

## Research Article

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# Prevalence of hypertension and its associated factors among civil servants in Antsokiya Gemza Wereda, North East Ethiopia, 2021

Mohammed Yimam<sup>1</sup>; Yitbarek Wasihun<sup>2</sup>; Eyob Ketema Bogale<sup>3\*</sup>

<sup>1</sup>Mekoy Health Center, Antsokiya Gemza wereda, North Shoa, North East Ethiopia.

<sup>2</sup>Health Promotion and Behavioral Sciences Department, Wollo University, Dessie, Ethiopia.

<sup>3</sup>Health Promotion and Behavioral Sciences Department, School of public health, college of medicine and health sciences, Bahir Dar University, Bahir Dar, Ethiopia.

### \*Corresponding Author: Eyob Ketema Bogale

Health Promotion and Behavioral Sciences  
Department, School of public health, college of  
medicine and health sciences, Bahir Dar University,  
Bahir Dar, Ethiopia.  
Email: ketema.eyob@gmail.com

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**Keywords:** Hypertension; Antsokia Gemza Woreda; Civil servants; Ethiopia.

**Abbreviation:** AHA: American Heart Association; BP: Blood Pressure; BMI: Body Mass Index; CDC: Centers for Disease Control and Prevention; DBP: Diastolic Blood Pressure; MET: Metabolic Equivalents; mmHg: Millimeter of Mercury; NIAID: Non-Infectious Adult Diseases; SBP: Systolic Blood Pressure; SPSS: Statistical Package for Social Science Students, and WHO- World Health Organization.

### Abstract

**Background:** Hypertension is one of the most common diseases afflicting humans throughout the world. The prevalence of hypertension is also on the rise in developing countries and as there is a change in the lifestyle associated with urbanization including sedentary lifestyle, smoking, obesity, high fat, and energy diet, and the associated increased prevalence of Diabetes mellitus. Because of the associated morbidity and mortality and the cost to society, hypertension is an important public health challenge.

**Objective:** To assess the prevalence of hypertension and Associated factor among public Civil Servants in Ansokiya Gemza woreda, North East Ethiopia.

**Methodology:** A facility-based cross-sectional study was conducted. The study was conducted from June 01 to July 30, 2021. A total sample size of 275 participants was involved in the study. Systematic random sampling techniques were applied to select study participants. Data was entered into EPI data version 3.1 and then exported to SPSS version 25 for analysis. Bivariable and Multivariable logistic regression was used for analysis.

**Result:** The prevalence of hypertension was found to be 23.5%. Civil servants whose age  $\geq 41$  years old (AOR=2.52, 95% CI = (1.09-4.29)), BMI  $\geq 25$  kg/m<sup>2</sup> (AOR=2.9, 95% CI= (1.34-4.68) alcohol drinking (AOR=16.84, 95% CI= (3.59-39.01)), cigarette smoking (AOR= 26.51, 95% CI= (4.77-57.08)), and khat chewing (AOR= 6.90, 95% CI = (3.55-8.78)) were associated with hypertension.

**Conclusions:** The prevalence of hypertension of the membrane was high. Age  $\geq 41$  years old, BMI  $\geq 25$  kg/m<sup>2</sup>, alcohol drinking, cigarette smoking, and khat chewing were associated with hypertension.

## Background

Hypertension means high pressure in the arteries. It is commonly known as high blood pressure (140/90 mmHg or above) [1]. In 2016 and 2017 WHO report shows those 40 million deaths and more than 70% of mortality worldwide had been caused by Non-Communicable Diseases (NCDs). More than 40% of these deaths were premature and 80% of these deaths from NCDs occur in low and middle-income countries. Hypertension is one of the most frequently observed risk factors for Cardio Vascular Disease (CVD) in Sub-Saharan African [2].

The World Health Organization has estimated that high blood pressure causes one in every eight deaths, making hypertension the third leading killer in the world. Globally, there are one billion hypertensives and four million people die annually as a direct result of hypertension [3].

Hypertension increases the risk of developing heart disease, kidney disease, hardening of the arteries, eye damage, and stroke. It is also called a 'silent killer, since it doesn't show any symptoms in the early stages, symptoms only manifest after end-organ damage [4]. Increasing survivorship rates, especially in urban Ethiopia, are leading to a rise in the number of elderly Ethiopians, and old-age diseases. Some of these are the so-called lifestyle illnesses, normally associated with Western societies where a sedentary life and unhealthy diet have substituted old infections as the major source of morbidity and mortality [5].

Hypertension is an important public health challenge, which affects approximately one billion persons worldwide [6]. According to the World Health Organization (WHO), hypertension is the leading risk factor for mortality which is 12.7% of deaths will be attributed [7]. Each year at least 7.1 million people die as a consequence of hypertension. The overall average prevalence of hypertension in the world was estimated at 35% (37% in men and 31% in women) [6].

Increases in rates of hypertension and other cardiovascular diseases, representing an emerging public health problem in LMICs, happen as populations grow older, become urbanized, and lifestyle changes favor sedentary habits, physical inactivity, obesity, increasing alcohol consumption, and salt intake, among other [8].

World Health Organization (WHO) estimated in 2011 that 34% of the Ethiopian population is dying from non-communicable diseases, with a national cardiovascular disease prevalence of 15%, cancer and chronic obstructive pulmonary disease prevalence of 4% each, and diabetes mellitus prevalence of 2%. Communicable maternal, perinatal, and nutritional conditions accounted for 57% of the deaths. This WHO estimation is comparable with East African countries, such as Kenya, Uganda, and Eritrea [6].

The resulting double burden of non-communicable diseases, with a higher prevalence of pre-existing communicable, maternal, prenatal, and nutritional conditions, constrains the already meager health resources and hinders economic development in Ethiopia [9].

To date, there are some studies dealing with the prevalence of hypertension and associated factors among civil servants in

Ethiopia [10-12]. However, those studies lack important variables like knowledge, alcohol drinking, and chat. The purpose of this study was to assess the prevalence of hypertension and associated factors to address the aforementioned gap in the area.

## Materials and methods

### Study design and settings

A facility-based cross-sectional study design was conducted from June 01 to July 30, 2021, among civil servants in Antsokiya Gemza Woreda. It is located 555 km from the city of Amhara regional state and 349 km away from Addis Ababa. It has 12 kebele, 5 health centers, and 04 private clinics.

The total population of the Woreda is 66,673, out of which 34,003 are males and 32,670 are females. There are 1504 civil servants in 12 sectors and of which 947 are males and 557 are females.

### Participants and sampling

All civil servants in Antsokiya Gemza Woreda during the study period were the source of population and all selected civil servants in Antsokiya Gemza Woreda were the study population. All civil servants that worked in Antsokiya Gemza Woreda during the data collection period were included in the study whereas contract workers, civil servants who had worked for less than six months, and who were critically ill and unable to communicate during the data collection period were excluded from the study.

The sample size was calculated by considering the two specific objectives; using the formula for estimation of single population proportion and using Epi info version 7 to identify the factors. Considering the 24.5% of prevalence of hypertension from the previous study [13], the margin of error (0.05) and critical value at 95% confidence level. The final sample size was 275 by adding 10% non-respondent. We took the largest estimated sample.

Systematic random sampling was applied to select study participants. Lists of total civil servants were obtained from Antsokiya civil service office before data collection. The size of study participants consisting of eligible populations to be selected from each sector was determined proportionally based on the size of the study units found in each sector. The sampling interval (kth unit) was obtained by dividing the entire civil servant (1504) by the desired sample size (275) and it was approximately 5. The first participant was randomly chosen for the survey by the lottery method, and then every five respondents were recruited for the study.

### Data collection and measurements

Data were collected using an interviewer-administered structured questionnaire and anthropometric measurements. Data were collected by five trained clinical nurses. The questionnaire was adapted from the WHO STEP tool and was modified to the context of this study [14]. Questionnaires were categorized into Sociodemographic characteristics, Knowledge, and Behavioral characteristics.

Weight and height were taken for each study participant. Height was measured using a portable anthropometric height measuring scale without shoes, wearing no headgear, knees

fully straight and both hands were held down to the side and recorded the height to the nearest 0.1 centimeters and the body weight was measured with a Seca weight scale to 0.1kg with light clothing, barefoot, standing erect on the center of the balance, and record the weight to the nearest 0.1kilo gram. Measuring instruments were checked and calibrated before the procedure to make measurements more reliable. Finally, BMI was also measured, and it was calculated as weight (kg)/height (m<sup>2</sup>) to determine the nutritional status of the respondents. Data collectors took at least two separate height and weight measurements for an individual and repeated them when the variation of the two measures was greater than 0.1kg for weight and greater than 0.1 cm for height.

Blood pressure was measured by the principal investigator in a sitting position using a digital BP apparatus with an appropriate cuff size that covers the upper arm. by pressing the start button of the cuff then wait until record it. Before the measurement participants were asked to rest for at least 05 minutes. They were asked to confirm that they had not smoked or consumed caffeine-containing products for at least 30 minutes for measurement. Two consecutive measurements were taken in at least five minutes. Mean systolic and diastolic blood pressure was determined by averaging the first and the second measurement [15].

### Operational definitions

Hypertension; Hypertension was defined as hypertension is defined as mean Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) of 140/90mmhg or greater and hypertensive patients on regular drug therapy for hypertension [16]. To be hypertensive the average of two separate measurements is greater than 140/90mmhg [17].

Participants who answered knowledge questions score of mean value or above were considered as having good knowledge [11].

Body Mass Index (BMI) was calculated as weight in kilograms over height in meter squares {weight (kg)/height in meter (m<sup>2</sup>). The study participants were considered underweight when their BMI was below 18.5kg/m<sup>2</sup>. Normal BMI 18.5 kg/m<sup>2</sup> up to 24.9 kg/m<sup>2</sup>. Overweight when the BMI is between 25.0 kg/m<sup>2</sup> and 29. kg/m<sup>2</sup> Obese when their BMI was greater than or equal to 30 kg/m<sup>2</sup>.

### Data quality assurance

The training was given to both supervisors and data collectors. The pre-test was conducted on 5% (10) of the sample size in Giske Rabel Woreda before the actual data collection period. A necessary correction was done based on the results of pre-test data. The questionnaire was translated to the local language (Amharic) and back to English by fluent speakers of the two languages. Strict supervision was done by supervisors and the overall quality of the data collection was also monitored by the principal investigator. To reduce the variability of BP measurement results, we use digital BP apparatus to measure hypertension for all participants. The collected data were checked for completeness and consistency before starting, processing, and analyzing data.

### Data Management and Analysis

The data were coded and entered using Epi-Data Version 3.1 and exported to SPSS version 25 for analysis. A binary logistic regression model was fitted to analyze the association. Both the bi-variable and multi-variable logistic regression analysis

was performed to assess the association between dependent and independent variables. All covariates with P-value less than 0.25 during bi-variable analysis were considered for further multivariable analysis to control for all possible confounders. Then, those variables that show a P-value less than 0.05 and AOR with a 95% confidence interval were used to set the statistically significant level and to identify predictors of hypertension. Model fitness was checked using Hosmer and Lemeshow goodness-of-fit test. Hosmer-Lame shows Goodness of fit test statistics showed the model as a best-fitted model with a P-value of 0.742. Finally, results were presented using frequencies, proportions, figures, and tables.

## Results

### Socio-demographic characteristics of respondents

A total of 275 civil servants were enrolled in the study with a response rate of 100%. The mean age of the study participants was 36.29 years with a standard deviation (SD) of 4.5 years and ranging from 21 and 59 years old. Above half 169 (61.5%) of the respondents were married and 147 (53.50%) were female. Nearly three fourth of them had a BSc. degree and the mean monthly income of respondents were 4525.75 ETB. Above two-thirds, 181 (69.5%) of respondents were Orthodox Christian followers (Table 1).

**Table 1:** Socio-Demographic Characteristics of Study Participants in Antsokiya Gemza Woreda, North Shoa, North East Ethiopia, 2021(n=275).

Characteristics	Categories	Number	%
Sex	Male	128	46.50
	Female	147	53.50
Age	21-40 years	147	53.50
	41-54 years	90	32.70
	55-65 years	38	13.8
Marital status	Married	169	61.50
	Divorced	12	4.40
	Single	94	34.2
Educational status	10th completed	7	2.50
	Diploma	57	20.40
	Bsc degree	204	74.20
	Masters	7	2.50
Religion	Orthodox Christian	191	69.5
	Muslim	64	23.00
	Protestants	20	7.30
Monthly income	<3000 birr	32	11.60
	3001-6000 birr	62	22.50
	6001-9000 bir	138	50.20
	>90 bi01rr	43	15.60

### Behavioral characteristics of respondents

Sixty-two (22.50%) of the respondents had a history of alcohol use in the past six months prior to the study. Out of those who consume alcohol, the majority, 59(21.45%) used some times per week, 2(0.8%) weekly, and 1(0.4%) used daily. Forty (14.5%) had a history of substance use in the last six months and 40(14.5%) used to chat which all of them used some times per week.

**Table 2:** Behavioral Characteristics of Study Participants in Antsokiya Gemza Woreda, North Shoa, North East Ethiopia, 2021 (n=275).

Variables	Frequency	%
Have you ever smoking Cigarette?		
Yes	22	8
No	253	92
Frequencies of smoking		
<1 pack per day	22	8
Have you ever been drinking alcohol?		
Yes	62	22.55
No	213	77.45
Frequencies of drinking		
Daily	1	0.02
Weekly	2	0.03
Sometimes	59	0.95
Have you ever been chewing chat?		
Yes	40	14.5
No	235	85.5
Frequencies of chewing chat		
Sometimes	40	100
Have you been exercising?		
Yes	91	33.1
No	184	66.9
frequencies of exercising		
walking 10 minutes	72	26.20%
2-3 doing vigorous exercise	19	6.9

**Table 3:** Prevalence of hypertension of Study Participants in Antsokiya Gemza Woreda, North Shoa, North East Ethiopia, 2021 (n=275).

Variable	Male		Female		Over all prevalence	
	No.	%	No.	%	No.	%
BP measurement (Sys/Dias)						
≥ 140/90 (Hypertensive)	27	9.80	38	13.82	65	23.63
<140/90 (not Hypertensive)	101	36.69	109	39.67	210	76.36
Total	128	46.50	147	53.50	275	100

**Table 4:** Bivariate and multivariable association of hypertension and independent factors among study participants in Antsokiya Gemza Woreda, North Shoa, North East Ethiopia, 2021 (n=275).

Variable	Hypertension (BP)		COR (95%)	AOR (95%)	P-value
	≥140/90	<140/90			
Age (years)					
21-40	16	131	1	1	
41-54	15	75	1.63(0.4-1.52)	0.39(0.18-0.86)	0.13
55- 65	34	4	69.59(1.43-7.03)	1.04(1.01-1.08)	0.002
Drinking alcohol					

Twenty-two used cigarettes of which 22 used less than one pack per day. Fifty-two (18.90%) of the participants weighted the recommended for their height, 181 (65.80%) were normal weight and 42 (15.3%) were underweight (Table 2).

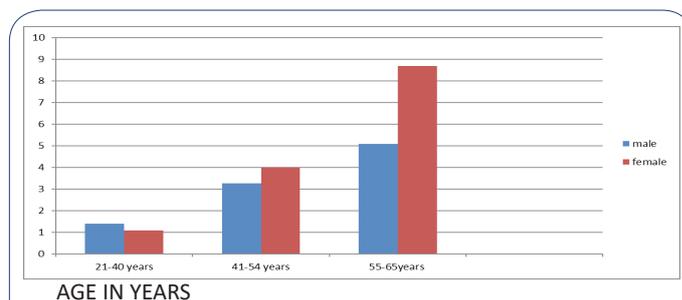
### Knowledge of study participants about hypertension

The majority (95.30%) of the participants were heard about hypertension. About 195 (70.90%) of the participants got information about hypertension from health institutions. One hundred and ninety-eight (72.00%) participants said hypertension is an increase in blood pressure. One hundred and eighty-nine (68.70%), 182 (66.20%), 155 (56.4%), 122 (44.40%), 121 (44.00%) and 70 (25.50%) said stress, consuming salt and fat heavily, older age, physical inactivity, smoking cigarette, and alcohol drinking were the major causes of hypertension respectively.

Two hundred and twenty-one (80.4.0%) of respondents said headache and dizziness were the symptoms of hypertension. 42 (15.30%) of participants reported they have family members (father, mother, or siblings) who suffered. About 116 (42.2%) respondents had good knowledge about hypertension.

### Prevalence of Hypertension

The prevalence of hypertension was found to be 23.60% with a 95% CI (21.90- 29.70). The prevalence of hypertension was higher among females at 58.4% with 95% CI (55.85- 61.50) than males at 41.6% with 95% CI (39.61-44.6%) (Table 3 and figure 1).



**Figure 1:** Age and sex distribution of the prevalence of hypertension of Study Participants in Antsokiya Gemza Woreda, North Shoa, North East Ethiopia, 2021(n=275).

Yes	18	52	1.16(0.78-3.16)	16.84(3.59-39.014)	≤0.01
No	47	158	1	1	
Smoking cigarette					
Yes	27	95	0.86(0.91-5.01)	26.51(4.77 -57.08)	≤0.01
No	38	115	1	1	
Chewing chat					
Yes	5	32	0.46 (0.25 - 6.69)	6.91(1.77-26.89)	0.005
No	60	178	1	1	
BMI (kg/ m2)					
>25	36	2	738(1.64-4.98)	1.32(1.49-1.52)	≤0.01
18.5- 24.9	28	167	574(0.001 -1.37)	0.14 (0.02 -1.40)	0.093
< 18.5	1	41	1	1	
Weight					
>70	40	6	163.3(4.62-15.11)	1.82(0.15-21.58)	
66-70	16	17	13.17(.076 - 6.932)	0.54 (0.06 - 04.82)	0.577
61-65	5	63	1.11 (.29 - 46.61)	2.73 (0.23 - 32.67)	0.427
56-60	2	51	0.54 (.33 -156.04)	6.00 (0.33 -110.59)	0.228
50-55	1	29	0.48 (.19 -181.58)	6.44 (0.20 -203.79)	0.291
<50	1	14	1	1	

### Factors associated with hypertension

In binary logistic regression analysis hypertension was significantly associated with weight, BMI, alcohol use, age, cigarette smoking, and chat chewing. In the multivariate logistic regression analysis drinking alcohol, cigarette smoking, chat chewing, BMI, and Age were significantly associated with hypertension.

Alcohol drinkers were 16.844 times more likely to be hypertensive compared to non-alcohol drinkers (AOR=16.84, 95% CI= (3.59- 39.01)). Cigarette smokers were 26.511 times more likely to be hypertensive compared to non-cigarette smokers (AOR= 26.51, 95% CI= (4.77- 57.08)). Chat chewers were 6.905 times more likely to be hypertensive compared to non-chat chewers (AOR= 6.90, 95%CI = (3.55-8.78)) (See table 4)

### Discussion

The results of the study revealed that the prevalence of hypertension among civil servants was about 23.6% with a 95% CI (21.90- 29.70). This finding was higher than the study finding from Zimbabwe civil servant employees of 21% [19] other African countries of 22.4% [9] in Mozambique, 26.3% [8] in Egypt, and 19.4% [20] in Cameroon but comparable to European countries such as Turkey with a prevalence of 25.1 [21]. This may be due to the high prevalence of obesity and the relatively older age group compared to the Civil servants in which the majorities are below the age of 41 years [21].

The prevalence of hypertension was higher in females than in males. Similar findings were reported in Turkey in a civil servants' survey where hypertension prevalence was higher in women (46.1%) than men (41.6%) [21]. The higher prevalence in females might be due to the high level of obesity and physical inactivity which was more common among females than males. Among civil servants of Antsokiya Gemza employees, the prevalence of hypertension increased with age. In Turkey, the prevalence of hypertension was found to be strongly linked to age, with 16.9 % [21]

A similar pattern was seen in Egypt in which in the youngest

age group (21 to 40 years) hypertension was present in 7.8% [8] of the population, whereas the prevalence rate was 59.4% [8] in the 55-65 age groups. The increasing prevalence of hypertension with age represents the biological effect of increased arterial resistance due to the thickening arterial wall that comes with age [8]

Increased BMI was identified as a factor for hypertension in this study and previous studies [10,12,22]. This might be due to the excess weight increasing blood cholesterol and triglyceride levels, and lowering high-density lipoprotein levels [11].

Although more females were obese than males, the stratified analysis showed that the association between obesity and hypertension was stronger in males than that in females. Similar findings were reported in Eritrea where the effect of BMI was greater in males than in females, especially in the below 45 yea age groups [23].

Cigarette smoking was also a risk factor for hypertension among civil servants of Antsokiya Gemza employees. A person's risk of hypertension greatly increases with the number of cigarettes he or she smokes and the longer a person smokes, the greater their risk of hypertension attack. People who smoke a pack of cigarettes a day have more than twice the risk of heart attack than non-smokers. Chronic heavy smoking also increases the risk of developing other non-communicable diseases such as peripheral vascular disease, lung cancer, and chronic obstructive airway diseases [24,25].

In this study, civil servants of Antsokiya Gemza wereda those who have been drinking alcohol were 11.844 times more likely to be hypertensive compared to those who have not been drinking alcohol. It was similar to the studies conducted in Gonder and Other parts of the World [26,27]. The possible reasons for this fact are that alcohol can produce CNS imbalance (initiates both central and peripheral reactions which lead to hypertension), baro (presso) reflex impairment (baro-reflex challenged vasoconstrictors such as phenyl epinephrine and angiotensin II), sympathetic outflow (causes secretion of

corticotrophin-releasing hormone (minerals-corticosteroid and catecholamines)), RAS initiation, expansion of extracellular fluid (elevation of plasma vasopressin and rennin activities), shifts extracellular calcium to intracellular space increase sensitivity to vasoconstrictor norepinephrine. These all lead to vasoconstriction and cause hypertension [5,8].

The history of smoking is one of the well-established risk factors for hypertension [27]. Similarly, in this study, smokers were 16.511 times more likely to be hypertensive compared to non-smokers. This study is in line with studies that were conducted in different parts of the world, including Ethiopia [3,26]. The possible reason might be that cigarette smoking increases arterial inflammation and stiffness [26]. As a result of vasoconstriction, blood pressurizes the walls of the arteries.

According to this study, Khat chewers were 6.905 times more at risk for hypertension than non-chat chewers. This study also confirmed a positive association between chat chewing and hypertension development. The possible reason for this association is that Chat contains a chemical called Cathinone; a potent vasoconstrictor that causes diastolic blood pressure elevation. This is the reason why chat chewers were more likely to be hypertensive compared to non- chat chewers [27].

#### Limitation of the study

Since the study is cross-sectional it may not demonstrate direct cause and effect between dependent and independent variables. The study was limited to behavioral and physical measurements and did not include biochemical. Another limitation is possible to selection bias and social desirability bias.

#### Conclusions

In general, the study has revealed that the overall prevalence of hypertension among the participants was high. Age  $\geq$  41 years old, BMI  $\geq$  25 kg/m<sup>2</sup>, alcohol drinking, cigarette smoking, and Khat chewing were positively associated with hypertension.

The findings of this study indicate that hypertension has become an important public health problem and lifestyle modification has a valuable effect to decrease the magnitude of hypertension.

#### Declarations

**Ethical approval and consent to participate:** Ethical clearance was obtained from the Zemen Post Graduate College research ethics review committee. Permission was obtained from concerned stakeholders. Written informed consent was obtained from all study participants during data collection. The study participants were assured of confidentiality by excluding their names during the period of data collection. The rights are given to study participants to refuse, stop or withdraw from the interview at any time. Confidentiality was maintained throughout the study.

**Availability of data and materials:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Consent for publication:** The authors declare that they have agreed to publish in this journal

**Competing of interest:** The authors declare that they have no competing interests.

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**Authors' contributions:** Writing - Original draft and Data curation: M.Y and. Y.W Design of methodology: M.Y, Y.W, and EK. Formal analysis: M.Y, Y.W, and EK. Supervision: Y.W. The investigation, Resources, Conceptualization, Administration, and Writing - Review & editing: M.Y, Y.W, and EK. Manuscript preparation: M.Y and EK. Editing the overall improvement of the manuscript: Y.W. All authors read and approved the final manuscript.

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