




# BMJ Open Prevalence of non-communicable disease risk factors among nurses and para-health professionals working at primary healthcare level of Bangladesh: a cross-sectional study

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## ABSTRACT

**Objective** To determine the prevalence of non-communicable disease (NCD) risk factors among nurses and para-health professionals (PHPs) working at primary healthcare centres in Bangladesh. In addition to this, we also investigated the association of these risk factors with the categories of health professions.

**Design** Cross-sectional study and the sampling technique was a census.

**Setting** The study site was a medical university of Bangladesh where the study population was recruited by NCD Control Programme of Directorate General of Health Services to participate in a 3-day training session from November 2017 to May 2018.

**Participants** A total of 1942 government-employed senior staff nurses (SSNs) and PHPs working at Upazila Health Complexes.

**Primary and secondary outcome measures** The data were collected using a modified STEPwise approach to NCD risk factors surveillance questionnaire of the World Health Organisation (V.3.2). The prevalence of NCD risk factors was presented descriptively and the  $\chi^2$  test was used to determine the association between NCD risk factors distribution and categories of health professions.

**Results** The mean age of the participants was 37.6 years (SD 9.5) and most of them (87.6%) had a diploma in their respective fields. Physical inactivity (86.9%), inadequate fruits and/vegetable intake (56.3%) and added salt intake (35.6%) were the most prevalent behavioural risk factors. The prevalence of central obesity, overweight, raised blood glucose and raised BP were 83.5%, 42.6%, 19.2% and 12.8% respectively. Overall, the NCD risk factors prevalence was higher among PHPs compared with SSNs. A highly significant association ( $p<0.001$ ) was found between risk factors and the categories of health professions for tobacco use, alcohol intake, added salt intake and physical inactivity.

**Conclusion** High NCD risk factors prevalence and its significant association with SSNs and PHPs demand an appropriate risk-reduction strategy to minimise the possibility of chronic illness among them.

## Strengths and limitations of this study

- Inclusion of senior staff nurse and para-health professionals from all Upazila Health Complexes in the country covering 8 divisions and 64 districts to explore a wide range of established non-communicable disease (NCD) risk factors is its main strength.
- Collection of data following the STEPwise approach to NCD risk factors surveillance methods of the WHO is its another strength.
- Being cross-sectional in nature, the study could not establish causality due to the lack of temporal evidence.
- Application of recall method to collect data on NCD risk factors was associated with the probability of recalled bias.

## INTRODUCTION

Non-communicable diseases (NCDs) are the leading cause of mortality worldwide and recognised threats to socioeconomic developments.<sup>1 2</sup> Currently, NCDs are considered as new priorities that put an additional burden on the existing healthcare system of developing countries.<sup>3</sup> Major NCDs include cardiovascular diseases (CVDs), cancer, diabetes and chronic respiratory diseases that kill an estimated 15 million people annually. Most of these premature deaths occur in low- and middle-income countries (LMICs). NCDs are gradually increasing in these countries due to rapid urbanisation, sedentary lifestyles and the increasingly available nutrient-poor processed foods. Other than health impacts, NCDs have a socioeconomic impact that quickly drains household resources of the affected individual due to exorbitant costs of expensive lifelong care.<sup>1</sup> However, the capacity of the healthcare system of LMICs is

limited to manage the short-term health conditions like emerging infectious diseases and maternal health but not accustomed to tackle NCDs as it needs long-term management using a multidisciplinary approach.<sup>4</sup>

Like other LMICs, Bangladesh has a huge burden of NCDs that contributed 67% of all deaths as per recent evidence.<sup>5</sup> Among the total deaths, 55% are caused by major NCDs and again half of these are by CVDs.<sup>5</sup> A nationally representative survey revealed that 76% of Bangladeshi adults showed at least two or more and 38% showed three or more NCD risk factors.<sup>6</sup> These risk factors are preventable, and their detection is much easier and cost-effective compared with the diseased state. Hence, the risk factors approach for prevention and control of NCDs become popular and recognised.

Healthcare professionals (HCPs) are an essential and a diverse group of workforce that devote most of their time to building a healthier society.<sup>7</sup> They primarily include qualified physicians, nurses, medical assistants, medical scientists, lab technologists, pharmacists, and other non-clinical support staff such as administrative staff.<sup>8</sup> Based on their knowledge and training, it might be assumed that they make healthy lifestyle choices and have better health compared with others.<sup>9</sup> It is also expected that the prevalence of cardiometabolic diseases and their risk factors would be relatively low among them. However, certain occupation-related risk factors like physical and mental stress from work shifts, overtime, providing medical care under life-and-death circumstances, etc. exposes them to high-risk behaviour of impending NCDs.<sup>10</sup> In this regard, a pedometer-based study among Nigerian nurses and para-health professionals (PHPs) (pharmacists and physiotherapists) found that most of the HCPs did not meet the recommended levels of physical activity, and this was significantly associated with adverse health outcomes.<sup>11</sup> Thus, the health of medical professionals is of great concern and should not be overlooked.

In Bangladesh, together with qualified doctors, nurses and PHPs provide health services both in urban and rural areas. Due to the massive shortage and disproportionate distribution of skilled health workers, they have to provide services in an overburdened, understaffed, and insufficiently equipped setting<sup>12</sup> that causes unusual physical and mental stress. Their health condition is still a neglected issue in Bangladesh, and data on this issue is completely lacking. Hence, our primary objective was to determine the prevalence of NCD risk factors among nurses and PHPs working at primary healthcare centres in Bangladesh. Besides, we sought to explore the association of these risk factors with the categories of health professions.

## MATERIALS AND METHODS

### Study design

This was a cross-sectional study conducted among nurses and PHPs of Bangladesh employed by the government at primary healthcare centres. The Non-communicable

Disease Control (NCDC) cell of the Directorate General of Health Services (DGHS) selected HCPs from all Upazila Health Complexes of the country, covering 8 divisions and 64 districts, and sent them to a medical university in Dhaka in 70 batches, with 30 participants in each batch. Total 1942 senior staff nurses (SSNs) and PHPs (subassistant community medical officer, medical technologist, pharmacist and sanitary inspector) of 20–60 years of age underwent a 3-day training on NCD management during November 2017 to May 2018 and the data for this study were collected in this period. The sampling technique used was census as all these trainees participated in the study.

### Data collection procedures

For each batch, data were collected in three steps, following the standardised method of WHO STEPwise approach to Surveillance (STEPS) of NCD risk factors.<sup>13</sup> In the first step, a pretested self-administered questionnaire was distributed on the first day of the training, which the participants answered after giving their informed written consent. This questionnaire was a modified version of the STEPS questionnaire (WHO V.3.2) that gathered information about the participants' sociodemographic, behavioural (tobacco and alcohol consumption, physical activity, dietary habits, added salt intake) and metabolic risk factors (raised blood glucose, raised BP). We used the pictorial show cards to make them understand the fruit/vegetable servings and various types of physical activities.

In the second step, anthropometry and blood pressure (BP) were measured as per the standard protocol described in 'Non-communicable disease risk factors survey Bangladesh 2010'.<sup>14</sup> Anthropometry included the participants' height, weight, waist circumference (WC) and hip circumference (HC). We also calculated their body mass index (BMI) and waist-to-hip ratio to categorise obesity. The BP was recorded two times using an aneroid sphygmomanometer and first measurement was taken after 15 min' rest prior to measurement and 3 min after interval prior to second measurement. The mean of the two measurements was used to determine the final BP. All anthropometric values were measured in the International System of Units (SI) and the parameters of BP were taken in mm Hg. The third step was to measure their fasting capillary blood glucose (after a minimum of 8 hours' fasting) on the second day of training. The capillary blood glucose was measured using glucometer with aseptic precautions. The survey questionnaire (English and Bengali version) and informed consent form are submitted as supplementary files (see online supplementary files 1-3).

### Ascertainment of the key variables

#### Current tobacco use

Those who smoked or used smokeless tobacco in the past 30 days were considered as 'current tobacco user'. Smokeless tobacco use denotes the use of chewing tobacco with betel nut, such as jarda, gul, sada pata and khoir.<sup>14</sup>

### Alcohol consumption

Alcohol consumption was measured by asking the respondents if they have consumed ever in a lifetime and within the past 30 days as the current user.<sup>14</sup>

### Dietary habit

Participants were asked about the number of days they ate fruits and vegetables in a week and the number of servings on those days they took. One standard serving size equal to 80 g (WHO, STEPS V.3.2). Less than five (<5) servings of fruits and/vegetable intake a day was considered inadequate.<sup>14</sup>

### Added salt intake

The participants who used to take dietary salt during eating meal was categorised as an added dietary salt consumer.

### Physical activity

We collected information only on their work-related physical activity, which was assessed in terms of the minutes that made them breathless or they felt palpitation if the physical activity continued for at least 10 min. Then the total duration of such physical activity in a day was converted into the metabolic equivalent of task or MET-minute to express the intensity of physical activity. We asked the respondents how many days a week and how much time they spent (in minutes) each of that day in doing vigorous and moderate activities. We categorised physical activity as less active ( $\leq 600$  MET-minutes per week), moderately active ( $\approx 600$ – $3000$  MET-minutes per week) and highly active ( $\geq 3000$  MET-minutes per week).<sup>14</sup> The detailed measurement of dietary servings and physical activity was added as supplementary files (see online supplemental file 4).

### Generalised obesity

The participants were considered as obese and overweight when BMI  $\geq 30$  kg/m<sup>2</sup> and 25–29.9 kg/m<sup>2</sup>, respectively.<sup>15</sup> Central obesity was categorised according to the cut-off value specified by the International Diabetes Federation—waist–hip ratio  $>0.90$  for men and  $>0.85$  for women.<sup>16</sup>

### Raised capillary blood glucose

When fasting blood glucose is  $\geq 7.0$  mmol/L and/or on antidiabetic treatment for raised blood glucose.<sup>17</sup>

### Raised BP

When systolic BP  $\geq 140$  mm Hg and/or diastolic BP  $\geq 90$  mm Hg and/or on antihypertensive treatment for raised BP.<sup>18</sup>

### Quality assurance

The investigators ensured the quality control by self-monitoring data collection like assistance in filling up the questionnaire by explaining the meaning of the terms for risk factors and employing trained personnel to measure the height, weight, WC, HC, BP, and capillary blood

glucose. Observers were engaged from other departments of the University for quality control. In addition to assuring the quality, we also maintained certain protocols to reduce potential biases: (1) pre-testing of the questionnaire and professional sensitivity; (2) using standard methods of measurement as per STEPS survey of Bangladesh 2010<sup>14</sup>; (3) using show cards to better explain dietary servings and physical activities; (4) maintaining adequate privacy during physical measurements and (5) using robust equipment for measurements.

### Patient and public involvement

None of the study participants were involved directly in the setting of the research question or outcome measures. They did not have any role in designing or implementing this work or interpretation of the results.

### Ethical consideration

Each participant was informed about the objectives of the study and its outcome, the necessity of an invasive procedure, and data safety issues. Data were collected after written informed consent was obtained. Ethical approval to conduct the study was taken from the Ethical Review Committee of the University and it is submitted as a supplementary file (see online supplemental file 5). Blood glucose measurement reports were delivered to the participants instantly, and they were advised according to their glycaemic status.

### Data processing and analysis

All 1942 responses were reviewed thoroughly for consistency and completeness. A total of 30 responses were found incomplete or inconsistent, and hence the final analysis comprised of 1912 responses. The obtained data were then cleaned, edited, and verified before coding and entering them into an excel sheet, and then transferred to the software Statistical Package for Social Science (V20.0) for Windows (SPSS). The analysis was carried out in SPSS, and the outputs were tabulated. Descriptive statistics were presented as the frequency, percentage, IQR and mean with SD where appropriate. All estimates of precisions were presented at a 95% CI. The association between NCD risk factors and the categories of health professions was evaluated using the  $\chi^2$  test. The findings were considered statistically significant at the level of  $p < 0.05$ . The SPSS datasheet is submitted as a supplementary file (see online supplemental file 6).

The following risk factors were used for analyses: tobacco use, alcohol use, inadequate fruits and/vegetable intake, added salt intake, low physical activity, overweight, obesity, raised blood glucose, and raised BP. Here, all the behavioural and metabolic risk factors were categorised as per the definition used in the 'Non-communicable disease risk factors survey Bangladesh 2010'<sup>14</sup> except added salt intake, and central obesity. We used the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for reporting the results of a cross-sectional observational study (see online supplemental file 7).



**Table 1** Sociodemographic and professional characteristics of the study population, n=1912

Characteristics	SSN (n=938)	PHPs (n=974) n (%)	Total
Age (years)*	38.2±9.7	37.1±9.4	37.6±9.5
Age categories			
20–29 years	243 (25.9)	236 (24.2)	479 (25.1)
30–39 years	263 (28)	453 (46.5)	716 (37.4)
40–49 years	298 (31.8)	122 (12.5)	420 (22.0)
≥50 years	134 (14.3)	163 (16.7)	297 (15.5)
Gender			
Men	114 (12.2)	831 (85.3)	945 (49.4)
Women	824 (87.8)	143 (14.7)	967 (50.6)
Duration of employment (years)*	13.9±9.6	13.7±9.3	13.8±9.5
Highest educational qualification			
Diploma	770 (82.1)	904 (92.8)	1674 (87.6)
BSc	121 (12.9)	32 (3.3)	153 (8.0)
MSc	36 (3.8)	13 (1.3)	49 (2.6)
Others (MPhil/PhD/ equivalent)	11 (1.2)	25 (2.6)	36 (1.9)
Number of patients served/day*	31.6±16	41.8±33.4	36.8±26.8

Categorical variables were presented as frequency and percentage.

\*Continuous variables were presented as mean and SD. BSc, bachelor of science; MSc, master of science; PHPs, para-health professionals; SSN, senior staff nurse.

## RESULTS

### Sociodemographic and professional characteristics

A nearly equal proportion of men (49.5%) and women (50.6%) participated with the mean age of 37.6±9.5 years. The proportion of women was higher (87.8%) among SSNs, whereas there were more men (85.3%) among the PHPs. Although maximum participants were under 40 years old, nearly half of the PHPs were 30–39 years old and one-third of the SSNs were 40–49 years. Most of the participants had diplomas (87.6%) which was the highest educational qualification. The mean duration of their employment was 13.8±9.5 years, and on average, they served 36.8±26.8 patients per day (table 1).

### Prevalence of behavioural risk factors of NCD

Table 2 shows the distribution of behavioural risk factors for NCDs among the participants. Among the behavioural risk factors, low physical activity (86.9%), inadequate fruits and/or vegetable intake (56.3%) and added salt intake (35.6%) were most prevalent. The prevalence of physical inactivity, and added salt intake were higher among SSNs (92% and 39.9%, respectively) compared with PHPs. Regarding inadequate fruits and/or vegetable intake, more than half of the participants (56.3%) did not follow

the WHO recommendation, and no job-specific difference was detected among them. Current tobacco usage and alcohol consumption were higher among PHPs than among SSNs (table 2).

Here, most of the behavioural risk factors were significantly associated with the professional categories (SSNs and PHPs).

### Prevalence of metabolic risk factors of NCD

Among the metabolic risk factors, most of the participants had central obesity (83.5%), overweight (42.6%), raised blood glucose, (19.2%) and raised BP (12.8%). A comparison between SSNs and PHPs showed that proportion of overweight (45.6% vs. 39.6%) and raised BP (14.9% vs. 10.6%) were high among the PHPs whereas the prevalence of central obesity (82.6% vs. 84.3%), generalised obesity (7.2% vs. 9.6%) and raised blood glucose (37.4% vs. 30.6%) were higher among SSNs (table 3).

Among the metabolic risk factors of NCD, overweight (p=0.008), raised BP (p=0.005) and generalised obesity (p=0.007) showed a significant association with the categories of health professions.

## DISCUSSION

Although health professionals are the role models for the general people and a locus of their trust, we observed a greater prevalence of different NCD risk factors among SSNs and PHPs of Bangladesh. The study also explored their profession, which was found to be significantly associated with the distribution of various NCD risk factors.

Three behavioural risk factors, namely physical inactivity, inadequate fruit and/or vegetable intake, and added salt intake, were highly distributed among the study population. About 87% of the health professionals were physically inactive, which was about twice the national rate (45.7%) of work-related physical inactivity.<sup>19</sup> In comparison to the global data of work-related physical inactivity, it is also higher than HCPs of the other countries.<sup>20 21</sup> The possibilities of such variation in reporting the prevalence of physical inactivity might be due to methods of physical activity assessment (subjective/objective) and the settings in which the healthcare providers used to work. HCPs working in low-resource settings such as Bangladesh, with an understaffed and under-equipped condition, are mostly overburdened to provide more time to manage their patients and have to sit for longer periods that forces them to be physically inactive. In this study, SSNs were mostly sedentary compared with the PHPs. This is supported by a Nigerian study among HCPs.<sup>20</sup> We believe this physical inactivity among SSNs is typical as women are the main workforce in this profession in Bangladesh (88% in the current study) and high prevalence of physical inactivity among women has been previously reported by two other studies<sup>19 22</sup> among the general population (53.6%) and postmenopausal women (58.1%), respectively.

**Table 2** Behavioural risk factors of NCDs among the study population, n=1912

Risk factors	Total (n=1942)		SSNs (n=938)		PHPs (n=974)		P value¶
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	
<b>Current tobacco use*</b>							
Smoking	48 (7.7)	6.5 to 8.9	10 (1.1)	0.4 to 1.8	138 (14.2)	12 to 16.4	<b>&lt;0.001</b>
Smokeless	53 (2.8)	2.1 to 3.5	26 (2.8)	1.7 to 3.9	27 (2.8)	1.8 to 3.8	1.000
<b>Past tobacco use</b>							
Smoking	115 (6.5)	5.4 to 7.6	15 (1.6)	0.8 to 2.4	100 (11.9)	9.7 to 14.1	<b>&lt;0.001</b>
Smokeless	33 (1.8)	1.2 to 2.4	6 (0.7)	0.2 to 1.2	27 (2.9)	1.8 to 4.0	<b>&lt;0.001</b>
<b>Alcohol intake</b>							
At least once in life	194 (10.1)	8.7 to 11.5	37 (3.9)	2.7 to 5.1	157 (16.1)	13.8 to 18.4	<b>&lt;0.001</b>
Current user (last 30 days)	30 (1.6)	1 to 2.2	9 (1.0)	0.4 to 1.6	21 (2.2)	1.3 to 3.1	<b>0.035</b>
<b>Fruits and vegetable intake (mean±SD)</b>							
Weekly fruit intake (days)	3.8±1.6		4±1.6		3.6±1.6		
Daily fruit servings	2±1.1		1.9±1.0		2±1.1		
Weekly vegetable intake (days)	5.7±1.5		5.8±1.5		5.5±1.6		
Daily vegetable servings	2.6±1.3		2.7±1.3		2.6±1.3		
Inadequate intake†	1076 (56.3)	54.1 to 58.5	542 (57.8)	54.6 to 61	534 (54.8)	51.7 to 57.9	0.193
<b>Dietary salt intake</b>							
Regular	199 (29.3)	25.9 to 32.7	100 (26.7)	22.2 to 31.2	99 (32.4)	27.2 to 37.6	
Often	75 (11.0)	9.4 to 16.2	48 (12.8)	8.6 to 13.4	27 (8.8)	5.6 to 12.0	
Sometimes	252 (37.1)	33.5 to 40.7	143 (38.2)	33.3 to 43.1	109 (35.6)	30.2 to 41.0	
Rarely	154 (22.6)	19.5 to 25.7	83 (22.2)	18 to 26.4	71 (23.2)	18.5 to 28.0	
Added salt intake‡	680 (35.6)	33.5 to 37.7	374 (39.9)	36.8 to 43.0	306 (31.4)	28.5 to 34.3	<b>&lt;0.001</b>
<b>Physical activity (MET min/week)</b>							
Highly active	51 (2.7)	2 to 3.4	16 (1.7)	0.9 to 2.5	35 (3.6)	2.4 to 4.8	
Moderately active	199 (10.4)	9 to 11.8	59 (6.3)	4.7 to 7.9	140 (14.4)	12.2 to 16.6	
Low active§	1662 (86.9)	85.4 to 88.4	863 (92.0)	90.3 to 93.7	799 (82.0)	79.6 to 84.4	<b>&lt;0.001</b>

Bold values indicated that the findings are significant.

\*Tobacco use in the past 30 days.

†WHO recommendation of fruits and/or vegetable intake >5 servings per day.

‡Participants who used to take dietary salt during eating meal.

§Physical activity ≤600 MET min/week.

¶X<sup>2</sup> test was run between risk factors and health profession categories (SSNs, PHPs), statistical significance p<0.05.

MET, metabolic equivalent of tasks; NCD, non-communicable diseases; PHPs, para-health professionals; SSN, senior staff nurse.;

About the impact of dietary habits on the development of NCDs, a recent systematic analysis that included 195 countries reported that unhealthy dietary habits (too much salt and fewer fruits/vegetables) kill more people than smoking.<sup>23</sup> In accordance with this report,<sup>23</sup> high added salt intake and less fruit and/or vegetable intake were also detected among Bangladeshi SSNs and PHPs. Similar findings are also observed among HCPs of South Africa,<sup>24</sup> Pakistan,<sup>25</sup> India,<sup>7</sup> Nigeria<sup>26</sup> and Mexico.<sup>27</sup> A Bangladeshi study found that highly qualified academicians and clinicians involved in teaching, training and patient management were sufficiently aware of the health impacts of dietary salt intake but about 29% of them used to take added salt with their meals, 31.6% used a salty sauce in their meals, 52.8% used a salty sauce in cooking and 41.8% consumed processed food with high salt content.<sup>28</sup> The aforementioned study<sup>28</sup>

showed that there was a gap between knowledge and practice which might result from several apparent barriers. In this regard, an integrative review reported different barriers related to healthy dietary choices among HCPs such as institutional barriers (long work schedules, changing shifts, heavy workload, insufficient staff and short, infrequent breaks), societal barriers (eating habits of peers), workplace barriers (limited access to healthy foods in the canteens or vending machines, inadequate food preparation and conservation facilities, lower cost and higher availability of junk food compared with healthy foods) and personal barriers (lack of self-efficacy and motivation and inadequate knowledge about nutrition).<sup>27 29</sup> All of these make it more difficult for health professionals to engage in healthy dietary behaviours, although they are highly knowledgeable on the issue.

**Table 3** Metabolic risk factors of NCDs among the study population, n=1912

Risk factors	Total (n=1912)		SSNs (n=938)		PHPs (n=974)		P value**
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	
<b>Raised blood pressure (BP)*</b>							
Yes	244 (12.8)	11.3 to 14.4	99 (10.6)	8.6 to 12.6	145 (14.9)	12.7 to 17.1	<b>0.005</b>
No	1688 (87.2)	85.7 to 88.7	839 (89.4)	87.4 to 91.4	829 (85.1)	82.9 to 87.3	
<b>Overweight†</b>							
Yes	815 (42.6)	40.4 to 44.8	371 (39.6)	36.5 to 42.7	444 (45.6)	42.5 to 48.7	<b>0.008</b>
No	1097 (57.4)	55.2 to 59.6	567 (60.4)	57.3 to 63.5	530 (54.4)	51.3 to 57.5	
<b>Generalised obesity‡</b>							
Yes	151 (7.9)	6.7 to 9.1	90 (9.6)	7.7 to 11.5	61 (6.3)	4.8 to 7.8	<b>0.007</b>
No	1761 (92.1)	90.9 to 93.3	848 (90.4)	88.5 to 92.3	913 (93.7)	92.2 to 95.2	
<b>Central obesity§</b>							
Yes	1596 (83.5)	81.8 to 85.2	791 (84.3)	82 to 86.6	805 (82.6)	80.2 to 85	0.323
No	316 (16.5)	14.8 to 18.2	147 (15.7)	13.4 to 18	169 (17.4)	15 to 19.8	
<b>Raised blood glucose¶</b>							
Yes	368 (19.2)	17.4 to 21	182 (19.4)	16.7 to 21.9	186 (19.1)	16.6 to 21.6	0.865
No	1544 (80.8)	79 to 82.6	756 (80.6)	78.1 to 83.1	788 (80.9)	78.4 to 83.4	

Bold values indicated that the findings are significant.

\*Raised BP, systolic  $\geq 140$  mm Hg and/or diastolic  $\geq 90$  mm Hg and/or treatment for raised BP.

†Overweight, body mass index 25–29.9 kg/m<sup>2</sup>.

‡Generalised obesity, body mass index  $\geq 30$  kg/m<sup>2</sup>.

§Central obesity, waist-hip ratio  $>0.90$  for men and  $>0.85$  for women.

¶Raised capillary blood glucose  $\geq 7.0$  mmol/L and/or treatment for raised blood glucose.

\*\* $\chi^2$  test was run between risk factors and health profession categories (SSNs, PHPs), statistical significance  $p < 0.05$  and presented as bold values.

PHPs, para-health professionals; SSN, senior staff nurse.

Among the metabolic risk factors, the toll of central obesity (83.5%) and overweight (42.6%) was greater than other risk factors. The prevalence of these two was four times higher than the national prevalence of central obesity (21%) and overweight (10.8%) among the general population of Bangladesh.<sup>14</sup> This proportion was also much higher than found in other global studies conducted in different parts of the world for central obesity<sup>7 30–33</sup> and overweight<sup>8 26 32–35</sup>, respectively. However, our finding is supported by two other studies conducted among HCPs, one in Bangladesh<sup>36</sup> and another in India.<sup>32</sup> A comparison among the professional categories revealed that SSNs were more centrally obese than PHPs. This finding is also supported by two other studies, one from South Africa<sup>37</sup> and one from England,<sup>38</sup> which reported a higher burden of central obesity among nurses than other health professionals.

Several etiological explanations have been postulated as underlying the high prevalence of central obesity among nurses. These include the nature of the work nurses do (rotating and night shift duties), unhealthy dietary patterns and lack of physical activity.<sup>39–41</sup> Interestingly, although the proportion of central obesity was higher among SSNs, overweight was not prevalent among them. The reason could be that we used two different parameters to level them as

overweight and obese: overweight was levelled on the BMI while central obesity on the waist-to-hip ratio.

Besides the body composition (overweight and obesity), two key metabolic risk factors (raised blood glucose and raised BP) of NCD were highly distributed among SSNs and PHPs. However, previous reports regarding these three risk factors among HCPs are mixed. A higher prevalence than the current study has been reported by several studies for raised BP.<sup>30 34 42 43</sup> Again, some other studies reported a low prevalence of raised blood glucose<sup>7 42 44</sup> and raised BP<sup>7 32</sup> among the HCPs. Although the results are mixed, the development of these risk factors takes time with a long latency, which indicates that HCPs might ignore or are unaware of these risk factors due to insufficient knowledge on chronic disease development. Similar to our findings, a study mentioned that chronic illness among health professionals are underreported as they hold idealistic views of their role in treating illness and fighting diseases, and may not think that self-care is a priority.<sup>45</sup>

In this study, we found that the distribution of different NCD risk factors was significantly associated with categories of health professions. Globally, data regarding the distribution of NCD risk factors among different categories of health professions is scanty and inconsistent. Moreover, studies on the association among the prevalence of

risk factors and the categories of health professions are also lacking. Thus it is difficult to compare our findings with other studies in detail. However, one study conducted in Taiwan showed a significant association of different NCD risk factors with different categories of health professions.<sup>8</sup> The exact cause of the development of NCD risk factors among health workers based on their profession category is not known. We believe that although they are from the healthcare sector, their knowledge, attitude and practice do not converge. Here, SSNs were associated with indoor patient care, and Subassistant community medical officer (SACMO) were provided treatment in primary care settings as a helping hand of qualified doctors. In some instances, SACMO was independently involved in patient management and played a key role. On the other hand, medical technicians (MTs) and the sanitary inspector had a very limited role in direct patient management. So, it is clear that SSNs, SACMO, MTs and sanitary inspectors have different roles in the healthcare system and as a result different workloads. We have already discussed that intensity of the workload, stress, night shifts, rotating duties, limited access to healthy foods at the workplace and knowledge about nutrition and personal motivations are the possible determinants of acquired NCD risk factors among nurses and the para-health workforce of Bangladesh. However, this finding is inconclusive and demands further studies on this issue to clarify the current finding more precisely.

### Limitations

This study has several limitations. First, the participants were not selected randomly for this study; rather, they were called to attend the training sessions by the NCDC cell of DGHS, Bangladesh. Second, self-reported information of behavioural risk factors might be associated with recalled bias. Third, we diagnosed new diabetes cases based on fasting capillary blood glucose (not by oral glucose tolerance test) that might have overestimated or underestimated the real prevalence of diabetes among the study population. Finally, this study did not include qualified physicians who maintain a direct relationship with patients. Hence, the results could not be generalised for all HCPs in Bangladesh.

### Strengths

Other than these limitations, this is the first study in Bangladesh that is conducted on a large sample of health workers to evaluate the prevalence of NCD risk factors and which explored their association with the categories of health profession. This is also important as there is no health policy in force for the health workers of Bangladesh to protect them from any chronic illness. Lack of data on this issue makes it more difficult for policymakers to take an effective initiative. In this regard, this study is important as it provided baseline data that will help in conducting a large-scale study among the HCPs of Bangladesh.

### CONCLUSION

High prevalence of NCD risk factors among SSNs and PHPs demand the immediate attention of the HCPs as well as policymakers to take appropriate preventive measures. A comprehensive risk reduction strategy should be developed for Bangladeshi HCPs including health awareness creation and screening of risk factors. Further studies on physicians working in various healthcare settings of Bangladesh are also recommended to explore the real scenario. Quality healthcare services can be ensured by ensuring the good health of healthcare providers.

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