



# Noncommunicable Disease Profiles of Bangladeshi Immigrants Aged >55 Years Living in Toronto: Access to Health Workshop and Needed Supports for Management

Qazi Shafayetul Islam <sup>a\*</sup>, Nasima Akter <sup>a</sup>  
and Krishna Prasad Sharma <sup>a</sup>

<sup>a</sup> Bangladeshi-Canadian Community Services (BCS), 2899 Danforth Avenue, M4C1M2, Toronto, Ontario, Canada.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors QSI and NA designed the study. Author QSI performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors QSI and NA managed the analyses of the study. Author KPS checked the data outcomes, organized the outcomes in the tables, searched the literature. All authors read and approved the final manuscript.*

## **Article Information**

DOI: 10.9734/JPRI/2022/v34i627282

### **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/95732>

**Original Research Article**

**Received: 27/10/2022**

**Accepted: 29/12/2022**

**Published: 30/12/2022**

## **ABSTRACT**

**Objectives:** The study explored the profiles of noncommunicable diseases (NCDs) of South Asian Bangladeshi immigrants aged > 55, access to health workshops about NCDs for self-care, and the types of support they needed to control and manage their NCDs.

**Methods:** The study was cross-sectional. The participants were Bangladeshi immigrants aged > 55 living in Toronto. They attended an ethnic community organization for services from January to

\*Corresponding author: E-mail: [qsislam@bangladeshi.ca](mailto:qsislam@bangladeshi.ca);

March 2020, and the study included participants from them (purposively). Pretested structured and semi-structured questionnaires were applied to collect the information. The study used chi-square and logistic regression for data analysis.

**Results:** The study included 191 participants; among the participants, males and females were 44.0% (84) and 56.0% (107), respectively, more than half of them (53.4%, 102) were aged > 60 years, and the majority (69.6%, 133) lived in Canada for more than five years. The frequently mentioned NCDs by gender perspective were diabetes (male vs. female: 51.2% vs. 57.9%), high blood pressure (male vs. female: 48.8% vs. 54.2%), and high cholesterol (male vs. female: 33.3% vs. 36.4%). They also mentioned arthritis/chronic joint pain (22.0%, 44), anxiety and depression (16.2%, 31), and heart disease (15.2%, 29). Females, compared to males, were more likely to have multiple NCDs, AOR= 1.62, 95% CI: 0.86, 3.04. Also, the participants aged > 60 years were 2.53 times more likely to have multiple NCDs than those who were < 60 years (95% CI: 1.34, 4.77), and the participants who arrived in Canada in five years were more likely to have multiple NCDs, AOR=1.42, 95% CI: 0.72, 2.83) compared to the group more than five years. Furthermore, 51.8% (99) of participants had no access to health workshops/ health information about NCDs for self-management. Most needed caregiver support from family members (59.7%, 114) to manage NCDs. Also, they required accompaniment support to go to health care providers (40.3%, 77), needed a doctor's cooperation (34.0%, 65), prescription management support (28.3%, 54), and home support (26.7%, 51) for managing the diseases.

**Conclusion:** The profile of NCDs of Bangladeshi immigrants aged > 55 years were high blood pressure, diabetes, and high cholesterol. Gender and sociodemographic variables changed the profile of NCDs in Bangladeshi immigrants. Participants needed better health information access and family care support to manage NCDs. Local ethnic community services can design a community-based health, home, and caregiver support approach to address the NCDs of Bangladeshi immigrants.

*Keywords: Noncommunicable diseases; diabetes; blood pressure; cholesterol; South Asian.*

## 1. INTRODUCTION

According to World Health Organization (WHO), yearly, about 41 million out of 55 million global deaths occur (71%) due to noncommunicable diseases (NCDs) such as cardiovascular, cancer, respiratory, and diabetes; among them, 17 million people die before the age of 70 [1]. Most NCD death (77%) occurs in low- and middle-income countries [1]. However, in a high-income country like Canada, one in three Canadian adults lives with at least one chronic NCD, and NCDs are estimated to account for 88% of all deaths [2,3]. Canada has the opportunity to address the NCDs adequately. Recently, the governments increased the annual budget for the direct cost of chronic diseases (NCDs) by about 58% of healthcare spending [4]. Also, the Public Health Agency of Canada's World Health Organization (WHO) and the Pan American Health Organization (PAHO) work together to create policies and implement them for managing NCDs in institutions and communities [5]. They focus on the immigrants' health and NCD to get helpful information, develop policies for ethnic communities/ immigrants based on the evidence, and reduce health challenges.

However, recently, Canada increased adverse NCD outcomes among immigrants [2,6]. South Asian immigrants from Bangladesh, India, Pakistan, Sri Lanka, and Nepal, a significant visible minority, have a higher incidence and prevalence of NCDs such as cardiovascular disease (CVD), diabetes, and hypertension than white Canadians [7-10]. Significant risk factors for NCDs in South Asians are physical inactivity, consumption of higher carbohydrate-related food, and lack of adequate knowledge of NCDs [1,7, 10]. Thus, favoring sides of having NCDs in South Asians are low lifestyle and inappropriate dietary habits in a new country and the time consumed for integrating immigrants into a new country's culture and the healthcare system. Taking time to integrate affects the health of immigrants, and thus, their health worsens while living in a new country [11-13].

So, every South Asian ethnic group, such as Bangladesh, India, Pakistan, Nepal, Sri Lanka, Bhutan, and Maldives, should have information about their NCDs. Though some evidence is available for India and Pakistan, South Asian Bangladeshi immigrants' information about NCDs is missing in their research [14]. These communities are increasing significantly and

adding to the Canadian population yearly [15]. Bangladeshi people consume insufficient fruits and vegetables, are physically inactive, and intake high salt with meals [10,16]. These immigrants are not exceptional from the risks for NCDs, and they should be included in NCDs and their national policies. Based on the evidence, we need to get available information about NCD in Bangladeshi immigrants for our local initiatives like community-based health activities in Canada to improve immigrants' quality of life and to achieve the goal of national interest.

An ethnic organization, Bangladeshi-Canadian Community Services (BCS), took the initiative (a study) to explore the profile of NCDs of South Asian Bangladeshi immigrants by gender and sociodemographic variables because these variables influence NCDs [17]. BCS in Toronto usually offers social and well-being services (culturally appropriate programs run by the Bengali language) for community members aged >55 years. The study was conducted on BCS's clients. Thus, the study had three research questions. (1) what was the chronic NCD of South Asian Bangladeshi immigrants aged > 55 living in Toronto (by gender and sociodemographic perspectives)? (2) Did the immigrants access health workshops to control and manage NCD? and (3) what support they needed to control and manage chronic NCDs at home? The result of the study helps stakeholders, local and national policymakers, and healthcare providers to develop policies and programs for Bangladeshi immigrants to find out opportunities to work to achieve the sustainable development goals of WHO, as Canada is a signatory. The World Health Organization's goal is to reduce the prevalence of NCDs by one-fourth by 2025 [18]. Again, the study results could help ethnic community organizations take community-based interventions or approaches to support and achieve the goals of WHO.

## 2. METHODS

### 2.1 Study Setting and Design

The study completed the data collection in Toronto, Ontario, at the BCS office. The study recruited South Asian Bangladeshi participants aged > 55 who attended Bangladeshi-Canadian Community Services (BCS) for services. Bangladeshi-Canadian Community Services (BCS), an ethnic non-profit organization, is situated in Danforth, Toronto, and serves any South Asian immigrants [18]. According to BCS's

policy, Bangladeshi immigrants aged 55 or older can take services as seniors [19]. Anyone across Toronto can come to the BCS to receive government information, health-related information, medical escort services, home services, and social connections. The study was cross-sectional and used structured and semi-structured questionnaires to collect data from the participants. The study collected data from the respondents in the Bengali language because half of the participants aged >55 had language barriers. The study collected information from them from January to March 2020 because the participants visited the BCS during that period.

### 2.2 Sample and Sampling Technique

We did not have lists of Bangladeshi immigrants in Toronto aged more than 55 years, so we applied a purposive sampling technique. We used the list of those who attended BCS and received service from January to March 2020. The interviewers collected information from them at BCS/agency. We planned to collect data from January to June to get a good sample size. However, due to the COVID pandemic, the agency/ BCS stopped its in-person services at the end of March 2020, which hampered data collection, too. From January to March, we got 219 aged > 55 years. The interviewers contacted them and informed them about the study and its purposes over the phone. Finally, the study was able to collect information from 191 participants. The interviewers scheduled the interview based on the participant's availability to attend BCS/ agency in person. BCS provided the study participants with public transportation costs (bus/ subway, streetcar, etc.) to come to the agency for the interviews if they lived far. For the participants who could not come alone, BCS sent volunteers to help participants come to BCS. The study participants originated from Bangladesh and migrated to Canada with family members.

### 2.3 Data Collection Procedures

#### 2.3.1 Interviewer's recruitment and training

The study involved three interviewers with social studies backgrounds, and they had past experiences in data collection. The principal investigator (PI) developed training guidelines for the interviewers, and the interviewers received a 2-day intensive training consisting of didactic lectures, mock interviews, and role play.

#### 2.3.2 Questionnaire development

The study used a structured and semi-structured questionnaire to collect information from the

participants. The PI invited five community members while developing the questionnaire for NCD data collection. The PI developed the questionnaire (in Bengali) based on a literature review on NCDs and community people's experiences. The PI pre-tested the questionnaire with ten Bangladeshi volunteers aged >55 years. The pre-testing purpose was to check consistency, culturally appropriate language, sequencing of questions, and understanding of the data collection procedure. After the pre-test, the PI edited, modified, updated the questionnaire, and finalized the survey. The interviewers collected data on the sociodemographic profile. Furthermore, the study collected data on NCD profiles among Bangladeshi immigrants, accessibility to health workshops, and the types of support or needs requiring by participants to manage NCDs.

### 2.3.3 Data collection

The PI formed a research team that consisted of three interviewers and a supervisor. The interviewers contacted the targeted participants on the phone, explained the study's purpose and ethical issues, and scheduled interviews with them. Any interested participant could not come to the agency for the interview, and the interviewer went to their homes with permission to collect the data. In this situation, the PI also sent an official letter to the study participants to consider their safety issues. Before the final interview, the interviewers talked to the participants on the phone several times to build rapport and make the respondents comfortable with providing the information during the interview. The interviewers had taken written consent from the participants before starting the interview.

Moreover, the supervisor observed and supervised the data collection procedures, techniques, ethical issues, and quality of data collection. The supervisor checked for any inconsistencies in the data in the questionnaire. Furthermore, with the discussion with the PI, the supervisor immediately organized the re-interviewer to complete the information and secure valid data.

### 2.4 Analysis

One youth volunteer of BCS received training on entering data on IBM SPSS (Statistical Package

for the Social Science) (version 26.0) and cleaned, edited, and coded the data under the supervision of the principal investigator. The PI computed the mean for continuous variables such as age, years of schooling, and years living in Canada and calculated the proportion for categorical variables. The outcomes of the analysis were done by gender and sociodemographic variables. Also, the PI did the statistical tests (Chi-square-  $\chi^2$ ) and logistic regression to estimate Odds ratios for categorical data along with 95 % confidence intervals (CI).

### 3. RESULTS

The study included 84 (44.0%) males and 107 (56.0%) females (Table 1). A more significant proportion of participants (53.4%, 102) were aged more than 60 years. Many (44.5%, 85) did not complete 12 grades of schooling. More than two-thirds of participants (69.6%, 133) had been in Canada for more than five years, and more portions became Canadian citizens (61.8%, 118). One-third of them (35.1%, 67) depended on others in healthcare decisions. About 47% (90) reported dependency on financial assistance. Every one in five (22%) had volunteering experience in the last three months. Half of the participants (50.3%, 96) reported about their English language barrier. Most of them (61.3%,117) lived nearby BCS agency.

In Table 2, NCD profiles among the participants were diabetes (55.0%, 105), followed by high blood pressure (51.8%, 99), and high cholesterol (35.1%, 67). Every one in five participants reported arthritis (22.0%, 44). Some participants (15.0-16.0%) reported chronic anxiety and depression (16.2%, 31) and heart diseases (15.2%, 29). Compared to males, females had little higher proportions of diabetes (51.2% vs. 57.9%,  $p=0.38$  or not significant), high blood pressure (48.8% vs. 54.2%,  $p=0.47$  or not significant), high cholesterol (33.3% vs. 36.4%,  $p=0.76$  or not significant), and arthritis (14.3% vs.28.0%,  $p=0.03$  or significant). Also, with increasing age, high blood pressure significantly increased among participants ( $p=0.04$ ). The participants who lived in Canada for less than five years had higher proportions of diabetes and high blood pressure than those who lived more than five years, but they were not statistically significant.

**Table 1. Socio-demographic characteristics of the study participants (N=191)**

<b>Demographic characteristics</b>		<b>% (n)</b>
Gender	Male	44.0 (84)
	Female	56.0 (107)
Age in years	55-59	46.3 (89)
	60+	53.4 (102)
	Mean ( $\pm$ standard deviation)	60.7 ( $\pm$ 5.9)
Completed School	12 grades	44.5 (85)
	Diploma/University	55.5 (106)
Living in Canada (years)	1-5	30.4 (58)
	5+	69.6 (133)
	Mean ( $\pm$ standard deviation)	11.1 ( $\pm$ 8.9)
Immigration status	Permanent residence (PR)	38.2 (73)
	Citizenship	61.8 (118)
Dependent on health care decision	Yes	35.1 (67)
	No	64.9 (124)
Income source	Dependent on others	47.1 (90)
	Government supports	34.0 (65)
	Job	18.8 (36)
Living close to BCS agency	Yes	61.3 (117)
	No	38.7 (74)
Community volunteer experience	Yes	22.0 (42)
	No	78.0 (149)
English language barrier	Yes	50.3 (96)
	No	49.7 (95)

**Table 2. Self-reported chronic non communicable disease by gender, age, and years living in Canada (N=191)**

Chronic diseases	Gender %(n)		$\chi^2$ test p-value	Age %(n)		$\chi^2$ test p-value	Years in Canada % (n)		$\chi^2$ test p-value	Total %(n)
	Male	Female		55-59	60+		< 5	5+		
High blood pressure	48.8 (41)	54.2 (58)	0.47 <sup>+</sup>	43.8 (39)	58.8 (60)	0.04 <sup>+</sup>	58.6 (34)	48.9 (65)	0.27 <sup>+</sup>	51.8 (99)
Diabetes	51.2 (43)	57.9 (62)	0.38 <sup>+</sup>	50.6 (45)	58.8 (60)	0.31 <sup>+</sup>	65.5 (38)	50.4 (67)	0.06 <sup>+</sup>	55.0 (105)
High Blood cholesterol	33.3 (28)	36.4 (39)	0.76 <sup>+</sup>	34.8 (31)	35.3 (36)	0.96 <sup>+</sup>	36.2 (21)	34.6 (46)	0.87 <sup>+</sup>	35.1 (67)
Heart diseases	22.2 (17)	11.2 (12)	0.11 <sup>+</sup>	12.4 (11)	17.6 (18)	0.42 <sup>+</sup>	12.1 (7)	16.5 (22)	0.52 <sup>+</sup>	15.2 (29)
Arthritis	14.3 (12)	28.0 (30)	0.03 <sup>+</sup>	19.1 (17)	24.5 (25)	0.39 <sup>+</sup>	22.4 (13)	21.8 (29)	0.93 <sup>+</sup>	22.0 (42)
Psychological	20.2 (17)	13.1 (14)	0.24 <sup>+</sup>	16.9 (15)	15.7 (16)	0.85 <sup>+</sup>	10.3 (6)	18.8 (25)	0.20 <sup>+</sup>	16.2 (31)

<sup>+</sup> not significant, <sup>\*</sup> significant

**Table 3. Odds ratio for the more than one chronic noncommunicable disease by sociodemographic variables**

Sociodemographic variables	Chronic diseases	$\chi^2$ test	Adjusted Odds Ratio (AOR)	95% CI			
				Lower	Upper		
	Single						
	More than one						
Gender	Male (ref)	50.0 (42)	50.0 (42)	0.19 <sup>+</sup>	1	0.86	3.04
	Female	40.2 (43)	59.8 (64)		1.62		
Age (years)	55-59 (ref)	56.2 (50)	43.8 (39)	0.02 <sup>*</sup>	1	1.34	4.77
	60+	34.3 (35)	65.7 (67)		2.53		
Living in Canada (Years)	6 and more (ref)	48.9 (65)	51.1 (68)	0.08 <sup>+</sup>	1	0.715	2.83
	5 and less	34.5 (20)	65.5 (38)		1.42		
Dependent status	Non-dependent (ref)	50.0 (62)	50.0 (62)	0.05 <sup>+</sup>	1	0.747	2.92
	Dependent	34.3 (23)	65.7 (44)		1.48		
Volunteer	Non-volunteer (ref)	46.3 (69)	53.7 (80)	0.38 <sup>+</sup>	1	0.769	3.45
	Volunteer	38.1 (16)	61.9 (26)		1.63		
Total		44.5 (85)	55.5 (106)				

<sup>+</sup> not significant, <sup>\*</sup> significant

In Table 3, female participants were more likely to have multiple NCDs (more than one) than males (AOR= 1.62, 95% CI: 0.86, 3.04). Again, the participants older than 60 were 2.53 times more likely to have multiple NCDs than those below 60 (95% CI: 1.34, 4.77). Moreover, the participants who depended on others to make healthcare decisions were more like to have multiple NCDs than non-dependent participants (AOR=1.48, 95% CI: 0.75, 2.92). Furthermore, the participants who lived in Canada for less than five years were more likely to have multiple NCDs than those who lived more than five years (AOR=1.42, 95% CI: 0.72, 2.83).

In Table 4, only 48.2% (92) of participants had access to health workshops/ health information about NCD. However, more females (56.1%, 60) had access to health workshops/ information than men (38.1%, 32; p=0.02). Also, the participants who volunteered in the community had a higher proportion of accessibility to health workshops/ health information than those who were not volunteers (81.0% vs. 38.9%, p=0.02).

Again, the participants having multiple NCDs had more accessibility (56.6%, 60) compared to the participants having single NCDs (37.6%, 32) (p=0.01). The participants who had anxiety and depression had less access to the health workshops/ information than the participants who had no psychological problems (25.8% vs. 52.5%, p=0.01).

In Table 5, a higher proportion of participants (59.7%, 114) needed family support or caregiver support by family members to manage their NCDs. A significant proportion of participants aged more than 60+ years (47.1%, 48) and the participants who lived in Canada for less than five years (60.3%, 35) needed accompaniment support to go to the healthcare system, such as a family physician, hospitals, and laboratories for testing. Compared to males, females needed little higher proportion of doctor's cooperation (35.5% vs. 32.1%, p=0.65), medicine management support (29.9% vs. 26.2%, p=0.63), and home support to get their work done (29.0% vs. 23.8%, p=0.50).

**Table 4. Accessibility of seniors to health information by sociodemographic and disease profiles**

Sociodemographic and disease profiles		Accessibility to health workshops/ information %		χ <sup>2</sup> test p-value
		Yes (n)	No	
Gender	Male	38.1 (32)	61.9 (52)	0.02*
	Female	56.1 (60)	43.9 (47)	
Volunteer	Yes	81.0 (34)	8.1 (8)	0.02*
	No	38.9 (58)	61.1 (91)	
Years in Canada	Less than 5	48.3 (28)	51.7 (30)	0.98+
	5+	48.1 (64)	51.9 (69)	
Age in years	55-59	44.6 (41)	48.5 (48)	0.66+
	60+	55.4 (51)	51.5 (51)	
Chronic diseases	High blood pressure	55.6 (55)	44.4 (44)	0.04 <sup>+</sup>
	No blood pressure	40.2 (37)	59.8 (55)	
	Diabetes	54.3 (57)	45.7 (48)	0.08 <sup>+</sup>
	No diabetes	40.7 (35)	59.3(51)	
	Have high cholesterol	49.3 (33)	50.7 (34)	0.88 <sup>+</sup>
	No cholesterol	47.6 (59)	52.4 (65)	
	Have heart diseases	58.6 (17)	41.4(12)	0.23 <sup>+</sup>
	No heart diseases	46.3 (75)	53.7 (87)	
	Have arthritis	66.7 (28)	33.3 (14)	0.01 <sup>+</sup>
	No arthritis	43.0 (64)	57 (85)	
	Have psychological problem	25.8 (8)	74.2 (23)	0.01 <sup>+</sup>
	No problem	52.5 (84)	47.5 (76)	
Multiple chronic diseases	56.6 (60)	43.4 (46)	0.01 <sup>+</sup>	
Single chronic disease	37.6 (32)	62.4 (53)		

+ not significant, \* significant

**Table 5. Type of supports towards chronic noncommunicable diseases by gender, age, and years living in Canada (N=191)**

Types of support	Gender %(n)		$\chi^2$ test	Age %(n)		$\chi^2$ test	Years in Canada % (n)		$\chi^2$ test	Total %(n)
	Male	Female	p-value	55-59	60+	p-value	< 5 years	5+	p-value	
Family care support	61.9 (52)	57.9 (62)	0.66 <sup>+</sup>	65.2 (58)	54.9 (56)	0.18 <sup>+</sup>	53.4 (31)	62.4 (83)	0.27 <sup>+</sup>	59.7 (114)
Accompaniment support	39.3 (33)	41.1 (44)	0.88 <sup>+</sup>	32.6 (29)	47.1 (48)	0.05 <sup>+</sup>	60.3 (35)	31.6 (42)	0.00 <sup>*</sup>	40.3 (77)
Doctor's cooperation	32.1 (27)	35.5 (38)	0.65 <sup>+</sup>	40.4 (36)	28.4 (29)	0.09 <sup>+</sup>	34.5 (20)	33.8 (45)	0.97 <sup>+</sup>	34.0 (65)
Medicine management support	26.2 (22)	29.9 (32)	0.63 <sup>+</sup>	24.7 (22)	31.4 (32)	0.34 <sup>+</sup>	31.0 (18)	27.1 (36)	0.60 <sup>+</sup>	28.3 (54)
Home support	23.8 (20)	29.0 (31)	0.50 <sup>+</sup>	27.0 (24)	26.5 (27)	0.94 <sup>+</sup>	22.4 (13)	28.6 (38)	0.45 <sup>+</sup>	26.7 (51)

+ not significant, \* significant



#### 4. DISCUSSION AND CONCLUSION

The study explored the noncommunicable diseases (NCDs) profile of Bangladeshi immigrants aged > 55. Bangladeshi male and female immigrants > 55 years had diabetes or high sugar, high blood pressure, and high cholesterol. Older women over 60 and immigrants who migrated to Canada in five years were more likely to have multiple NCDs. In addition, many did not have access to health workshops/ health information about NCD. Females needed more family care support or caregiver support to manage NCDs. The implication of the findings is described below.

The study found that diabetes, hypertension, and high cholesterol were common in Bangladeshi immigrants of more than 55 years living in Toronto. Similar findings were found in South Asian immigrants [10,14,16,20]. A few ethnic community organizations offer services for the South Asian Bangladeshi community in Toronto [21-24]. They could create awareness among Bangladeshi immigrants about NCDs through comprehensive training or workshops in their language (Bengali) to understand the extent of the diseases and the challenges that hinder their healthy living.

In our study, older women (over 60) were more likely to develop multiple NCDs than men. Similar findings were found [25]. However, women are often ignored in managing NCD because people perceive NCDs mainly as being considered diseases of men [26,27]. The death rate of women from NCDs is almost similar to men [27]. The government should work with ethnic organizations to address the women's health of Bangladeshi immigrants.

Also, we found in our study that Bangladeshi immigrants > 55 years developed more than one NCD within five years of arrival in Canada. It is almost typical for immigrants in a new country [28,29]. Immigrants who come to a new country must prove that they are healthy through immigration health screening requirements or medical screening tests [30]. However, when they arrive, they face difficulties adjusting to the new environment, have stress, and adopt risky health behaviors with increasing arrival time [31-34]. Local ethnic organizations should develop robust outreach strategies to reach newcomer immigrants and engage them in culturally appropriate healthy living activities.

This study found that Bangladeshi immigrants aged more than 55 years had poor access to health workshops, and men had less access to health workshops. The ethnic organizations must revise the socioeconomic factors like participants' time, distance from the organizations, family support, transportation cost, and workshop quality that could limit the accessibility to health workshop/ health information. Again, the study found that Bangladeshi immigrants aged > 55 emphasized family support to manage NCD, indicating that they need caregiver support from family members. Ethnic organizations provide family members with caregiver training to help family members having NCDs manage their health diseases adequately. Also, local community organizations could be involved in creating volunteer support (like caregiver support) if family support is unavailable.

The study has limitations. We had a small sample size (n=191), so we could not draw firm conclusions about the study results. Also, we took a convenient sample, so it could not be generalized. Furthermore, the participants reported their noncommunicable diseases (self-reported diseases), and they could be biased. However, the study findings can help design further research and investigation for large-scale research for South Asian communities. Again, in the study, we could not apply different methods for triangulation or more clarification because of the pandemic, shortage of resources, and lack of funding. However, we set the guidelines to maintain the data quality at different levels, such as training for interviewers, data collection, record-keeping system, and re-interview. They all ensured the data's validity and reliability.

In conclusion, Bangladeshi immigrants are no exception to NCDs. In Addition, many had multiple NCDs. Gender and sociodemographic factors influence the NCD profiles of Bangladeshi immigrants aged > 55 years. Furthermore, Bangladeshi immigrants >55 years had less access to health workshops or health information about NCDs for self-care. Local ethnic organizations should design culturally appropriate health workshops to educate them. Bangladeshi immigrants needed family caregiver support to manage NCDs. Training family members to provide services to those living with NCDs is essential. Local community services should come forward to help Bangladeshi immigrants for managing chronic diseases by

applying a community-based home support approach.

## ETHICAL APPROVAL AND CONSENT

The internal ethical board of Bangladeshi Canadian Community Services (BCS) approved the study. There is no medical approach to human subjects, so we did not require rigorous ethical issues. We obtained consent from the study participants verbally. Here we maintained the Helsinki Declaration of Ethical Principles for Human Subjects and maintained confidentiality strictly. After receiving permission from the participants, the interviewers started interviewing. Furthermore, the participant's answers were anonymous because we did not write their names on the questionnaire form. The interviewer told the participants that they had the right to refuse to answer any question, to stop giving information at any point, or to withdraw from the interview. The interviewers kept information in a separate area, so only the principal investigator accessed the information.

## ACKNOWLEDGEMENT

The study authors thank the participants for their valuable information and time. They also acknowledge the contributions of interviewers/data collectors and the volunteers who entered the data on the computer. The authors thank the participants' family members and the board of directors of BCS, who encourage the study initiative and support during the study period.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. WHO. Noncommunicable diseases: key facts. World Health Organization; 2022. Accessed 29 October 2022. Available: <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
2. Branchard, Brenda et al. At-a-glance - How Healthy are Canadians? A brief update. "Aperçu - Quel est l'état de santé des Canadiens? Brève mise à jour." Health promotion and chronic disease prevention in Canada: research, policy and practice. 2018;38(10):385-87. DOI:10.24095/hpcdp.38.10.05.
3. WHO. Noncommunicable Diseases-country profiles 2018. World Health Organization; 2018. Accessed 30 October 2022. Available: <https://apps.who.int/iris/handle/10665/274512>
4. CDPAC. Chronic disease prevention alliance of Canada-2018 prebudget submission to the house of commons standing committee on finance; 2017. Accessed 03 October 2022. Available:ChronicDiseasePreventionAllianceOfCanada-e.pdf (ourcommons.ca)
5. Government of Canada. working together globally: Canada's World Health Organization (WHO) collaborating centre on chronic noncommunicable disease policy. Accessed 02 October 2022. Available:<https://www.canada.ca/en/public-health/corporate/mandate/about-agency/working-together-globally-canada-world-health-organization-collaborating-centre-chronic-noncommunicable-disease-policy.html>
6. Campbell NRC, Ordunez P, Giraldo G, Morales YAR, Lombardi C, Khan T et al. WHO HEARTS: A global program to reduce cardiovascular disease burden: experience implementing in the Americas and opportunities in Canada. Can J Cardiol. 2021;37(5):744-55. DOI:10.1016/j.cjca.2020.12.004
7. Rana A, de Souza RJ, Kandasamy S, Lear SA, Anand SS. Cardiovascular risk among South Asians living in Canada: a systematic review and meta-analysis. CMAJ open. 2014;2(3):E183-91. Available:<https://doi.org/10.9778/cmajo.20130064>
8. Tharmaratnam T, Iskandar MA, Doherty S, et al. The role of physical activity prescription in cardiovascular disease prevention amongst South Asian Canadians. Front Cardiovasc Med. 2018;5:165. Published 2018 Nov 14. DOI:10.3389/fcvm.2018.00165
9. Islam F, Khanlou N, Tamim H. South Asian populations in Canada: migration and mental health. BMC Psychiatry. 2014;14:154. Published 2014 May 26. DOI:10.1186/1471-244X-14-154
10. Fraserhealth. South Asian Health Report. Accessed 14 January 2023. Available: <http://www.fraserhealth.ca/about-us/health-reports/>

11. Walker PF, Barnett ED, Hauck FR, Pearson RD. Immigrant medicine. *Emerg Infect Dis.* 2008;14(6):1007-1008. DOI:10.3201/eid1406.080154
12. Smith GD et al. Ethnic inequalities in health: A review of UK epidemiological evidence. *Critical Public Health.* 2000; 10(4):375–408. Available:10.1080/09581590010005331
13. Kennedy S, McDonald JT, Biddle N. The healthy immigrant effect and immigrant selection: evidence from four countries. Social and economic dimensions of an aging population research papers 164, McMaster University. Accessed September 27 2022. Available:<https://ideas.repec.org/p/mcm/se/dapp/164.html>
14. Venkatramana P, Latheef SAA. Non-communicable diseases in South Asian immigrants: An overview. *Migration and Diasporas: An Interdisciplinary Journal.* 2019;2(1):29-53. Available:[https://grfdt.com/Upload/JournalGallery/1\\_968752431\\_P.%20Venkatramana.pdf](https://grfdt.com/Upload/JournalGallery/1_968752431_P.%20Venkatramana.pdf)
15. Statistics Canada. The Canadian census: A rich portrait of the country's religious and ethnocultural diversity; 2022. Accessed 10 January 2023. Available:<https://www150.statcan.gc.ca/n1/daily-quotidien/221026/dq221026b-eng.htm>
16. Riaz BK, Islam MZ, Islam ANMS, et al. Risk factors for non-communicable diseases in Bangladesh: findings of the population-based cross-sectional national survey 2018. *BMJ Open.* 2020;10(11):e041334. Published 2020 Nov 27. DOI:10.1136/bmjopen-2020-041334
17. Government of Canada: Common chronic diseases in women compared to men. 2021. Public Health Agency; 2021. Accessed 22 October 2022. Available:<https://www.canada.ca/en/public-health/services/publications/diseases-conditions/common-chronic-diseases-women-compared-men-aged-65-years-older.html>
18. World Health Organization. Sixty-Fifth world health assembly resolutions, decisions, Annexes; 2012. Available: <http://www.who.int/mediacentre/events/2012/wha65/en/>. WHA65/2012/REC/1
19. BCS. Annual report 2018. Bangladeshi-Canadian Community Services; 2019. Accessed 20 November 2022. Available: [www.bangladeshi.ca](http://www.bangladeshi.ca)
20. Rana A, de Souza RJ, Kandasamy S, Lear SA, Anand SS. Cardiovascular risk among South Asians living in Canada: a systematic review and meta-analysis. *CMAJ Open.* 2014;2(3):E183-E191. Published 2014 Jul 22. DOI:10.9778/cmajo.20130064 [19]
21. BCS. Senior initiatives. Bangladeshi-Canadian Community Services. Accessed 14 January 2023. Available: <https://www.bangladeshi.ca/senior>
22. BCCS. Senior Services. Bangladesh Centre & Community Services. Accessed 14 January 2023. Available: <https://www.bangladeshcentre.ca/seniors-services>
23. SAWRO. South Asian Women's Rights Organization. Accessed 14 January 2023. Available: [www.sawro.org](http://www.sawro.org)
24. BIES. Bengali Information Employment Services. Accessed 14 January 2023. Available: <https://www.bies-canada.org/>
25. Chauhan S, Kumar S, Patel R, Simon DJ, Kumari A. Burden of communicable and non-communicable diseases-related inequalities among older adults in India: a study based on LASI survey. *BMC Geriatr.* 2022;22(1):790. Published 2022 Oct 10. DOI:10.1186/s12877-022-03481-x (women vulnerable)
26. Salomon JA, Wang H, Freeman MK, et al. Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the Global Burden Disease Study 2010 [published correction appears in *Lancet.* 2013;381(9867):628]. *Lancet.* 2012;380(9859):2144-62. DOI:10.1016/S0140-6736(12)61690-0.
27. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010 [published correction appears in *Lancet.* 2013;381(9867):628. AlMazroa, Mohammad A [added]; Memish, Ziad A [added]]. *Lancet.* 2012;380(9859):2095-2128. DOI:10.1016/S0140-6736(12)61728-0

28. Al-Hatimy F, Farooq A, Al Abiad M, et al. A retrospective study of non-communicable diseases amongst blue-collar migrant workers in Qatar. *Int J Environ Res Public Health*. 2022;19(4):2266. Published 2022 Feb 17.  
DOI:10.3390/ijerph19042266 (arrival in five years)
29. WHO. Prevention and control of noncommunicable diseases in refugees and migrants. Copenhagen: WHO Regional Office for Europe; 2019 (Technical guidance on refugee and migrant health). Accessed 16 January 2023.  
Available:<https://apps.who.int/iris/bitstream/handle/10665/311461/9789289053990-eng.pdf?sequence=1&isAllowed=y>
30. Kennedy S, Kidd MP, McDonald JT, Biddle N. The healthy immigrant effect: patterns and evidence from four countries. *Journal of International Migration and Integration*. 2015;16(2), 317-32.
31. Vang Z, Sigouin J, Flenon A, Gagnon A. The healthy immigrant effect in Canada: A systematic review. Population change and lifecourse strategic knowledge cluster discussion paper Series/Un Réseau stratégique de connaissances Changements de population et parcours de vie Document de travail. 2015;3(1):4-19.  
Available:<https://ir.lib.uwo.ca/pclc/vol3/iss1/4>
32. McDonald JT, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. *Soc Sci Med*. 2004;59(8):1613-27.  
DOI:10.1016/j.socscimed.2004.02.004.
33. McDonald JT, Kennedy S. Is migration to Canada associated with unhealthy weight gain? Overweight and obesity among Canada's immigrants. *Soc Sci Med*. 2005; 61(12):2469-81.  
DOI:10.1016/j.socscimed.2005.05.004. (25)
34. Ng E, Wilkins R, Gendron F, Berthelot JM. Dynamics of immigrants' health in Canada: evidence from the National Population Health Survey. Healthy today, healthy tomorrow? Findings from the National Population Health Survey (Catalogue 82-618-MWE2005002). Ottawa: Statistics Canada; 2005. Accessed 28 December 2022.  
Available:<https://www150.statcan.gc.ca/n1/pub/82-618-m/2005002/pdf/4193621-eng.pdf>

© 2022 Islam et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle5.com/review-history/95732>