Original Article

Community Section

Determinants of Non Communicable Diseases: A Mixed-method Study on its Prevalence and Perceptions among Rural Population of Muchisa, West Bengal

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ABSTRACT

Introduction: Most people with Non Communicable Diseases (NCDs) are unaware of the problem because it usually does not have any signs or symptoms in the initial stages. The measures for prevention of NCDs are not well known to the rural population which results in a huge burden on the health system.

Aim: To estimate the burden of NCDs, and its risk factors among the rural population residing in a village of Budge Budge II block, West Bengal. Also to explore their perceptions regarding determinants, complications and prevention of NCDs, and to look for the association of NCDs with the risk factors and socio-demographic characteristics.

Materials and Methods: An observational study, with cross-sectional design using mixed-methods approach, was conducted on 160 residents of Muchisa, from December 2020 to March 2021. A predesigned, pretested and structured schedule, prepared on the basis of World Health Organisation (WHO) STEPS framework, was used to assess the presence NCD and associated risk factors in the study population. Focused group discussion guide was employed to inquire about their perceptions. The participants were selected through cluster random sampling. The data were explored using Pearson's Chi-square test, logistic regression and thematic analysis. A p-value of <0.05 was considered significant.

Results: Mean age of the participants was 45.0±16.8 years, and 69.4% participants were females. Total 75% of the participants suffered from atleast one NCD. All the participants had atleast one risk factor for NCD. Age group of 40-59 years (p-value <0.001) and 60 years or above (p-value=0.002), female gender (p-value=0.009), and preschool education or below (p-value=0.006) were associated with a higher risk of NCD. Qualitative data analysis revealed that lifestyle modification was not perceived to be effective against NCDs.

Conclusion: Socio-demographic factors, like age, gender and education have a bearing on the risk of developing NCD. Lack of awareness about the prevention of NCDs is the challenge in addressing the problem.

Keywords: Body mass index, Chronic disease, Control, Prevention, Risk factors

INTRODUCTION

Non Communicable Diseases (NCDs) comprises of significant burden on community health globally. About 71% of all deaths globally can be attributed to NCDs [1]. Over 85% of these "premature" deaths occur in low and middle-income countries [1]. The NCDs terrorize advancement towards the 2030 Agenda for Sustainable Development, which focuses on minimising early mortality from NCDs by one-third till the year 2030. Most NCD-related deaths are attributed to the cardiovascular diseases (17.9 million), followed by cancer (9.0 million), respiratory disease (3.9 million), and diabetes mellitus (1.6 million) [1]. Most individuals suffering from NCDs may develop serious complications including death without any prior warning as these diseases may have asymptomatic presentation in the initial stages. In response to the current scenario, the WHO have developed a Global action plan 2013-2020 to prevent and control NCDs [2].

As per WHO recommendations, a minimum of "150-300 minutes of moderate-intensity aerobic physical activity" or "75-150 minutes of vigorous-intensity aerobic physical activity", or "an equivalent combination of both" every week, along with 7-9 hours of sleep per day for adults is required for substantial health benefits [2,3]. There is evidence that replacing "sedentary time" with even "light intensity physical activity" can be helpful [4]. Having a minimum of "5 servings of fruits and vegetables a day", and minimising salt intake to less than 5 gm/day have been recognised as some of the economical means of improving health outcomes [5,6]. The target should be

to achieve a Body Mass Index (BMI) between 18.5-22.9 and a waist-hip ratio of less than 0.85 for females and less than 0.90 for males [7,8]. Modifiable risk factors for the NCDs are tobacco use, lack of physical activity, unhealthy diet, and alcohol consumption [1]. Raised blood pressure, overweight/obesity, hyperglycaemia, and hyperlipidaemia are the four vital metabolic changes which could be attributed to these risk factors. However, the burden of the NCDs can be effectively reduced through lifestyle modification, regular monitoring of blood pressure and sugar and compliance to medications.

Unfortunately, the rural population is less aware of the risk factors associated with NCDs, and have lower rates of health care utilisation as compared to the urban population [9-11]. The prevalence of risk factors for NCD is higher in rural West Bengal, where the percentage of smokers and alcohol users was reported to be more than 40% and 10%, respectively [12, 13]. Bhattacharjee S et al., also reported that the burden of NCDs like overweight, abdominal obesity and hypertension was 29.8%, 20.2% and 17.8%, respectively, in adults of Siliguri, West Bengal [12]. Even the adolescent population of West Bengal is becoming prey to these risk factors [14]. A vital event surveillance study in Birbhum, West Bengal also reported that NCDs were the major cause of mortality in the area [15]. This emphasises on the need for extensive research in this area.

Study Objectives

- To estimate the burden of NCDs among the rural population residing in a village of Budge Budge II block, West Bengal;

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- To evaluate the proportion of those possessing risk factors for NCDs; to explore their perceptions regarding determinants, complications and prevention of NCDs, and to look for the association of NCD with the risk factors and socio-demographic characteristics.

MATERIALS AND METHODS

An observational study with cross-sectional design and explanatory sequential mixed-methods approach (using both qualitative as well as quantitative data) was conducted on adults in Muchisa village, under Budge Budge II Block of South 24 Parganas in West Bengal, India. The study was planned in December 2020. Data Collection was initiated after approval from Institutional Ethics Committee of Institute of Post Graduate Medical Education And Research, Kolkata, West Bengal (IPGME&R/IEC/2021/126, dt-06.02.21) and the local authorities.

Data Collection

The data collection for quantitative strand was for two weeks from 8th February-21st February 2021 which was followed by data entry and analysis (22nd February-28th February 2021). After analysis of the quantitative data, participants were selected for the qualitative strand from among the participants of the quantitative strand. Data for the qualitative strand were collected on 4th March 2021.

Sample size calculation: The sample size was calculated using the formula (the quantitative component):

$N=Z^2pq/e^2$

Where, Z=1.96,

p=prevalence of hypertension,

q=1-p,

e=10% absolute error

Considering the prevalence of hypertension (as cardiovascular diseases are the most common cause of NCD deaths globally [1] and in India [16] to be 24.7% [17], with a precision of 5% and confidence level of 95%, the sample size was calculated as 72. After considering a non response rate of 10%, a sample size of 80 was deduced. This sample size was multiplied with a design effect of 2 (cluster sampling). Thus, the quantitative part of the study was conducted on a sample of 160 rural inhabitants.

Cluster random sampling technique

Two stage cluster random sampling technique was used to enroll the study participants.

- In the 1st stage, one cluster (Roy Para) with a population of 695 (as per April 2020 data) was selected out of the seven Paras in Muchisa village using simple random sampling technique.
- In the 2nd stage units (individuals) were selected by systematic random sampling where sampling interval was 4.

Therefore, every fourth person was selected and 14 participants were selected purposively from amongst the study participants for the focussed group discussions.

Inclusion criteria: The adults of Muchisa available during data collection were included in the quantitative study after obtaining written informed consent.

Exclusion criteria: Individuals with severe illness were excluded from the survey.

Study Procedure

Data were collected after ensuring anonymity and confidentiality. Initially a one-to-one interview was conducted on the selected sample population in their households using a predesigned, pretested and structured schedule. This schedule was developed by the researchers on the basis of WHO STEPS framework after expert validation, and pretesting on a sample of 30 rural people

from Muchisa, who were excluded from the final sample selection process for the actual study [5].

Along with the interview, anthropometric and other measurements like blood pressure (average of three readings) and pulse rate (with the help of GVC Iron analog weighing scale, Omron HEM 712 upper arm automatic blood pressure monitor and non stretchable measuring tape) were also recorded.

Besides, other parameters were also recorded to estimate the burden of risk factors for NCDs among the study population:

- Fasting Blood Sugar (FBS),
- Post Prandial Blood Sugar (PPBS), and
- Glycated haemoglobin (HbA1C)

Focused Group Discussions (FGD)

The two FDG were then carried out including those identified to have a risk factor for NCDs to explore their perceptions regarding the disease, possible complications, prevention and control. The total number of participants in the qualitative strand was 14 because only a few participants turned up for the FGD session. The sessions were video graphed after taking consent from the participants.

- FDG 1: Included six participants (2 males, 4 females) who were purposively selected. Their age varied from 50-70 years.
- FDG 2: Comprised of eight female participants, with age ranging from 25-55 years.

Outcome variables

i.   Self-reported NCD

ii. Clinically diagnosed NCD (Diagnosed with the help of body mass index [7], waist hip ratio [8], blood pressure [18] and laboratory reports like FBS, PPBS, HbA1c [19].

- A participant with BMI ≥25 Kg/m^2 was identified as obese.
- Hypertension was diagnosed if the average of three blood pressure measurements of a participant was recorded to be

    ≥140 mmHg systolic or

    ≥90 mmHg diastolic
- In order to diagnose diabetes mellitus,

    FBS ≥7.0 mmol/L (126 mg/dL),

    PPBS ≥11.1 mmol/L (200 mg/dL) or

    HbA1c ≥6.5% were taken as cut-offs

Explanatory variable

i.   Socio-demographic characteristics

ii. Lifestyle and behavioural factors

Operational definitions:

1. Non communicable disease: "also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioural factors" [1].

2. Risk factor: "any attribute, characteristic, or exposure of an individual which increases the likelihood of developing a noncommunicable disease" [20]. As per WHO, less than <150 hours of moderate and vigorous intensity exercise per week [2]; <7 hours or >9 hours of sleep per day [3], increased waist-hip ratio (males ≥0.90, females ≥0.85) [8]; consuming <5 servings of fruits and vegetables a day [5]; salt intake of more than 5 g/day [6] and BMI of 25 or more [7] are considered risk factors for NCD. Other risk factors include tobacco use, and alcohol consumption [1].

3. Rural: An area which comes under a Gram Panchayat and where "a minimum of 75% of male working population is involved in agriculture and allied activities" [21].

STATISTICAL ANALYSIS

Data were recorded in the Microsoft Office Excel 2010 (Microsoft Corp, Redmond, WA, USA) and the analysis was performed using Statistical Package for the Social Sciences (IBM, New York City, United States of America) version 25.0. Descriptive statistical measures were employed to summarise the data. Binary logistic regression was performed to ascertain relationship between the dependent (Self-reported NCD, Clinically diagnosed NCD) and the independent variables (socio-demographic characteristics, lifestyle and behavioural factors). The dependent variables did not follow normal distribution (Kolmogorov-Smirnow test: p-value <0.001; Shapiro-Wilk test: p-value <0.0001). Data were checked for multi-collinearity, Variance Inflation Factor was found to be less than 10 and tolerance was greater than 0.1. Thus, Pearson's Chi-square test was used to compare the study variables with respect to presence or absence of self-reported NCD. Multivariate binary logistic regression was used to test the association between the dependent and the independent factors after adjusting for potential covariate. A p-value <0.05 was considered significant. The focused group discussions were analysed thematically by the authors. The transcripts were prepared from the video recordings of the focus group. Each author individually analysed the transcripts manually, to derive themes, codes and corresponding verbatim. This was followed by a discussion among the authors to finalise the themes and codes based on common consensus.

RESULTS

[Table/Fig-1] displays the socio-demographic characteristics of the study population. A total of 160 rural individuals were included in the study, of which 39.4% belonged to the age group of 40-59 years (mean age was 45.0±16.8 years), 69.4% were females, and 68.8% were married. All of them were followers of Hinduism, and belonged to the General Caste. About 31.3% of the sample belonged to class IV as per Modified BG Prasad Scale 2020 [22].

Socio-demographic variables	n (%)
Age (years)	
18-39	61 (38.1)
40-59	63 (39.4)
≥60	36 (22.5)
Gender	
Male	49 (30.6)
Female	111 (69.4)
Type of family	
Nuclear	77 (48.1)
Joint	83 (51.9)
Education	
Illiterate	54 (33.1)
Preschool	4 (2.5)
Primary	43 (26.4)
Middle	32 (19.6)
Secondary	11 (6.7)
Higher secondary	9 (5.5)
Graduate	7 (4.3)
Marital status	
Married	110 (68.8)
Unmarried/Widowed/Separated	50 (31.3)
Socio-economic status as per modified BG Prasad Scale 2020	
Class V (Lower)	35 (21.5)
Class IV (Lower middle)	51 (31.3)
Class III (Middle)	45 (28.1)
Class II (Upper middle)	25 (15.6)
Class I (Upper)	4 (2.5)

Occupation	
Unemployed	4 (2.5)
Homemaker/Retired/Students	105 (65.6)
Unskilled/Semi-skilled worker	32 (20.0)
Skilled/Semi-professional	19 (11.9)

[Table/Fig-1]: Socio-demographic characteristics of the study population (N=160).

Total 75% of the participants suffered from atleast one NCD. The percentage of the study population with hypertension and obesity was 65.6% and 35.6%, respectively. Ten participants possessed their fasting blood glucose reports at the time of data collection - five of them were identified to have impaired fasting glucose levels. Out of the total population, 65.6% were hypertensive, of which 36.2% were aware about their disease (self-reported), and 63.8% were diagnosed by the researchers (clinically-diagnosed). A total of 57 participants were obese, but only one of them was aware about this. Total 85% participants with diabetes mellitus were aware of their disease [Table/Fig-2].

Variables	Present n (%)	Absent n (%)
NCD	120 (75)	40 (25)
Hypertension	105 (65.6)*	55 (34.4)
Obesity	57 (35.6)†	103 (64.4)
Diabetes mellitus	20 (12.5)‡	140 (87.5)

[Table/Fig-2]: Categorisation of the study population based on their NCDs.
*36.2% self-reported, 63.8% clinically diagnosed
†1.8% self-reported, 98.2% clinically diagnosed
‡85% self-reported, 15% clinically diagnosed

All the participants possessed one or more predisposing factors for NCD. The most prevalent risk factor was having a diet deficient of fruits and vegetables (100%), followed by insufficient physical activity (88.1%) and increased waist-hip ratio (88.1%) [Table/Fig-3].

Risk factors for NCD	n (%)
I. Responses from the participant	
A. Family history	
1. Do you have a family history of NCD? (N=160)	
Yes	58 (36.3)
No	102 (63.7)
B. Diet	
1. How much salt do you consume daily? (N=160)	
<5g/day	56 (35)
≥5g/day	104 (65)
2. In a typical week, on how many days do you eat fruit? (N=160)	
7 days	0
<7 days	160 (100)
3. How many servings of fruit do you eat on one of those days? (N=160)	
1 serving	58 (36.3)
Do not consume fruits	102 (63.7)
4. In a typical week, on how many days do you eat vegetables? (N=160)	
7 days	91 (56.9)
<7 days	69 (43.1)
5. How many servings of vegetables do you eat on one of those days? (N=160)	
1	69 (43.1)
2	83 (51.9)
3	1 (0.6)
Do not take vegetables	7 (4.4)
C. Tobacco consumption	
1. Have you ever used tobacco products? (N=160)	
Currently using	38 (23.8)

Used in the past	7 (4.4)
Never used	115 (71.8)
2. What are the tobacco products currently used by you? (n=38)	
Smokeless tobacco	21 (55.2)
Tobacco smoking	12 (31.6)
Both	5 (13.2)
3. If you are a current tobacco user, do you use the product daily? (n=38)	
Yes	38 (100)
No	0
D. Alcohol consumption	
1. Have you ever consumed an alcoholic drink? (N=160)	
Yes	25 (15.6)
No	135 (84.4)
2. During the past 30 days, how many times did you have ≥5 standard alcoholic drinks (for men)/≥4 standard alcoholic drinks (for women) in a single drinking occasion? (n=25)	
Once	1 (4)
Twice	1 (4)
Never	23 (92)
E. Physical activity and sleep	
1. What is the total duration for which you exercise every week? (N=160)	
<150 minutes	141 (88.1)
≥150 minutes	19 (11.9)
2. What is your average sleep duration? (N=160)	
<7 hrs/day	66 (41.2)
7-9 hrs/day	55 (34.4)
>9 hrs/day	39 (24.4)
II. Researcher's observation	
A. Body Mass Index ≥25 Kg/m² (N=160)	57 (35.6)
B. Blood Pressure ≥140 mmHg systolic or ≥90 mmHg diastolic (N=160)	98 (61.3)
C. Waist-hip ratio (males ≥0.90, females ≥0.85) (N=160)	141 (88.1)

[Table/Fig-3]: Burden of various risk factors for chronic diseases among the study population (N=160).

[Table/Fig-4] demonstrates the association of risk factors with NCD. The univariate analysis showed that age group of 40-59 years (OR: 4.77, p-value <0.001) and 60 years or above (OR: 6.35, p-value=0.002), female gender (OR 2.71, p-value=0.009) and preschool education or below (OR: 3.48, p-value=0.006) were associated with a higher risk of NCD.

Risk factors	Total count n (%)	NCD Absent n (%)	NCD Present n (%)	Chi-square (χ²)	p-value
Age (Completed years)					
<40	61 (100)	27 (44.3)	34 (55.7)	19.632	<0.001**
40-59	63 (100)	9 (14.3)	54 (85.7)		
≥60	36 (100)	4 (11.1)	32 (88.9)		
Gender					
Male	49 (100)	19 (38.8)	30 (61.2)	7.148	0.010**
Female	111 (100)	21 (18.9)	90 (81.1)		
Marital status					
Married	110 (100)	31 (28.2)	79 (71.8)	1.901	0.237
Unmarried/Widowed/Separated	50 (100)	9 (18)	41 (82)		
Type of family					
Nuclear	77 (100)	21 (27.3)	56 (72.7)	0.409	0.585
Joint	83 (100)	19 (22.9)	64 (77.1)		
Education					
>Preschool	102 (100)	33 (32.4)	69 (67.6)	8.114	0.004**
≤Preschool	58 (100)	7 (12.1)	51 (87.9)		
Employment					
Employed	51 (100)	16 (31.4)	35 (68.6)	1.621	0.241
Unemployed/Homemaker/Retiree/Student	109 (100)	24 (22)	85 (78)		
Socio-economic status as per modified BG Prasad Scale 2020					
≥Class III	74 (100)	22 (29.7)	52 (70.3)	1.643	0.207
<Class III	86 (100)	18 (20.9)	68 (79.1)		
Tobacco use					
Past use	7 (100)	3 (42.9)	4 (57.1)	3.145	0.208
Current use	38 (100)	6 (15.8)	32 (84.2)		
Never used	115 (100)	31 (27)	84 (73)		
Alcohol					
Ever used	25 (100)	7 (28)	18 (72)	0.142	0.802
Never used	135 (100)	33 (24.4)	102 (75.6)		
Physical activity					
<150 min/week	141 (100)	33 (23.4)	108 (76.6)	1.613	0.258
≥150 min/week	19 (100)	7 (36.8)	12 (63.2)		
Duration of sleep					
<7 hrs or >9 hrs	105 (100)	23 (21.9)	82 (78.1)	1.561	0.250
7-9 hrs	55 (100)	17 (30.9)	38 (69.1)		
Waist-hip ratio					
Increased	141 (100)	32 (22.7)	109 (77.3)	3.364	0.089
Normal	19 (100)	8 (42.1)	11 (57.9)		
Salt intake					
≥5 g/day	104 (100)	26 (25)	78 (75)	<0.001	1
<5 g/day	56 (100)	14 (25)	42 (75)		
Family history of NCD					
Present	58 (100)	13 (22.4)	45 (77.6)	0.325	0.704
Absent	102 (100)	27 (26.5)	75 (73.5)		

[Table/Fig-4]: Association of NCD with socio-demographic factors (N=160).
p-value <0.05 was considered as statistically significant;
For waist-hip ratio: Increased (≥0.85 for females; ≥0.90 for males); Normal (<0.85 for females; <0.90 for males)

The Quantitative analysis was followed by two focused group discussions (FGD-1, FGD-2) (total participants 14) to investigate the perceptions of the study population regarding the disease, its prevention and associated complications.

- There were six participants in FGD-1 aged between 36 and 70 years consisting of two males and four females. Three of the participants of FGD-1 self reported their NCDs (Participant 3 and Participant 6: hypertension; Participant 1: obesity) while the other three participants were clinically diagnosed to be suffering from NCD (2 obesity and 1 hypertension).

- FGD-2 included eight participants (one male and seven females) with ages ranging from 25-65 years. Three participants of FGD-2 were aware of the NCDs they were suffering from and hence reported the same (Participant 3 and Participant 5: hypertension; Participant 8: diabetes mellitus). The remaining participants were clinically diagnosed to be hypertensive [Table/Fig-5].

DISCUSSION

In India, 12.3 to 22.7% rural people aged 15 years and above are either diabetic or hypertensive. [23] The burden is higher in rural West Bengal where a minimum of 16.5% suffer from these NCDs [24].

[Table/Fig-6] [12,25-32] depicts that the overall prevalence of hypertension was greater in the present study work compared to that reported by Bhagyalaxmi PS et al., Swaminathan K et al.,

S. No.	Themes	Codes	Verbatims
1	Diet and NCD	Eat healthy, live better. Diet plan is not for poverty-stricken.	"…if we eat well, we stay healthy" "…poor people, it is not possible to maintain a diet plan"
2	Physical activity and NCD	Physical shortcomings and household workload hinder physical activity.	"…have palpitations and knee joint pain on walking" "…cannot take time off from household chores"
3	Obesity and NCD	No association between obesity and NCD	"…no idea about impact of obesity"
4	Medications for NCD	Medicines prevent complications. Compliance to doctor's advice. Money - a barrier in procurement of medicines.	"if I do not take anti-hypertensives daily, I suffer from head reeling" "…the doctor advised on taking medications to reduce BP". "…do not have enough money to buy medicines"
5	Regular monitoring of blood pressure	Regular monitoring helps in keeping track of variations in blood pressure. Lack of finances - an obstacle in regular blood pressure monitoring at a health facility.	"to know whether there is a rise or fall in BP" "…do not have money to visit a health facility for BP measurement"
6	Addictions and NCD	Social support necessary to quit addiction.	"family members insisted on giving up tobacco" "visualising neighbours using the substance always tempted"
7	Medical advice on measures other than medications to prevent and control NCD	Unsatisfactory medical counseling.	Doctors "…never speak. They are always in a hurry to write the prescription and dispose off the patients"
8	Complications associated with NCD	Hypertension predisposes to complications.	"head reeling, palpitations…" and "stroke" are "associated with high BP"

[Table/Fig-5]: The favourable and unfavourable regarding control of non communicable diseases that emerged from the FGDs.

Study	Place, period and sample size	Socio-demographic characteristics	Prevalence of NCD
Present study	Muchisa, West Bengal (2021) 160 rural inhabitants	Mean age: 45±16.8 years 69.4% females 33.1% illiterates	Obesity: 35.6% Hypertension: 65.6% Diabetes: 12.5%
Bhar D et al., [25]	Siliguri, West Bengal (2019) 172 tribal people	Mean age: 42.1±11.3 years 51.7% females 59.3% illiterate	Obesity: 26.2%
Bhattacharjee S et al., [12]	Siliguri, West Bengal (2015) 779 adults	Mean age: 45.05±10.9 years (males); 42.27±12.5 years (females) Nearly one-third were illiterate	Abdominal obesity: 20.2% Hypertension: 17.8% Diabetes: 9.1%
Kokane AM et al., [26]	Madhya Pradesh (2020) 5,680 persons	Mean age: 40.4 years Mean years of education 4.6 years	Overweight or obese: 18.7% Hypertension: 22.3% Diabetes: 6.8%
Bhagyalaxmi A et al., [27]	Gujarat (2013) 1,684 rural people	Mean age: 37.5±1.36 years 47.3% females 31.1% illiterate	Central obesity: 14.4% Hypertension 15.4%
Swaminathan K et al., [28]	Tamil Nadu (2017) 865 rural inhabitants	Mean age: 48.2±13.7 years 52% females	Obesity: 31.6% Hypertension 37.8 % Diabetes: 16.2%
Sarma PS et al., [29]	14 districts of Kerala (rural and urban) (2019) 12,012 participants	Mean age: 42.5±14.8 years 63% females 24.28% educated upto primary school	Obesity: 8.4% Hypertension: 29.8% Diabetes: 19%
Aboobakur M et al., [30]	Male, Maldives (2010) 2,028 individuals	Mean age: 42.0±10.5 years 1094 females 37.7% illiterate	Hypertension 41.4%
Pelzom D et al., [31]	Bhutan (2017) 2,822 Bhutanese	Age Range: 18-65 years 62 % females 63 % illiterate	Overweight: 33% Hypertension: 36%
Aryal KK et al., [32]	Nepal (2015) 4,143 adults	Age Range: 15-69 years 68% females 45 % illiterate	Overweight and obesity: 21% Hypertension: 26% Diabetes: 4%

[Table/Fig-6]: Prevalence of non communicable diseases [12,25-32].

and in Maldives study [27,28,30]. The prevalence of obesity in the current study was found to be 35.6% which was higher than others studies, but comparable to the study by Pelzom D et al., from Bhutan [12,25,26,29,31,32]. Prevalence of diabetes (12.5%) was also higher than that reported by Bhattacharjee S et al., and Kokane AM et al., and Aryal KK et al., [12,26,32]. While Sarma PS et al., reported a slightly higher prevalence (19%) than the current study [29].

A comparison of prevalence of risk factors for NCD has been shown in [Table/Fig-7] [25,26,29]. Every participant in the current survey possessed atleast one risk factor for NCD which was contrary to the discovery by Sarma PS et al., in Kerala where they had reported more than 15% participants to be risk-free [29]. This difference might be attributed to a higher literacy rate in Kerela as compared to West Bengal [33]. The most prevalent risk factor among participants in some surveys was having a diet deficient in fruits and vegetables which corroborates to the present study findings [25,26,30]. Other

Study	Place, period and sample size	Prevalence of risk factors*
Present study	Muchisa, West Bengal (2021) 160 rural inhabitants	Diet deficient in fruits and vegetables: 100% Insufficient physical activity: 88.1% Tobacco use (current): 23.8% Alcohol use: 15.6%
Sarma PS et al., [29]	14 districts of Kerala (rural and urban) (2019) 12012 participants	Tobacco use: 8.1% Alcohol use: 8.7% Physical inactivity: 21.7%
Kokane AM et al., [26]	Madhya Pradesh (2020) 5,680 persons	Tobacco: 34.2% Alcohol: 4.5% Insufficient physical activity: 19.6% Less than 5 servings of fruits and vegetables: 98.5%
Bhar D et al., [25]	Siliguri, West Bengal (2019) 172 tribal people	Inadequate fruits and vegetables: 96.5%

[Table/Fig-7]: Prevalence of risk factors for non communicable diseases [25,26,29].
*The modifiable risk factors have been compared

Study	Place, period and sample size	Socio-demographic characteristics	Determinants of NCD	Prevention of NCD	Complications of NCD
Present Study	Muchisa, Budge-Budge II block, West Bengal (2021) 14 participants	Focused Group Discussions (FGD) 1: 36-70 years; 2 males and 4 females FGD 2: 25-65 years; 1 male and 7 females	Did not know	Dietary modification Medications Regular monitoring of blood pressure.	"Head reeling" "Palpitations" "Stroke"
Idriss A et al., [35]	Freetown and Makeni, Sierra Leone (2020) 116 participants	Local leaders and community members	"too much sugar and carbo-hydrate" "too much salt in diet"	"Health seeking practices" Prayers	"Stroke" "Leg ulcers"
Al-Shoaibi AAA et al., [36]	Slum community in Dhaka (2018) 13 informants	Age range: 17-67 years	Alcohol "too much salt and oily foods"	Medicines Pouring "cold water" on the head Morning walk	

[Table/Fig-8]: Awareness regarding NCD control measures [35,36].

behavioral risk factors like alcohol intake and insufficient physical activity were more frequent in the present study as compared to other studies [26,29]. The percentage of smokers and alcohol users in this research were 28.1% and 15.6%, respectively, which was about half the prevalence of smokers (69.8%) and alcohol users (40.7%) compared to the study by Bhar et al., [25]. Community-based interventions for screening the risk factors, behavioral change communication and awareness generation could help in curbing the disease burden.

As age was observed to influence NCD, establishment of a "Geriatric Clinic" at the nearby health centre could assist in management of NCDs in the elderly age group. Peer et al., stated an association between alcohol intake and presence of NCD which was not observed in the current study probably due to a lesser frequency of alcohol users in the settings [34].

As evident from [Table/Fig-8] [35,36], while dietary modifications, medications and BP monitoring were suggested preventive methods in the present study, Idriss A et al., that health seeking practices and prayers were regarded [35]. Al-Shoaibi AAA et al., from Dhaka, like the present study, reported that modulation of diet and regular medicines were protective. Notably, participants in the present survey as well as in Dhaka study knew that addiction could be detrimental to health, still they could not quit it due to lack of support from acquaintances. Most subjects in the present study as well as in the Dhaka study refrained from regular blood pressure monitoring due to the cost involved [36].

Limitation(s)

Like many studies, this survey also had certain limitations. Firstly, systematic random sampling scheme employed for selection of participants may lead to inclusion of more number of females in the study. Besides, the population was not screened for chronic diseases like diabetes which is a prevalent cause of morbidity.

CONCLUSION(S)

The risk factors of NCDs were highly prevalent among the study population. Inadequate fruit and vegetable intake was the most prevalent risk factor in the current study. Advancing age, female gender and lower level of education were some of the factors triggering onset of NCD. The participants were unaware about the measures to prevent and effectively control chronic diseases. Most of the participants were ignorant about the role of factors other than medications in prevention and control of NCDs. The focused group participants had some knowledge about the complications which could be associated with hypertension. The participants had longing for better communication with the health professionals to help them understand the disease better. This study paves the way for future interventional studies aiming at improvement in prevention of chronic diseases.

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