass index (BMI) was ≥25.0 (measured as- dividing the weight in kg by height in meter2). Hypertension (HTN) was defined when systolic blood pressure (SBP) was ≥140 mm. of Hg. or diastolic blood pressure (DBP) was ≥90 mm. of Hg. or history of previously diagnosed HTN. Hyperglycaemia was defined when fasting blood glucose (FBG) was 100–125 mg/dl (5.6–6.9 mmol/l) and 2-h PG 140–199 mg/dl (7.8–11.0 mmol/l) according to American Diabetes Association. Hyperlipidaemia was defined when fasting total cholesterol (FTC) was ≥190 mg/dl or on medication for hyperlipidaemia.

The collected data were checked for competences, coded and cleaned and finally exported to Statistical package for social science (SPSS) software version-21 for analysis. Descriptive statistics was done to illustrate socio-demographic factors and risk factors among the respondents. Comparative statistics (Chi-square test) was done to illustrate the association between socio-demographic factors and risk factors. When there were p values <0.05 in Chi-square tests, these analyses were considered for further multivariate analyses (adjusted binary logistic regression). Determinants of risk factors among this population were considered when there were significant associations (p<0.05 at 95% confidence interval) in multivariate analyses.

RESULTS

Men respondents dominated women by 60.1%. The mean age of the respondents was 44.4±13.2 years, and majority of them were below 50. Half of them (50.3%) were illiterate. Two in every five (40.4%) were involved in any job. Four in every nine (44.8%) had monthly family income less than 5,000 BDT (Table 1).

Current study explored that the behavioural and metabolic risk factors of NCDs are very common among the Bihari population. One-third of them (32.2%) was habituated to practice tobacco in any form, among which three-quarter were used to practice smokeless tobacco. Almost all (99.5%) were used to intake insufficient fruit and vegetables. Half (52.5%) were used to take added salt during their meal. Three-quarter (76.0%) didn’t perform adequate level of physical activity. More than half (54.6%) were overweight or obese. One-third (33.9%) had hypertension. One-fourth (23.0%) had hyperglycaemia. And, half of them (50.3%) had hyperlipidaemia. However, alcohol consumers were negligible (Table 2).

Chi-square test found significant association (p<0.05) of behavioural and metabolic risk factors with the considered socio-demographic factors of the respondents in this study as shown below in Table 3. We tried to stratify the data according to sex (male, female), age groups (below 50 and 50 above), educational status (literate and illiterate), occupational status (employed and unemployed) and monthly income (less and above 5,000TK). Any kind of tobacco using is more among male than female but the difference is not significant (p=0.143), similarly there is no statistical difference regarding alcohol consumption, insufficient fruits and vegetable intake, inadequate physical activity, added salt intake, obesity, hypertension and hyperlipidaemia between male and female. However, in terms of hyperglycaemia women are having more hyperglycaemia (32.9%) and the difference is significant (p=0.009). In terms of age groups alcohol consumption, hypertension and hyperglycaemia is significantly different (p values 0.019, <0.001 and 0.002 respectively). In terms of literacy, salt intake, hypertension and hyperglycaemia are different among the groups (p values 0.046, 0.033 and 0.006) and risk factors are mostly higher among illiterate group. Similarly, in terms of occupational status use of tobacco and inadequate physical activity differs among employed and unemployed groups (p value 0.048, 0.004) respectively.

Binary logistic regression analysis (not shown in any table) found tobacco use was almost 2 times higher among the employed participants (p=0.049, OR 1.9, 95% CI 1.0-3.5); respondents having higher age (50 years and

Table 1: Socio-demographic factors of Bihari community in Bangladesh (n=183).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>110</td>
<td>60.1</td>
</tr>
<tr>
<td>Women</td>
<td>73</td>
<td>39.9</td>
</tr>
<tr>
<td>Age (in years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean±SD=47.2±13.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 50</td>
<td>120</td>
<td>65.6</td>
</tr>
<tr>
<td>50 and above</td>
<td>63</td>
<td>34.4</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literate</td>
<td>91</td>
<td>49.7</td>
</tr>
<tr>
<td>Illiterate</td>
<td>92</td>
<td>50.3</td>
</tr>
<tr>
<td>Occupational status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>74</td>
<td>40.4</td>
</tr>
<tr>
<td>Unemployed (including housewives)</td>
<td>109</td>
<td>59.6</td>
</tr>
<tr>
<td>Monthly income (in BDT=Bangladesh taka), Median=6,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 5,000</td>
<td>82</td>
<td>44.8</td>
</tr>
<tr>
<td>Above 5,000</td>
<td>101</td>
<td>55.2</td>
</tr>
</tbody>
</table>
above) were showing 10 times increased alcohol consumption (p=0.035, OR 10.3, 95% CI 1.2-89.9); illiteracy and low monthly family income (up to 5,000 BDT) reported 2-3 times higher extra salt uses during meal (p=0.047, OR 1.8, 95% CI 1.0-3.3; and p=0.001, OR 2.7, 95% CI 1.5-5.0 respectively); unemployed individual showed almost 3 time inadequate physical activity than employed group (p=0.005, OR 2.7, 95% CI 1.4-5.5); higher age (50 years and above) and hypertension was 3 times more among illiterate respondents (p=0.001, OR 3.1, 95% CI 1.6-5.9; and p=0.034, OR 2.0, 95% CI 1.1-3.7 respectively); hyperglycaemia was more among women sex, higher age (50 years and above) and illiterate (p=0.010, OR 2.5, 95% CI 1.2-5.1; p=0.002, OR 3.1, 95% CI 1.5-6.2; and p=0.007, OR 2.8, 95% CI 1.3-5.8 respectively) respondents and hyperlipidaemia was found to be almost 3 times higher among comparatively higher monthly income families (p=0.001, OR 2.8, 95% CI 1.6-5.0).

Table 2: Behavioural and metabolic risk factors of non-communicable diseases among stranded Pakistani Bihari community in Bangladesh (n=183).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tobacco use (current)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>59</td>
<td>32.2</td>
</tr>
<tr>
<td>No</td>
<td>124</td>
<td>67.8</td>
</tr>
<tr>
<td><strong>Types of tobacco use (n=59)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking tobacco</td>
<td>9</td>
<td>15.3</td>
</tr>
<tr>
<td>Smokeless tobacco</td>
<td>44</td>
<td>74.6</td>
</tr>
<tr>
<td>Both types</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td><strong>Alcohol intake (current)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>3.3</td>
</tr>
<tr>
<td>No</td>
<td>177</td>
<td>96.7</td>
</tr>
<tr>
<td><strong>Insufficient FAVs intake (&lt;5 servings/day)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean±SD=1.8±0.9 servings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>182</td>
<td>99.5</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Added salt use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96</td>
<td>52.5</td>
</tr>
<tr>
<td>No</td>
<td>87</td>
<td>47.5</td>
</tr>
<tr>
<td><strong>Inadequate PA (&lt;150 minutes moderate-to-high intensity PA/week)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median=60 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>139</td>
<td>76.0</td>
</tr>
<tr>
<td>No</td>
<td>44</td>
<td>24.0</td>
</tr>
<tr>
<td><strong>Overweight and obesity (BMI≥25.0)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean± SD=27.5±19.3 BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>100</td>
<td>54.6</td>
</tr>
<tr>
<td>No</td>
<td>83</td>
<td>45.4</td>
</tr>
<tr>
<td><strong>HTN (SBP ≥140 or DBP ≥90 mmHg or previously diagnosed HTN)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean±SD=SBP 119±17 and DBP 75±10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62</td>
<td>33.9</td>
</tr>
<tr>
<td>No</td>
<td>121</td>
<td>66.1</td>
</tr>
<tr>
<td><strong>Hyperglycemia (FBG ≥6.1 mmol/l)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ±SD= 5.8±2.8 FBG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>42</td>
<td>23.0</td>
</tr>
<tr>
<td>No</td>
<td>141</td>
<td>77.0</td>
</tr>
<tr>
<td><strong>Hyperlipidemia (FTC ≥190 mg/dl or on medication for hyperlipidemia)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD= 194±44 mg/dl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>92</td>
<td>50.3</td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>49.7</td>
</tr>
</tbody>
</table>

FAVs= Fruit and vegetables; SD = Standard deviation; PA = Physical activity; BMI = Body mass index; HTN = Hypertension; SBP = Systolic blood pressure; DBP = Diastolic blood pressure; FBG = Fasting blood glucose; FTC = Fasting total cholesterol.
### Table 3: Relationship of behavioural and metabolic risk factors of noncommunicable diseases with socio-demographic factors among Bihari community in Bangladesh (n=183).

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Tobacco use</th>
<th>Alcohol consumption</th>
<th>Insufficient FAVsI</th>
<th>Added salt intake</th>
<th>Inadequate PA</th>
<th>Overweight/obesity</th>
<th>Hypertension</th>
<th>Hyperglycaemia</th>
<th>Hyperlipidaemia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes N (%)</td>
<td>P value</td>
<td>Yes N (%)</td>
<td>P value</td>
<td>Yes N (%)</td>
<td>P value</td>
<td>Yes N (%)</td>
<td>P value</td>
<td>Yes N (%)</td>
</tr>
<tr>
<td></td>
<td>N (%)</td>
<td></td>
<td></td>
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<tr>
<td>Sex</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>40 (36.4)</td>
<td>0.143</td>
<td>3 (2.7)</td>
<td>0.684</td>
<td>109 (99.1)</td>
<td>0.319</td>
<td>79 (71.8)</td>
<td>0.108</td>
<td>54 (49.1)</td>
</tr>
<tr>
<td>Women</td>
<td>19 (26.0)</td>
<td></td>
<td>3 (4.1)</td>
<td></td>
<td>73 (100)</td>
<td></td>
<td>35 (47.9)</td>
<td></td>
<td>79 (82.2)</td>
</tr>
<tr>
<td>Age (in years)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Below 50</td>
<td>33 (27.5)</td>
<td>0.058</td>
<td>1 (0.8)</td>
<td>0.019*</td>
<td>120 (100)</td>
<td>0.344</td>
<td>68 (56.7)</td>
<td>0.116</td>
<td>92 (76.7)</td>
</tr>
<tr>
<td>50 and above</td>
<td>26 (41.3)</td>
<td></td>
<td>5 (7.9)</td>
<td>*</td>
<td>62 (98.4)</td>
<td>0.344</td>
<td>28 (44.4)</td>
<td></td>
<td>47 (74.6)</td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literate</td>
<td>25 (27.5)</td>
<td>0.17</td>
<td>1 (1.1)</td>
<td>0.211</td>
<td>91 (100)</td>
<td>0.446</td>
<td>41 (45.1)</td>
<td>0.046*</td>
<td>69 (75.8)</td>
</tr>
<tr>
<td>Illiterate</td>
<td>34 (37.0)</td>
<td></td>
<td>5 (5.4)</td>
<td></td>
<td>91 (98.9)</td>
<td></td>
<td>55 (59.8)</td>
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<td>70 (76.1)</td>
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<tr>
<td>Occupational status</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>30 (40.5)</td>
<td>0.048*</td>
<td>1 (1.4)</td>
<td>0.404</td>
<td>73 (98.6)</td>
<td>0.404</td>
<td>43 (58.1)</td>
<td>0.207</td>
<td>48 (64.9)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>29 (26.6)</td>
<td></td>
<td>5 (4.6)</td>
<td></td>
<td>109 (100)</td>
<td></td>
<td>53 (48.6)</td>
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<td>91 (83.5)</td>
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<tr>
<td>Monthly income (BDT)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 5,000</td>
<td>24 (29.3)</td>
<td>0.438</td>
<td>2 (2.4)</td>
<td>0.693</td>
<td>81 (98.8)</td>
<td>0.404</td>
<td>54 (65.9)</td>
<td>0.001*</td>
<td>58 (70.7)</td>
</tr>
<tr>
<td>Above 5,000</td>
<td>35 (34.7)</td>
<td></td>
<td>4 (4.0)</td>
<td></td>
<td>101 (100)</td>
<td></td>
<td>42 (41.6)</td>
<td></td>
<td>81 (80.2)</td>
</tr>
</tbody>
</table>

Chi-square test and Fisher’s Exact test were done when appropriate. FAVsI= Fruit and vegetables intake; PA= Physical activity; BDT= Bangladeshi Taka. Star (*) mark represents significant association.
DISCUSSION

Since stranded Bihari community in Bangladesh is underprivileged and not focused, the health-related data is extremely insufficient among them. Current study emphasized on NCD risk and explored the behavioural and metabolic risk factors of NCDs among Bihari community which wasn’t covered adequately. The study revealed NCD risk factors were remarkable among the population. In this section, we tried to discuss the study findings regarding the evidence on NCD risk factors among general population and under privileged population of Bangladesh for establishing a clear comparison among these groups and also with similar communities in South Asia context with available evidences.

Prevalence of overall tobacco use was found less among the Bihari population of this study than the available relevant studies in Bangladesh including two national surveys. Previous study among the Bihari’s in Mirpur camp of Dhaka city reported noticeably higher proportion of smoking tobacco use alone. The recent Global Adult Tobacco Survey reported almost constant finding for tobacco use with our study whereas data from WHO STEPS Survey and another study conducted to identify NCD risk factors among an underprivileged population in Dhaka reported noticeably higher prevalence of tobacco users. Moreover, another relevant study conducted among rural population of Bihar state of India using similar WHO Step wise approach reported higher prevalence of tobacco use than the current study. The possible reason of less prevalence of tobacco use in this study could be due to the under reporting about tobacco uses by the respondents. The alcohol consumption rate was negligible among this study population which is similar with the Bihari’s of Mirpur and underprivileged population of Shanty town. We found the alcohol consumption rate is even noticeably less than the native Indian Bihari population. Low alcohol consumption scenario in Bangladesh is actually the reflection of the successful restriction on alcohol production, business and consumption whereas Bangladeshi society, culture, religion and law are playing a favourable role. Although insufficient fruit and vegetables intake behaviour is remarkably higher in previous studies in Bangladesh, however, it was found extremely higher in our study even compared to Indian Bihari population also. Added salt intake behaviour in meal among the current study population wasn’t noticeably varied than the Bangladeshi general population as well as the underprivileged population. Inadequate level of PA was noticeably higher among the selected population in contrast to the general population of this country reported in national survey report and underprivileged population of Bangladesh, and also the Indian Bihari population. The residents of the selected community lack adequate open space and also playground for physical exerting recreational activities. Along with the behavioural risk factors, all of the metabolic risk factors have also been found a bit higher among the Bihari’s in Bangladesh. Remarkably higher proportion of overweight (including obesity) and hypertension have been found among them compared to the population of national survey and underprivileged population of Bangladesh and as well as the Indian Bihari population. Moreover, the proportions of raised blood glucose as well as hyperlipidaemia have also been found noticeably higher among the selected Bihari population in contrast of underprivileged population of the country. However, all of the socio-demographic factors of the Bihari population played the key role to determine the risk factors.

It was a pilot study and the study weren’t beyond few potential limitations. The study place was selected purposively, the sample size was low and the men-women ratio was disproportionate. Due to the cross-sectional design it could not describe the causal interference. There is a chance of missing some potential confounders while analysis, however, the potential strengths of the study were the assessment of all of the behavioural and metabolic risk factors of the population and biochemical measurements for assessing blood glucose by using gold standard marker (OGTT) and fasting total cholesterol.

To our best knowledge this is the first ever study to describe the NCD risk factors among the selected population. The findings of this study will be helpful to describe the vulnerability of developing NCDs in future among the selected Bihari population as well as other minorities in Bangladesh. We also recommend for conducting future studies in a large scale among this population for finding other gaps and supporting our study evidences where possible.

ACKNOWLEDGEMENTS

We thank all participants of the study. We would also like to acknowledge the local authority of Geneva camp of Bihari community to allow us to conduct the study and the donor for the funding.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES


