

# Hypertension Among the Elderly Population and its Associated Factors in Nepal: Analysis from Nepal Demographic and Health Survey 2022

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## ABSTRACT

**Background:** Current evidence suggests an increasing prevalence of hypertension and associated burden among the older population in Nepal. Despite being a common health problem and a strong risk factor for chronic health conditions among older adults, there is a gap in the literature regarding the prevalence of hypertension and associated factors among the older population in Nepal. Hence, this study aimed to find the prevalence and factors associated with hypertension among older adults in Nepal.

**Methods:** The 2022 Nepal Demographic and Health Survey data on older adults aged 65 years and above (n=725) was used in this study. Hypertension was operationalized as a binary variable, indicating its presence or absence. Multiple logistic regression analyses were conducted to test the association of lifestyle factors such as obesity, food insecurity, and sociodemographic factors with hypertension while accounting for complex survey design features.

**Results:** The prevalence of hypertension among older population in Nepal was 37.4%. Among the lifestyle factors, individuals with overweight [adjusted odds ratio (aOR)=2.03,  $p=0.006$ ], obesity (aOR=2.71,  $p=0.018$ ), and those who used non-iodized kitchen salt (aOR=3.38,  $p=0.016$ ) had higher odds of having hypertension. Among sociodemographic factors, greater age, and ethnic minorities such as Dalits and Terai Janajati had higher odds of having hypertension. Moreover, older adults in the richer wealth quintile (aOR=0.42,  $p=0.016$ ) had lower odds of having hypertension than those in the poorest quintile.

**Conclusions:** This study found a notable prevalence of hypertension among the older population in Nepal. Targeted hypertension screening programs for older adults should be prioritized. Similarly, hypertension awareness and healthcare access should be improved among lower-income and marginalized ethnic households such as Dalits, and Terai Janajatis by enhancing the capacity of the local governments.

**Keywords:** Blood pressure; cardiovascular disease; NDHS; prevalence.

## INTRODUCTION

Hypertension, also known as high blood pressure (BP), remains a significant global public health concern and well-established risk factor for cardiovascular and several other chronic diseases, particularly among older adults.<sup>1,2</sup> Since 1990, hypertensive populations have doubled, yet global prevalence has stayed relatively stable at 34% for males and 32% for females.<sup>3</sup> About

three-fourths of the world's hypertensive population resides in low- and middle-income countries (LMICs).<sup>4</sup> In South Asia, the pooled prevalence of hypertension was reported to be 27%, with Nepal having the highest at 33.8% among adult population.<sup>5</sup>

With Nepal's population gradually aging, the burden of hypertension and related complications is expected to rise.<sup>2</sup> Despite extensive research on hypertension,

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large-scale studies focusing on its burden and underlying factors among older adults in Nepal are scant. Therefore, this study aimed to advance this understanding by i.) calculating the prevalence of hypertension among the elder population, and ii.) identifying the associated socio-demographic and lifestyle factors.

## METHODS

We analyzed Nepal Demographic and Health Survey (NDHS) 2022 dataset for preparing this article. The NDHS is a nationally representative survey conducted every five years that employs multi-stage and probability proportional to size sampling techniques to collect data. In 2022, clusters were initially selected from the strata defined by urban and rural areas in each province, and then 30 households were randomly selected from each cluster.<sup>6</sup> A computer-assisted personal interviewing system was used for the data collection through face-to-face interview.

Hypertension is a binary (present/absent) variable in this study, which was derived based on the BP readings (systolic and diastolic) that were recorded in the NDHS. In the original survey, BP was measured using automatic upper-arm BP monitors with different cuff sizes tailored to different arm circumstances. Three different monitor models were used, each equipped with a specific cuff size: small (UA-767PVS), medium (UA-767F/FAC), and extra-large (UA-789AC). Measurements were taken in three sets, each reading spaced at least 5 minutes apart.<sup>6</sup> The average of the second and third readings was used to classify hypertension following the World Health Organization's (WHO) recommendation, where systolic pressure greater than 140 mmHg or diastolic pressure greater than 90 mmHg indicated hypertensive.<sup>6,7</sup>

Age was measured in completed years. Sex was either "male" or "female." Ethnicity was categorized into: "Brahman/Chhetri," "Tarai/Madhesi Other Castes," "Dalits," "Newar," "Hill Janajati," "Tarai Janajati," and "Muslim".<sup>8</sup> Education was categorized into "no formal education," "secondary level education (up to grade 10)," and "higher secondary and above education." Partnership or marital status was dichotomized into "partnered/married" and "not in partnership." The survey documented the participants' area of residence based on rurality, the province they lived in, and the ecological zone corresponding to their current residential location. Regarding the wealth index, NDHS employed principal component analysis using selected household items to compute it. The population was then divided into five quintiles based on the calculated score,

representing level of household wealth from poorest to richest.<sup>6</sup>

Nutritional status was measured by body mass index (BMI) and BMI data was categorized using the Asian adult's cut-offs into four groups (obesity: BMI  $\geq 27.5$  kg/m<sup>2</sup>, overweight: BMI 23.0-27.5 kg/m<sup>2</sup>, normal body weight: BMI 18.5-23.0 kg/m<sup>2</sup>, and underweight: <18.5 kg/m<sup>2</sup>).<sup>9</sup> Household-level food insecurity was assessed by asking eight questions from the Food Insecurity Experience Scale, determining if they had difficulties accessing food in the last year.<sup>10</sup> Using the Rasch model, the DHS team categorized food insecurity into severe, moderate, and no insecurity.<sup>6,10</sup> Using this information, for this study, food insecurity was dichotomized as, "insecure" and "secure." The frequency of household members smoking inside was recorded as "never," "daily," and "weekly, monthly, or less." The status of iodized salt use was tested and recorded as "yes" for the presence or "no" for the absence of iodine in the kitchen salt.

The 2022 NDHS dataset was downloaded as a SAS data file, and all data cleaning, recording, and analyses were performed using SAS 9.4 (SAS Institute Inc, 2013. Cary, NC). This research focused on older adults aged 65 and above, with data collected from 1,167 older participants by NDHS. However, due to the use of complete case analysis, the final sample size analyzed (analytical sample size) in this study was reduced to 725 individuals. Descriptive statistics were calculated using frequencies and percentages for categorical variables and mean and standard error for numeric variables. Bivariate tests were performed using the Rao-Scott Chi-square test and independent samples t-test. Multiple logistic regression was used to predict the odds of association of independent variables with hypertension. Each variable reported a variance inflation factor below 1.8, showing no multicollinearity issues. Thus, the final regression model included all variables. Variables such as smoking, exercising, tea/coffee consumption, and food intake within 30 minutes before the BP measurement cause an acute increase in BP. Hence, the regression model was controlled for these variables, and results for these variables were not reported. All regression models were weighted and accounted for the complex survey design features such as clustering and stratification.

Regarding ethical considerations, researchers submitted a brief proposal to the Demographic and Health Survey (DHS) program, seeking permission to utilize the 2022 NDHS dataset to study hypertension among older adults. Permission to use the data was subsequently granted.

Further, the DHS survey team obtained ethical clearance from the Nepal Health Research Council. The 2022 NDHS ensured ethical compliance by clearly explaining the study's purpose and procedures to participants and obtaining their consent before interviews. Confidentiality and anonymity were rigorously maintained, with only de-identified data accessed from the website. Additionally, participants diagnosed with hypertension were referred to local health facilities for further care.

## RESULTS

The mean age of the participants was 72 years [standard error (SE)=0.27]. About 54% were female and more than 34% of the participants were from Brahmin/Chhetri ethnic groups (Table 1a). Nearly three-fourths (74%) of the participants had no formal education. Almost 57% of the participants were married or in partnership

status. The distribution of participants among five different wealth indexes ranged between 16-26%, with the highest share (26%) representing the richest group. Three provinces, namely Koshi, Madhesh, and Bagmati, had more than 20% of participants each. More than half of the participants (54%) were from the Tarai region and 64% of older Nepalis resided in urban areas.

In the bivariate test (Table 1a), findings indicate that greater age was associated with the presence of hypertension ( $t(452) = -1.97, p=0.049$ ). Moreover, urban-rural differences in hypertension prevalence were statistically significant ( $\chi^2(1) = 4.47, p= 0.049$ ). Likewise, ethnicity ( $\chi^2(6) = 16.43, p= 0.068$ ) and province-based residence ( $\chi^2(6) = 13.90, p= 0.050$ ) were approaching significance and older adults residing in Karnali had the lowest prevalence of hypertension (Table 1b).

**Table 1a. Socio-demographic characteristics of respondents.**

Characteristics	Descriptive results		Bivariate results				$\chi^2 /$ t-statistics	p-value
	Frequency or mean	%	Hypertension: NO (62.6%)		Hypertension: YES (37.4%)			
			Frequency or mean	%	Frequency or mean	%		
<b>Age</b>	72.3 (SE=0.3)		71.9 (SE=0.3)		73.1 (SE=0.5)		-1.97*	0.049
<b>Sex</b>							2.82	0.145
Female	390	53.8	243	59.8	147	40.2		
Male	335	46.2	224	65.9	111	34.1		
<b>Ethnicity</b>							16.43	0.068
Brahman/ Chhetri	272	34.2	186	66.9	86	33.1		
Tarai/Madhesh Other Castes	91	13.9	59	66.2	32	33.8		
Dalits	103	13.9	60	56.7	43	43.3		
Newar	31	6.9	20	58.1	11	41.9		
Hill Janajati	153	19.4	102	63.1	51	36.9		
Tarai Janajati	56	8.2	24	44.2	32	55.8		
Muslim	19	3.5	16	80.4	3	19.6		
<b>Education</b>							1.22	0.735
No formal education	569	74.4	367	62.2	202	37.8		
Upto class 10 (grade 1-10)	140	22.1	91	65.4	49	34.6		
Higher secondary and above (grade 11 and higher)	16	3.5	9	54.9	7	45.1		
<b>Partnership status</b>							3.66	0.097
Partnered/ Married	402	56.8	273	65.6	129	34.4		
Not in partnership	323	43.2	194	58.7	129	41.3		

SE=Standard Error;  $\chi^2$ = Chi-square; \* t-test

**Table 1b. Socio-demographic characteristics of respondents.**

Characteristics	Descriptive results		Bivariate results				x <sup>2</sup> / t-statistics	p-value
			Hypertension: NO (62.6%)		Hypertension: YES (37.4%)			
	Frequency or mean	%	Frequency	%	Frequency	%		
<b>Wealth Index</b>							7.19	0.273
Poorest	192	17.3	124	59.7	68	40.3		
Poorer	161	20.7	106	64.5	55	35.5		
Middle	148	19.3	90	61.3	58	38.7		
Richer	102	16.4	73	72.3	29	27.7		
Richest	122	26.3	74	58.1	48	41.9		
<b>Province</b>							13.90	0.050
Koshi	129	20.5	75	53.9	54	46.1		
Madhesh	135	21.4	91	67.9	44	32.1		
Bagmati	122	23.5	78	61.2	44	38.8		
Gandaki	72	7.9	52	70.9	20	29.1		
Lumbini	84	13.6	57	67.7	27	32.3		
Karnali	71	4.3	52	74.1	19	25.9		
Sudurpaschim	112	9.0	62	53.0	50	47.0		
<b>Ecological region</b>							0.59	0.837
Tarai	329	53.9	202	61.4	127	38.6		
Hill	340	40.9	224	63.9	116	36.1		
Mountain	56	5.2	41	65.3	15	34.7		
<b>Urban/Rural location</b>							4.47	0.049
Rural	374	36.0	258	67.7	116	32.3		
Urban	351	64.0	209	59.8	142	40.2		

x<sup>2</sup>= Chi-square

More than 31% of the participants were overweight and obese (Table 2). Seven percent of the participants experienced food insecurity in the past 12 months preceding the survey. Nearly 98% of the household's kitchens had iodine in their salt. About 51% of obese and 44% of overweight participants were hypertensive and the proportion was statistically higher than participants with normal body weight ( $x^2(3) = 12.81, p = 0.036$ ). Of those whose household members smoked daily within the house, nearly 39% had hypertension. Among people with no iodine in their kitchen salt, 58% had hypertension and the bivariate test was approaching significance ( $x^2(1) = 3.35, p = 0.085$ ) (Table 2).

**Table 2. Health behavioral characteristics of respondents.**

Characteristics	Descriptive results		Bivariate results				x <sup>2</sup>	p-value
			Hypertension: NO (62.6%)		Hypertension: YES (37.4%)			
	Frequency	%	Frequency	%	Frequency	%		
<b>Nutrition status</b>							<b>12.81</b>	<b>0.036</b>
Obesity	46	8.8	23	48.7	23	51.3		
Overweight	143	22.4	86	55.7	57	44.3		
Normal body weight	331	42.3	223	68.1	108	31.9		
Underweight	205	26.5	135	64.4	70	35.6		
<b>Food insecurity</b>							<b>0.10</b>	<b>0.781</b>
Insecure	59	7.1	37	64.7	22	35.3		
Secure	666	92.9	430	62.5	236	37.5		
<b>Frequency household members smoke inside the house</b>							<b>0.73</b>	<b>0.724</b>
Never	396	61.0	259	63.0	137	37.0		
Daily	234	28.0	148	60.5	86	39.5		
Weekly, monthly, or less	95	11.0	60	65.7	35	34.3		
<b>Presence of iodine in kitchen salt</b>							<b>3.35</b>	<b>0.085</b>
Yes	703	97.5	457	63.2	246	36.8		
No	22	2.5	10	42.1	12	57.9		

x<sup>2</sup>= Chi-square

The overall prevalence of hypertension among Nepali adults 65 years and older was 37% (Table 2). More than 40% of the females had hypertension and 34% of males had hypertension (Table 1a). Nevertheless, the sex difference for hypertension was not statistically significant in the bivariate test.

The results of the multiple logistic regression analysis have been presented in Table 3a and Table 3b. The results of Table 3a and 3b come from the single regression model and they were just split for better presentation. The odds of having hypertension increased by 1.04 times per additional year of age among the older population, controlling for all other variables in the model. People from the Dalits and Tarai Janajati communities reported 166% higher [adjusted Odds Ratio (aOR)=2.66, Confidence Interval (CI): 1.39-5.11] and 263% higher (aOR=3.63, CI: 1.50-8.81) odds of being hypertensive, respectively, than their Brahman/Chhetri counterparts. Compared to participants in the poorest quintile, those in the poorer (aOR=0.55, CI: 0.31-0.98) and richer (aOR=0.42, CI: 0.20-0.85) quintiles had lower odds of having hypertension. Moreover, older adults from Sudurpaschim province had 2.65 times the odds of hypertension as compared to Karnali province. Similarly, in terms of nutritional status, participants who were obese and overweight had 2.71 (CI: 1.19-6.17) and 2.03 (CI: 1.23-3.35) times the odds of having hypertension, respectively, as compared to people with normal body weight. Likewise, older adults living in a household consuming non-iodized salt had 238% higher odds (aOR=3.38, CI: 1.26-9.07) of having hypertension compared to those using iodized salt.

**Table 3a. Association of socio-demographic factors and hypertension of older Nepalis.**

Characteristics	aOR [CI]	p-value
<b>Age</b>	1.04 [1.01–1.08]	<b>0.019</b>
<b>Sex (Ref= Female)</b>		
Male	0.70 [0.44–1.11]	0.126
<b>Ethnicity (Ref= Brahman/Chhetri)</b>		
Tarai/Madhese Other Castes	1.85 [0.85–4.04]	0.121
Dalits	2.66 [1.39–5.11]	<b>0.003</b>
Newar	1.43 [0.51–4.01]	0.491
Hill Janajati	1.41 [0.78–2.53]	0.254
Tarai Janajati	3.63 [1.50–8.81]	<b>0.005</b>
Muslim	0.93 [0.29–3.00]	0.907
<b>Wealth Index (Ref=Poorest)</b>		
Poorer	0.55 [0.31–0.98]	<b>0.042</b>
Middle	0.68 [0.37–1.24]	0.205
Richer	0.42 [0.20–0.85]	<b>0.016</b>
Richest	0.74 [0.34–1.63]	0.456
<b>Province (Ref=Karnali)</b>		
Koshi	2.18 [0.91–5.25]	0.082
Madhesh	1.15 [0.43–3.05]	0.780
Bagmati	1.55 [0.61–3.96]	0.358
Gandaki	1.07 [0.39–2.92]	0.890
Lumbini	1.04 [0.39–2.77]	0.937
Sudurpaschim	2.65 [1.17–6.00]	<b>0.019</b>
<b>Urban/Rural location (Ref=Rural)</b>		
Urban	1.36 [0.89–2.07]	0.154
<b>Nutrition status (Ref=Normal body weight)</b>		
Obesity	2.71 [1.19–6.17]	<b>0.018</b>
Overweight	2.03 [1.23–3.35]	<b>0.006</b>
Underweight	1.06 [0.67–1.69]	0.805
<b>Presence of iodine in kitchen salt (Ref=Yes)</b>		
No	3.38 [1.26–9.07]	<b>0.016</b>

Note: The regression model was controlled for education, partnership status, ecological region, and health behavior factors. Moreover, regression was also controlled for smoking, exercise, tea/coffee consumption, and food intake within 30 minutes before the blood pressure measurement.

aOR= adjusted odds ratio, CI= confidence interval

**Table 3b. Association of behavioral factors and hypertension of older Nepalis.**

Characteristics	aOR [CI]	p-value
<b>Nutrition status (Ref=Normal body weight)</b>		
Obesity	2.71 [1.19–6.17]	<b>0.018</b>
Overweight	2.03 [1.23–3.35]	<b>0.006</b>
Underweight	1.06 [0.67–1.69]	0.805
<b>Food insecurity (Ref=Secure)</b>		
Insecure	0.99 [0.46–2.13]	0.982
<b>Frequency household members smoke inside the house (Ref=Never)</b>		
Daily	1.28 [0.83–1.96]	0.260
Weekly, monthly, or less	0.90 [0.49–1.66]	0.742
<b>Presence of iodine in kitchen salt (Ref=Yes)</b>		
No	3.38 [1.26–9.07]	<b>0.016</b>

Note: The regression model was controlled for all socio-demographic variables, and was also controlled for smoking, exercise, tea/coffee consumption, and food intake within 30 minutes before the blood pressure measurement.

aOR= adjusted odds ratio, CI= confidence interval

## DISCUSSION

The primary goals of this study were to determine the prevalence of hypertension and then examine the association of socio-demographic and lifestyle factors with hypertension among older adults in Nepal. Findings from this study suggest that about 37.4% of older adults had hypertension in 2022. Age, ethnicity, wealth index, and province-based residence were significantly associated with socio-demographic factors with hypertension. Similarly, obesity and the absence of iodine in kitchen salt were significantly associated lifestyle factors with hypertension.

The prevalence of older adults in this study was higher than the overall prevalence for the adult population of Nepal, which ranged from 27.0 to 33.8%.<sup>5,11</sup> To the authors' knowledge, no previous studies in Nepal have specifically studied hypertension in older adults. However, a previous study from Nepal examined age subcategories and showed a hypertension prevalence of 22.0% among older individuals aged 65 years and above,<sup>12</sup> which was lower than our findings. In general, the burden of hypertension is found to be higher in LMICs than in high-income countries;<sup>4</sup> however, specific to older age, the prevalence reported in the USA at 63.1%<sup>13</sup> and Germany at 73.8%<sup>14</sup> were much higher than this study findings. In light of this, exploring hypertension prevalence among older populations in neighboring countries could provide better insights, potentially showing a higher hypertension burden than

this study's findings in India at 45.9% for middle-aged and older adults,<sup>15</sup> while lower hypertension prevalence at 29.0% for older adults in China.<sup>16</sup> The low prevalence reported in our study could be because of the use of the screening criteria. This study utilized hypertension criteria developed by WHO.<sup>7</sup> A study conducted using the 2017 guideline from the American College of Cardiology and the American Heart Association reported 23.0% more adults with hypertension than the WHO guideline did.<sup>17</sup>

The prevalence of hypertension increases significantly with age, showing the highest rates among the older population across several studies.<sup>12,15</sup> This study found that older adults from Dalits and Tarai Janajati ethnic groups had higher odds of having hypertension compared to Brahman/Chhetri. The higher risk among ethnic minorities is likely due to disparities in healthcare access influenced by historical disadvantages and variations in ethnicity-related dietary and cultural practices.<sup>18</sup> Older adults in richer households than those in the poorest households had lower odds of hypertension reported in this study. However, the difference was statistically significant for older adults in poorer and richer households. Consistent with this finding, a previous study reported that middle-aged adults from richer households had lower odds of hypertension.<sup>18</sup> Similarly, studies have found that older adults from lower wealth and economic status in LMICs have a higher prevalence of hypertension.<sup>19,20</sup> Although we did not control for the use of antihypertensive medications in this study, higher

hypertension awareness and treatment rates in wealthier households might have contributed to this, potentially reducing prevalence among this group. In contrast, older individuals with lower economic resources encounter barriers to accessing healthcare services, resulting in lower rates of hypertension detection and management,<sup>19</sup> and hindering access to medication and increasing the odds of having uncontrolled hypertension. This study did not find significant urban-rural differences in predicting hypertension. However, Sudurpaschim, the farthest west province, reported a higher hypertension burden than Karnali province. Although Koshi was not statistically different from Karnali province, it had the second-highest burden among the seven provinces. In other studies, among the adult population aged 18 and above, Gandaki and Lumbini had the highest burden of hypertension.<sup>12</sup> Hence, the Sudurpaschim and Koshi provinces need more targeted programs or policies to address the higher burden of hypertension among older adults.

Multiple studies have shown that overweight and obesity are the risk factors for hypertension.<sup>14,16,21</sup> Obesity may independently predict hypertension risk, but its effects are potentially amplified through interaction with other lifestyle factors like lack of physical activity.<sup>14</sup> Lack of iodized salt in the kitchen could act as a proxy for the iodine level in the blood flow; a previous study showed that low iodine concentrations are associated with hypertension.<sup>22</sup> However, another study showed a nonsignificant relationship between iodine and hypertension.<sup>23</sup> Nevertheless, the study warrants targeted awareness regarding the consumption of iodized salt to mitigate hypertension risks. It is also essential to disseminate this information cautiously to prevent the use of excessive salt.

Uncontrolled hypertension can cause serious health issues, including strokes, coronary heart disease, heart failure, peripheral artery disease, retinal disease, cognitive decline, dementia, atrial fibrillation, and chronic kidney disease.<sup>24</sup> Hence, prioritizing public health approaches such as lifestyle modifications, early diagnosis, and treatment is crucial in LMICs like Nepal. Promotion of BP screening at every level of health facilities, such as basic healthcare units to private pharmacies, can facilitate early detection, which is especially beneficial for older adults who face barriers to healthcare access.<sup>24</sup> Public Health Service Regulation 2020 of Nepal mandates that basic health services, including blood pressure checks, must be provided free of cost to every citizen from all basic health service centers and designated health institutions across Nepal;<sup>25</sup> which should be implemented

efficiently. Additionally, campaigns aimed at screening for hypertension contribute to early diagnosis and facilitate referral for management and treatment among those identified with hypertensive or pre-hypertensive conditions. As such, the May Measurement Month campaign conducted in 33 districts across Nepal helped 74,205 adults aged 18 and above get screened for their BP in 2019.<sup>26</sup>

Furthermore, dissemination of health promotion messages advocating for diets rich in protein, vitamins, and minerals, reducing salt intake while ensuring consumption of iodized salt, achieving healthy BMI, remaining active through moderate to vigorous physical activity, and practicing behavioral therapies such as yoga and meditation, can help older adults in adopting beneficial lifestyle changes to regulate blood pressure.<sup>24</sup> Moreover, during the management of hypertension, clinicians could recommend the Dietary Approaches to Stop Hypertension (DASH) diet as it is proven to reduce BP and is very useful for people with hypertension.<sup>27</sup> DASH emphasizes the consumption of vegetables, fruits, whole grains, lean proteins, and low-fat dairy while reducing intake of sodium, saturated fats, and cholesterol, which are the contributors to hypertension.

This study is limited by secondary data, which does not provide information on family history, other chronic diseases, physical activity, dietary patterns, occupation, and other potential factors in predicting hypertension. Additionally, using cross-sectional data prevents establishing causation and understanding the heterogeneity of hypertension in older populations. However, this study's strength lies in its use of a standard measure of blood pressure, along with employing a national dataset that includes complex sample elements that increase the generalizability and rigor of the study.

## CONCLUSIONS

This study suggests a high prevalence of hypertension among the older population aged 65 years and above. With the increasing older population in the country, this poses a significant risk in the increased prevalence of several chronic health conditions and might threaten the country's existing healthcare resources. Therefore, the government of Nepal and the provinces should develop interventions that promote the primary prevention of hypertension. Moreover, increasing access and opportunities to regular monitoring of blood pressure and screening of hypertension, especially among those with low economic resources, would help early diagnosis and possibly management of hypertension among those

groups.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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