

Knowledge of Cardiovascular Diseases and its Risk Factors in Letang Municipality of Eastern Nepal: A Cross-Sectional Study

Roshan Niraula¹, Vitasta Muskan¹, Prajjwal Pyakurel²

Submitted 6 May 2025

Accepted 1 June 2026

Published 15 July 2026



Vitasta Muskan

drvitastamuskan7@gmail.com



<https://orcid.org/0000-0002-2769-2276>

¹ Bachelor of Medicine, Bachelor of Surgery (MBBS), B.P. Koirala Institute of Health Sciences, Dharan, Nepal

² Postdoctoral Researcher, Massachusetts General Hospital, Boston, United States

Citation

"Niraula R, Muskan V, Pyakurel P. Knowledge of Cardiovascular Diseases and its Risk Factors in Letang Municipality of Eastern Nepal: A Cross-Sectional Study. JBPkiHS. 2025;8(2):16-24."



<https://doi.org/jbpkihs.v8i2.77410>



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Abstract

Background: Cardiovascular diseases are one of the major causes of worldwide mortality including Southeast Asia. Current efforts to improve cardiovascular health in Nepal mainly focus on awareness campaigns, with limited attention to actual health literacy. This study aims to assess cardiovascular disease knowledge among adults (≥18 years) in Letang Municipality, Morang, Nepal.

Method: This was a cross-sectional, community-based study, where we recruited 281 participants from December 8 to December 19, 2019, from four wards of Letang municipality. A semi-structured questionnaire regarding the knowledge was administered via face-face interview and anthropometric, blood pressure measurement was done to assess the risk of the participant with cardiovascular diseases. The knowledge was then assessed and compared between different age groups.

Results: The knowledge of cardiovascular disease was more in the 30–60 years of age group with adequate knowledge in 18% and fair knowledge in 36.4%. Those who are under the age group of 30 years had poor knowledge (poor knowledge in 46.9%, fair knowledge in 33%, and adequate knowledge in 10%) than that of age group 30–60 years. These differences were statistically significant ($p = 0.022$).

Conclusion: There was a lack of adequate knowledge about cardiovascular diseases among the people of the Letang municipality.

Keywords: Cardiovascular diseases; Letang Municipality; Public Health Knowledge; Risk factors

Declarations

Ethics approval and consent to participate: This study involved the participation of human subjects and the authors ensure that the methods described have been carried out following The Code of Ethics of the World Medical Association and informed consent has been obtained from participants prior to the enrollment.

Consent for publication: Informed consent was obtained from each participant in written before interviewing the participant. Any personal data of the participants have not been included in the manuscript.

Availability of data and materials: The full data set supporting this research is available upon request by the readers to the primary author (Roshan Niraula) iamroshn@gmail.com.

Competing interest: The authors have no conflicts of interest to

declare.

Funding: This study was a part of our MBBS curriculum.

Authors' contributions: All the authors were involved in conceptualization, literature search, designing of the study, data collection and analysis. RN drafted the first manuscript. PP did a critical review of manuscript for intellectual contribution and final approval of the version to be published. VM edited and proceeded with the submission of the final manuscript.

Acknowledgement: We would like to thank our team of Abhishek Das, Anil Acharya, Bibek Sharma, Deepa Chaudhary and Sunil Thatal for helping us for literature review, data collection and analysis. A special thankyou to Dr. Sandeepa Karki, for assistance at all times during the study.

BACKGROUND

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels. CVDs can have devastating physiologic consequences on human health [1]. CVDs (including congenital abnormalities, ischemic heart disease, hypertensive heart disease, diseases of the cardiac valves, and primary myocardial disorders) are one of the major causes of worldwide mortality with an estimated 17.9 million deaths each year globally [2]. Among the total deaths, Southeast Asians alone account for 8.5 million deaths per year [2]. Deaths due to CVDs are increasing rapidly in low- and middle-income countries, and Nepal is no exception [3–5]. In Nepal, it is estimated that 5.6% of people living in the mountains, 1.5% in the hills, and 5% in the terai region suffer from CVDs [1]. The Non-Communicable Disease and Injuries (NCDI) Poverty Commission reported the prevalence of CVD to be 17% among all non-communicable diseases (NCDs).

According to the Annual Health Report (075–076) by the Ministry of Health and Population, Government of Nepal, deaths due to NCDs have increased from 60% in 2014 to 66% in 2018 [6]. Among the CVDs, ischemic heart diseases and stroke were among the top two causes of years of life lost due to premature mortality [5]. Ischemic heart diseases alone account for 7.4 million deaths, whereas stroke accounts for 6.7 million deaths every year [5]. A study conducted by Shrestha et al. (2020) among residents of Pakhribas Municipality in Eastern Nepal suggested a lack of adequate knowledge regarding CVDs [7]. In the study, only 51.5% of the participants realized that a family history of CVDs increases the risk of CVDs, and 46% didn't know that coronary heart disease could be prevented [7]. Although the government has introduced the Package of Essential Non-Communicable Diseases (PEN) to screen, diagnose, treat, and refer various NCDs, a major shift in NCD prevention is still lacking [8].

Current attempts to improve cardiovascular health knowledge and behavior in Nepal focus mainly on awareness campaigns but pay little attention to the population's actual health literacy and knowledge [6]. Lack of knowledge regarding health and its services is contributing to an increase in deaths due to CVDs. It is therefore important to assess knowledge regarding the major risk factors of CVDs to develop context-specific intervention measures. This study aimed to evaluate the knowledge of cardiovascular diseases and their risk factors among people of Letang Municipality. The target population of this study includes all adult residents of Letang Municipality aged 18 years and above.

METHODS

This was a community-based, cross-sectional study conducted in Letang municipality and urban core of the Morang district located in Koshi Province in Eastern Nepal. It has an area of 119 square kilometers and is situated at the northern edge of the Terai plain below the hills. The municipality has a population of 18,552 people. The study population included people aged ≥ 18 years living in Letang for more than one year and those who gave consent. The study was conducted from December 8 to December 19, 2019 after obtaining ethical approval from the Departmental Review Unit (DRU/EPID: 05/2019).

Using the lottery method, wards six, seven, eight, and nine were selected among the total nine wards in Letang Municipality. The wards had populations of 2827, 3149, 3097, and 3538, respectively. Accordingly, 63, 70, 69, and 79 participants were selected from each ward, respectively. The number of participants selected from each ward was determined using population proportionate sampling to ensure that the sample reflected the population size of each ward. This method was chosen to minimize sampling bias and to provide a representative estimate of CVD knowledge in the municipality. The first household was selected using the "spin the bottle" method, and the remaining households were selected conveniently from each ward using the population proportionate formula.

As per the previous literature review, in a study conducted by Awad et al., the prevalence of public knowledge of cardiovascular diseases and their risk factors was found to be 40% [9]. Considering a 95% confidence interval (CI), 80% power, and a 5% margin of error, the sample size was calculated using the one-proportion formula: $N = 4pq/l^2$. The required sample size was calculated to be 256, and after adding a 10% non-response rate, the total sample size was 281.

A semi-structured questionnaire was administered via face-to-face interview. The study questionnaire was adapted from validated surveys that were previously used in Australia, Pakistan, Jordan, and South Africa [10–13]. The author from the previous study by Mukattash et al. [10] was emailed for the study questionnaire, and consent was taken to use the questionnaire for data collection. The questionnaire was first sent to subject experts and reliability and validity were reviewed by three faculty experts from the Department of Community Medicine, BPKIHS. It was translated into Nepali by bilingual experts and administered to the participants. Although the translated version was not formally pretested, the data collectors confirmed during interviews that the questions were understood by participants, and clarification was provided when necessary. Participants were also enquired

about their past medical history, and the documents available along with their medications were reviewed by the interviewer to fill out the questionnaire.

The height of the participants was measured using a stadiometer as per the WHO STEPS Survey protocol [14]. Participants were asked to remove their shoes and stand straight, with their occiput, shoulder blades, buttocks, and heels touching the rigid perpendicular board behind. The height was measured and recorded to the nearest centimeter. Weight was measured with a regularly calibrated digital scale placed on a flat surface, and participants were requested to step on barefooted without holding onto anything [14]. Blood pressure was measured using a calibrated aneroid sphygmomanometer with appropriately sized cuffs. Before taking the measurements, participants were asked to sit and rest for 15 minutes with their legs uncrossed. Three readings of systolic and diastolic blood pressure were obtained, allowing participants to rest for three minutes between each reading. The sphygmomanometer cuff was placed on the left arm while the participant rested their forearm on a table with the palm facing upward [14].

Knowledge of CVD was analyzed against socio-demographic (age, sex, marital status, education, employment), clinical (HTN, DM, CHD, BMI), and behavioral factors (smoking, physical activity, stress, family history of CVD). Data were entered in Microsoft Excel 2007 and analyzed using Statistical Package for Social Science Version 17.0. Descriptive statistics in the form of percentage and frequency were used to describe socio-demographic characteristics, behavioral characteristics, and personal opinion, body mass index (BMI), and hypertension (HTN) of participants. For inferential statistics, bivariate analysis was done using the chi-square test, and a p-value less than 0.05 was considered statistically significant.

For the purpose of this study, adults were defined as participants aged 18–59 years, and senior adults as those aged ≥ 60 years. Hypertension (HTN) was classified according to Joint National Committee-8 guidelines (JNC 8) (age >18 years) as [15]:

- Normal Blood Pressure: Systolic Blood Pressure (SBP) ≤ 120 mm Hg and Diastolic Blood Pressure (DBP) ≤ 80 mm Hg
- Pre-HTN: SBP 120–139 mm Hg and DBP 80–89 mm Hg
- Stage I HTN: SBP 140–159 mm Hg and DBP 90–99 mm Hg
- Stage II HTN: SBP ≥ 160 mm Hg and DBP ≥ 100 mm Hg

Similarly, the Body Mass Index (BMI) was categorized

according to WHO Asian Criteria [16] as:

- Underweight: <18.5 kg/m²
- Normal: 18.5–22.9 kg/m²
- Overweight: 23–24.9 kg/m²
- Obese I: 25–29.9 kg/m²
- Obese II: ≥ 30 kg/m²

As per previous literature, the level of knowledge, attitude, and practice regarding cardiovascular diseases (CVDs) among respondents was classified based on the number of correct responses [9]. Participants who could identify two diseases were considered to have poor knowledge, those identifying three to four diseases were categorized as having fair knowledge, and those identifying five to six diseases were regarded as having adequate knowledge. Similarly, for knowledge of ischemic heart disease and stroke, participants who identified two symptoms were classified as having poor knowledge, those identifying three to four symptoms as having fair knowledge, and those identifying five symptoms as having adequate knowledge.

For ischemic heart disease knowledge, participants were asked about symptoms such as chest pain, pain in jaw/neck, weakness or fainting, arm/shoulder pain, and shortness of breath. For stroke, items included sudden numbness or weakness, dizziness or loss of balance, difficulty speaking, sudden visual disturbances, and severe headache.

RESULTS

Our study was conducted in the Letang Municipality, which is a part of Morang district. The literacy rate of the Morang district was found to be 57%. Agriculture was the main source of income for the people living in this area. In our study, the majorities of participants were in the age group of 20–29 years and had attained less than high school education (82.9%). There was a preponderance of female participants (64.7%). About 82.5% were married. Smoking history showed 14% are current smokers. Around 3/4th of the participants performed physical activity zero to two times/week. Homemaker was the most common occupation (39%) (Table 1).

Among the participants, 8.9% believed that they have excellent personal health. About 62.7% categorized their weight as normal. Regarding smoking history, 14% were current smokers and 8.2% had smoked in the past. Among the people who smoked, 6.8% stopped smoking in more than 12 months. It was found that 69.5% of the participants performed physical activity zero to two times/week. When inquired about stress 8.2% categorized their life as stressful. Likewise, the majority of participants (82.9%) did not have any family members diagnosed with CVD (Table 2).

Table 1: Sociodemographic characteristics of the participants in Letang Municipality (n= 292)

Character-istics	Category	Frequency	Percentage (%)
Age in years	20-29	67	22.9
	30-39	55	18.8
	40-49	58	19.9
	50-59	41	14
	≥60	57	19.5
Gender	Male	103	35.3
	Female	189	64.7
Marital Status	Single	37	12.7
	Married	241	82.5
	Divorced	1	3
	Widowed	13	4.5
Education	Less than high school	242	82.9
	High School	35	12
	Bachelor	14	4.8
	Masters	1	0.3
Employment	Clerical	6	2.1
	Retired	11	3.8
	Student	12	4.1
	Professional	20	6.8
	Business	25	8.6
	Unemployed	31	10.6
	Self-employed	73	25
	Homemaker	114	39

Among the participants, 18.2% were diagnosed with hypertension (HTN) among which 14.4 % were under medication. Similarly, 11% were diagnosed with diabetes (DM) with 7.9% under medications. Additionally, 5.5% of the participants reported having high fasting blood glucose. About 5.8% had high blood cholesterol levels among which 3.1% were taking medications. Likewise, 3.1% were diagnosed with coronary heart disease (CHD) among which 1.4% was under medications (**Table 3**).

As per the BMI classification, 15.8%, 34.2%, and 13% were overweight, obese I and obese II respectively. Classifying HTN as per JNC-8 criteria after measurement, more than 1/3rd of the participants (39%) was hypertensive. The mean systolic and diastolic blood pressures were 125.06 mmHg and 80.25 mmHg, respectively (**Table 4**).

Analysis showed a significant association between CVD knowledge and education ($p = 0.001$). Participants, those who were educated less than high school, were found to have poor knowledge (53.7%) and those with high school

Table 2: Behavioral characteristics of the participants in Letang Municipality (n = 292)

Character-istics	Category	Frequency	Percentage (%)
Participants personal opinions about their health	Excellent	26	8.9
	Very good	39	13.4
	Good	132	45.2
	Fair	61	20.9
	Poor	34	11.6
Participants personal opinions about their weight	Underweight	33	11.3
	Normal	183	62.7
	Overweight	73	25
Smoking history	Obese	3	1
	Never smoked	225	77.1
	Currently smoker	41	14
	Previously smoked	24	8.2
Duration of cessation of smoking on past smoker	Less than 6 months ago	2	0.7
	In the last 6-12 months ago	2	0.7
	More than 12 months	20	6.8
Physical activity per week	0-2 times	203	69.5
	3-5 times	45	15.4
	5 times or more	44	15.1
Personal opinion regarding their level of stress	Very stressful	1	0.3
	Stressful	24	8.2
	Relatively stressful	121	41.4
	Free from stress	146	50
Family Members diagnosed with CVD	No	242	82.9
	Yes	50	17.1

education have fair knowledge (46%). Other parameters were found to be statistically insignificant (**Table 5**).

Participants were asked to identify six different types of CVDs like coronary heart disease, cerebrovascular disease, peripheral artery disease, congenital heart disease, rheumatic heart disease, deep vein thrombosis and pulmonary embolism. There was a significant association of knowledge of ischemic heart disease with age of the participants ($p = 0.02$). The majority of the participants in the age group >60 years had poor knowledge (56.1%) and those in the age group (30 to 60) years had adequate knowledge (33.1%) respectively. There were no significant

Table 3: Self-reported clinical conditions of the participants in Letang Municipality (n = 292)

Characteristics	Category	Frequency	Percentage (%)
HTN	No	239	81.8
	Yes	53	18.2
HTN medication	No	11	3.8
	Yes	42	14.4
Recent BP	Normal	195	66.8
	High	42	14.4
	I do not know	55	18.8
DM	No	260	89
	Yes	32	11
DM Medication	No	9	3.1
	Yes	23	7.9
Recent Fasting Blood Glucose Level	Normal	107	36.6
	High	16	5.5
	I do not know	169	57.9
High blood cholesterol	No	275	94.2
	Yes	17	5.8
Medication for high blood cholesterol	No	8	2.7
	Yes	9	3.1
Recent blood cholesterol levels	Normal	45	15.4
	High	8	2.7
	I do not know	239	81.8
CHD	No	283	96.9
	Yes	9	3.1
Medication for CHD	No	5	1.7
	Yes	4	1.4

associations of other variables with knowledge of CVD (Table 6).

Patients were asked to identify five different symptoms of ischemic heart diseases like pain or discomfort in jaw, neck or back; feeling weak, light headed or faint; chest pain or discomfort; pain or discomfort in arms or shoulder; difficulty in breathing or shortness of breath. There was no significant association of knowledge of stroke with various sociodemographic, clinical, and anthropometric parameters. Although those in high school or more than high school had higher knowledge than those in less than high school association was found to be statistically insignificant ($p = 0.10$) (Table 7).

Table 4: Distribution of BMI and hypertension (measured) among participants in Letang Municipality (n = 292)

Characteristics	Category	Frequency	Percentage (%)
BMI	Underweight	20	6.8
	Normal	88	30.1
	Overweight	46	15.8
	Obese I	100	34.2
Obese II		38	13
HTN	Normal	178	61
	HTN	114	39
Mean BP	Systolic BP	Diastolic BP	
	125.065	80.253	

DISCUSSION

CVDs, are the disorders of the heart and blood vessels, which can have devastating physiologic consequences on human health and are one of the major causes of worldwide mortality.^{1,2} Deaths due to CVDs are increasing rapidly in low-middle-income countries like Nepal [3-5]. Among the various non-communicable diseases (NCD), ischemic heart disease and stroke have found to be leading cause of mortality [5]. Knowledge of CVDs was assessed by asking the participants to identify six different diseases as CVD or not. Our analysis showed a significant association between CVD knowledge and education. For the classification of knowledge regarding diseases, if the participant could identify two diseases, they were classified as having poor knowledge. Similarly, participant who could identify, 3-4 diseases were classified as having fair knowledge and participants identifying 5-6 diseases as having adequate knowledge.

For the classification of knowledge regarding ischemic heart diseases and stroke, if the participant could identify two symptoms, they were classified as having poor knowledge. Similarly, participant who could identify, 3-4 symptoms were classified as having fair knowledge and participants identifying 5 symptoms as having adequate knowledge. There was a significant association of knowledge of ischemic heart diseases with the age of the participants. Knowledge about CVDs was found to be higher in people aged 30-60 years, which is consistent with the study conducted by Mirza et al., Muthukrishnan et al., and Vaidya et al. in Bangladesh, India, and Nepal respectively [17-19]. In our study, age was found to be significantly associated with knowledge about ischemic heart diseases. The higher proportion was seen in the 30-60 years' age group which is consistent with the study conducted by Mirza et al, Muthukrishnan et al., and Vaidya

Table 5: Association of CVD knowledge with different socio-demographic, clinical, and anthropometric parameters among participants in Letang Municipality (n = 292)

Characteristics	Categories	Knowledge about CVDs			P-value
		Poor n (%)	Fair n (%)	Adequate n (%)	
Age (years)	<30	38 (46.9)	33 (40.7)	10 (12.3)	0.068
	30-60	70 (45.5)	56 (36.4)	28 (18.2)	
	>60	36 (63.2)	18 (31.6)	3 (5.3)	
Gender	Male	43 (41.7)	43 (41.7)	17 (16.5)	0.160
	Female	101 (53.4)	64 (33.9)	24 (12.7)	
Marital Status	Unmarried	25 (49)	16 (31.4)	10 (19.6)	0.400
	Married	119 (49.4)	91 (37.8)	31 (12.9)	
Education Level	Less than High School	130 (53.7)	84 (34.7)	28 (11.6)	0.001*
	High School or more than High School	14 (28)	23 (46)	13 (26)	
Employment	Unemployed	88 (56.4)	51 (32.7)	17 (10.9)	0.096
	Employed	52 (41.9)	51 (41.1)	21 (16.9)	
HTN	No HTN	91 (51.1)	64 (36)	23 (12.9)	0.681
	HTN	53 (46.5)	43 (37.7)	18 (15.8)	
BMI	Underweight	13 (65)	5 (25)	2 (10)	0.265
	Normal	34 (38.6)	40 (45.5)	14 (15.9)	
	Overweight	25 (54.3)	17 (37)	4 (8.7)	
	Obese I	49 (49)	34 (34)	17 (17)	
	Obese II	23 (60.5)	11 (28.9)	4 (10.5)	

Table 6: Association of CVD knowledge with different socio-demographic, clinical, and anthropometric parameters among participants in Letang Municipality (n = 292)

Characteristics	Categories	Knowledge about Ischemic Heart Diseases			P-Value
		Poor n (%)	Fair n (%)	Adequate n (%)	
Age	<30	28 (34.6)	33 (40.7)	20 (24.7)	0.022*
	30-60	60 (39)	43 (27.9)	51 (33.1)	
	>60	32 (56.1)	11 (19.3)	14 (24.6)	
Gender	Male	37 (35.9)	31 (30.1)	35 (34)	0.311
	Female	83 (43.9)	56 (29.6)	50 (26.5)	
Marital Status	Unmarried	18 (35.3)	15 (29.4)	18 (35.3)	0.517
	Married	102 (42.3)	72 (29.9)	67 (27.8)	
Education Level	Less than High School	107 (44.2)	67 (27.7)	68 (28.1)	0.051
	More than High School	13 (26)	20 (40)	17 (34)	
Employment	Unemployed	75 (48.1)	44 (28.2)	37 (23.7)	0.106
	Employed	41 (33.1)	39 (31.5)	44 (35.5)	
	Student	4 (33.3)	4 (33.3)	4 (33.3)	
HTN	No HTN	73 (41)	57 (32)	48 (27)	0.477
	HTN	47 (41.2)	30 (26.3)	37 (32.5)	
BMI	Underweight	12 (60)	8 (30)	2 (10)	0.567
	Normal	33 (37.5)	27 (30.7)	28 (31.8)	
	Overweight	22 (47.8)	11 (23.9)	13 (28.3)	
	Obese I	40 (40)	31 (31)	29 (29)	
	Obese II	13 (34.2)	12 (31.6)	13 (34.2)	

Table 7: Association of CVD knowledge with different socio-demographic, clinical, and anthropometric parameters among participants in Letang Municipality (n = 292)

Characteristics	Categories	Knowledge about Stroke			P-Value
		Poor n (%)	Fair n (%)	Adequate n (%)	
Age	<30	48 (59.3)	6 (7.4)	27 (33.3)	0.909
	30-60	85 (55.2)	15 (9.7)	54 (35.1)	
	>60	35 (61.4)	5 (8.8)	17 (29.8)	
Gender	Male	54 (52.4)	14 (13.6)	35 (34)	0.097
	Female	114 (60.3)	12 (6.3)	63 (33.3)	
Marital Status	Unmarried	28 (54.9)	6 (11.8)	17 (33.3)	0.725
	Married	140 (58.1)	20 (8.3)	81 (33.6)	
Education Level	Less than High School	146 (60.3)	20 (8.3)	76 (31.4)	0.104
	High School or more than High School	22 (44)	6 (12)	22 (44)	
Employment	Unemployed	96 (61.5)	12 (7.7)	48 (30.8)	0.366
	Employed	64 (51.6)	14 (11.3)	46 (37.1)	
	Student	8 (66.7)	0 (0)	4 (33.3)	
HTN	No HTN	109 (61.2)	15 (8.4)	54 (30.3)	0.270
	HTN	59 (51.8)	11 (9.6)	44 (38.6)	
BMI	Underweight	17 (85)	0 (0)	3 (15)	0.139
	Normal	50 (56.8)	11 (12.5)	27 (30.7)	
	Overweight	30 (65.2)	4 (8.7)	12 (26.1)	
	Obese I	51 (51)	8 (8)	41 (41)	
	Obese II	20 (52.6)	3 (7.9)	15 (39.5)	

et al. in Bangladesh, India and Nepal respectively [17-19].

In our study, the knowledge about ischemic heart diseases and the education level is almost found to be significantly associated ($p = 0.051$). This points to the direction that, education can be a potential factor for the knowledge of CVDs and prevention of its risk factors. Also, the prevalence of knowledge is comparatively less in those having less than high school education which is in contrast with the study conducted by Al Nafisi et al. and Mirza et al. in Bangladesh and Kuwait respectively [9,17]. The possible reasons may be the lack of NCD education in school and high school curriculum. Additionally, the local government in such an urbanizing municipality is less aware of the modality of NCD prevention and care although they have authority and power to change the program and policy at the local level in these areas of study. To improve knowledge about NCD in school going children, government should emphasis on revising school and high school curriculum so as to include knowledge of NCD.

A high degree of knowledge regarding CVDs was seen among people without hypertension in our study. This reflects that people are aware of the CVDs and their risk factors and are adapting to healthy lifestyles by being involved in physical activity, avoiding smoking, and

eating a balanced diet every day. This is in contrast with the studies conducted by Muthu Krishnan et al. and Mirza et al. in India and Bangladesh respectively where hypertensive had more knowledge [17,18]. This might be because people diagnosed with hypertension had one or more co-morbidities and are aware of their hypertension status.

Greater than half of the respondents were not aware of any of the stroke symptoms in our study. The most common symptoms recognized by respondents were sudden dizziness, loss of balance/coordination, sudden numbness, and weakness of the face, arms, and legs, and sudden blurring of vision in one or both eyes. These figures were higher compared to those reported in Australia, Canada, and the Gulf country [20-22]. The lack of awareness of stroke symptoms may be due to a low level of knowledge regarding these conditions and their associated risk factors. To improve knowledge about stroke we can provide health education with the help of local radio station, television channel and newspaper. Furthermore, various community based campaign can be run to provide mass education to people in the community. The population can be targeted more towards the primordial prevention. The benefits of exercise, eating a healthy diet, avoiding alcohol consumption and smoking can be explained to the

younger population. Also the target population who are already hypertensive or possess any of the risk factors of CVDs can be made aware about the causes, warning signs and symptoms of Stroke.

Nearly one-fourth of respondents identified 8-9 risk factors. The commonest identified risk factors were obesity and smoking. Hypertensive, diabetic, and obese patients were more aware of their disease condition and risk factors and were concerned about the disease consequences and were counseled by health professionals' various times during their visit to the health center, in contrast, to study conducted by Al. Nafisi et al in Kuwait showed lower CVDs knowledge among those who have its risk factors [9].

There are very few research studies conducted in Letang Municipality to assess knowledge of CVDs and their risk factors. Our study is one of them and it provides a basic reference for conducting future studies and the importance of enrolling health education related programs and campaigns in the population. Conducting this study in Letang Municipality was our strength because it represents a semi-urban, rapidly urbanizing community in Eastern Nepal where lifestyle-related risk factors are emerging. Findings from this setting can provide valuable baseline information for similar municipalities across Nepal. However, there are few limitations of our study, as biochemical parameters were not assessed; the working populations who may have more CVD risk factors were unavailable during the time of data collection which may have underestimated our assumptions. Also, as the translated Nepali questionnaire was not pretested prior to data collection, there may have been minor variations in interpretation among participants. We also acknowledge

that the convenience sampling used in this study led to selection bias.

As we are living in a developing country, it has been quite a difficult task for us to spread health education and health awareness in every part of our country. However, there are these unavoidable diseases that are one of the leading causes of mortality all over the world. So, we can organize health education programs in rural areas by mobilizing health care workers for awareness campaigns. The telecommunication services, radio programs, and newspapers can also be used for the same purpose which can increase the outreach as well as be a cost-effective alternative. This study highlights the importance of educating and making people aware of cardiovascular diseases and their risk factors, which can have long-term implications in improving not only the lifestyle of the participants but also preventing mortality. Based on our findings, health education programs targeting young adults and individuals with low educational status are urgently needed. Early community interventions focusing on lifestyle modifications such as smoking cessation, physical activity, and diet can play a crucial role in reducing CVD burden in semi-urban areas like Letang.

CONCLUSION

This study revealed that knowledge of cardiovascular diseases and their risk factors was generally poor among residents of Letang Municipality, especially among younger adults and those with lower educational attainment. Only 18.2% of participants aged 30–60 years demonstrated adequate knowledge of CVDs.

References

1. Yadav K, Wagle R. Knowledge and Attitude Regarding Major Risk Factors of Cardiovascular Diseases among 15-19 Year Old Students of Kathmandu District. *Heal Prospect*. 2018;11:7-10. <https://doi.org/10.3126/hprospect.v11i0.7422>
2. Alwan, A. Disaster Medicine and Public Health Preparedness. World Health Organization. 2007. DOI:10.1097/DMP.0b013e3180676d32.
3. Alwan A, MacLean DR. A review of non-communicable disease in low- and middle-income countries. *Int Health*. 2009;1(1):3-9. DOI: 10.1016/j.inhe.2009.02.003
4. Bovet P, Paccaud F. Cardiovascular disease and the changing face of global public health: a focus on low and middle income countries. *Public Health Rev*. 2011;33:397-415. doi:10.1007/BF03391643
5. Naghavi M, Wang H, Lozano R, Davis A, Liang X, Zhou M, et al. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2015;385(9963):117-171. doi:10.1016/S0140-6736(14)61682-2
6. Department of Health Services (DoHS). Annual report: Department of Health Services 2075/76 (2018/19). Kathmandu: Ministry of Health and Population, Government of Nepal; 2019. Available from: <https://publichealthupdate.com/department-of-health-services-dohs-annual-report-2075-76-2018-19/>
7. Shrestha M, Pyakurel P, Yadav KP, Singh S, Priyadarshini S, Rajak B, et al. Knowledge, attitude and practices regarding cardiovascular diseases among people of Pakhribas municipality of Eastern Nepal. *Nepal Heart J*. 2020;17(1):33-39. doi: 10.3126/njh.v17i1.28806
8. Package of Essential Non-communicable Diseases (PEN) [Internet]. Kathmandu: Ministry of Health and Population, Government of Nepal; [cited 2021 Jun 1]. Available from: <https://www.mohp.gov.np/eng/program/free-health-programme/pen>
9. Al-Nafisi H, Awad A. Questionnaire of public knowledge of cardiovascular disease and its risk factors in Kuwait: a cross-sectional survey. *BMC Public Health*. 2014;14:1131. doi:10.1186/1471-2458-14-1131.
10. Mukattash TL, Shara M, Jarab AS, Al-Azzam SI, Almaaytah A, Al Hamarneh YN. Public knowledge and awareness of cardiovascular disease and its risk factors: a cross-sectional study of 1000 Jordanians. *Int J Pharm Pract*. 2012;20(6):367-76. doi:10.1111/j.2042-7174.2012.00208.x
11. Li YQ, Wright SC. Risk factors for cardiovascular disease in the Ga-Rankuwa community. *Curationis*. 2007;30(4):79-87. doi:10.4102/curationis.v30i4.1120
12. Yoon SS, Heller RF, Levi C, Wiggers J, Fitzgerald PE. Knowledge of stroke risk factors, warning symptoms, and treatment among an Australian urban population. *Stroke*. 2001;32(8):1926-1930. doi:10.1161/01.STR.32.8.1926
13. Jafary FH, Aslam F, Mahmud H, Waheed A, Shakir M, Afzal A, Qayyum MA, Akram J, Khan IS, Haque IU. Cardiovascular health knowledge and behavior in patient attendants at four tertiary care hospitals in Pakistan – a cause for concern. *BMC Public Health*. 2005;5:124. doi:10.1186/1471-2458-5-124.
14. Dhimal M, Bista B, Bhattarai S, Hyder MKA, Agarwal N, Rani MJ, et al. Noncommunicable Disease Risk Factors: STEPS Survey Nepal 2019. Kathmandu: Nepal Health Research Council; 2019. Report No.: 284. Available from: https://www.who.int/docs/default-source/nepal-documents/ncds/ncd-steps-survey-2019-compressed.pdf?sfvrsn=807bc4c6_2
15. Olin BR. Hypertension: The Silent Killer: Updated JNC-8 Guideline Recommendations. 2018. Available from: https://cdn.ymaws.com/www.aparx.org/resource/resmgr/CEs/CE_Hypertension_The_Silent_K.pdf
16. Girdhar S, Sharma S, Chaudhary A, Bansal P, Satija M. An epidemiological study of overweight and obesity among women in an urban area of North India. *Indian J Community Med*. 2016;41(2):154-157. doi:10.4103/0970-0218.185348.
17. Mirza A-S, Aslam S, Perrin K, Curtis T, Stenback J, Gipson J, Alrabaa S. Knowledge, attitudes and practices among patients with coronary artery disease in Dhaka, Bangladesh. *Int J Community Med Public Health*. 2016;3(10):2740-8. doi:10.18203/2394-6040.ijcmph20163355.
18. Muthukrishnan G, Kingston C, Ravikumar A. A cross sectional study of knowledge, attitude and practice on cardiovascular disease and its risk factors among anganwadi workers of Cuddalore district. *Int J Community Med Public Health*. 2018;5(6):2406-10. doi:10.18203/2394-6040.ijcmph20182167.
19. Vaidya A, Aryal UR, Krettek A. Cardiovascular health knowledge, attitude and practice/behaviour in an urbanising community of Nepal: a population-based cross-sectional study from Jhaukhel-Duwakot Health Demographic Surveillance Site. *BMJ Open*. 2013;3(10):e003416. doi:10.1136/bmjopen-2013-003416.
20. Yoon SS, Heller RF, Levi C, Wiggers J. Knowledge and perception about stroke among an Australian urban population. *BMC Public Health*. 2001;1:14. doi:10.1186/1471-2458-1-14.
21. Choinière R, Lafontaine P, Edwards AC. Distribution of cardiovascular disease risk factors by socioeconomic status among Canadian adults. *CMAJ*. 2000;162(9 Suppl):S13-S24.
22. Kamran S, Bener AB, Deleu D, Khoja W, Jumma M, Al Shubali A, et al. The level of awareness of stroke risk factors and symptoms in the Gulf Cooperation Council countries: Gulf Cooperation Council stroke awareness study. *Neuroepidemiology*. 2008;29(3-4):235-42. doi:10.1159/000112460.