

Prevalence of Undiagnosed Hypertension and its Associated Factors Among Adult Peoples Living in Enemor Woreda, South Ethiopia, 2021. Community Based Cross Sectional Study

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ABSTRACT

Background: Hypertension is defined as two or more readings of systolic blood pressure measurement of 130 mm Hg or higher or diastolic blood pressure measurement of 80 mm Hg or higher. In the early stages, symptoms of HTN are often not detectable and thus many people with the disease are left undiagnosed. Undiagnosed HTN increases the risk of complications such as renal failure, myocardial infarction, heart failure, stroke and premature death. There was a high prevalence of undiagnosed HTN among adolescents.

Objective: To assess the prevalence of undiagnosed hypertension and its associated factors among adult peoples living in Enemor Woreda, Ethiopia, 2021.

Method: A community based cross-sectional study design was conducted from April to May, 2021. Data were collected using a structured self-administered English version questionnaire; which translated to the national Amharic language. The data were collected from 630 households using systematic random sampling technique at K=7. The data were entered to epi data version 3.4 and analyzed by SPSS version 26. Bivariate and multivariable logistic regression with 95% CI was hold to determine the significance of variables.

Result: In this finding 260 (45.3%) of respondents were identified as having undiagnosed hypertension. Respondents having sedentary life style (AOR=2.24, 95%CI (1.37, 3.67)), BMI ≥ 25 (AOR=2.42, 95%CI (1.43, 4.09)), smokers [AOR: 0.45, 95%CI(0.28, 0.73)], health seeking behavior [AOR: 0.41, 95%CI(0.25, 0.66)], monthly income <2000 ETB [AOR: 0.68, 95%CI(0.48,0.97)] and respondents dietary habit Enjera with Wot [AOR: 0.57, 95%CI(0.40, 0.83)] were significantly associated with undiagnosed hypertension.

Conclusion: The overall prevalence of undiagnosed hypertension was 45.3%. respondents with BMI kg/m² >25, having sedentary life style, cigarette smoking, health seeking behavior, dietary habit and monthly income were significance predictors of undiagnosed HTN; therefore, people should follow Life style modification and have health seeking behavior to early detect and manage undiagnosed HTN with in the community.

Keywords: Undiagnosed Hypertension, Gurage Zone, Ethiopia

Acronym and Abbreviation

AOR	: Adjusted Odd Ratio
BMI	: body mass index
CI	: Confidence Interval
COR	: Crud Odd Ratio
DBP	: Diastolic Blood Pressure
HTN	: hypertension
NCD	: None Communicable Diseases
SBP	: Systolic Blood Pressure
SPSS	: Statistical Package of Social Science
USA	: United States of America
WHO	: world health organization

Introduction

Hypertension is defined as two or more readings of systolic blood pressure measurement of ≥ 130 mmHg or diastolic blood pressure measurement ≥ 80 mmHg [1]. Globally, around one billion people are affected by hypertension and predicted to increase to 1.5 billion by 2025 [2].

In the early stages, symptoms of HTN are often not detectable and those many people with the disease are left undiagnosed [3]. Undiagnosed HTN increases the risk of complications such as renal failure, myocardial infarction, heart failure, stroke and premature death [4].

Undiagnosed hypertension is defined as individuals who were hypertensive but did not report as having hypertension by a health professional. It is an important risk factor for the development of chronic kidney disease, cardiovascular disease and all-cause of mortality [5].

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In 2007, around 50% of the world populations were living with undiagnosed hypertension (7). One third of adults has hypertension and more than 50% of them are unaware of their status [6]. The burden of undiagnosed hypertension increases with age increases; it ranges from 6.0% in the age group of 18-19 years to 28.7% in the age group of 65-69 years (9) [7]. Its prevalence is also significantly higher in the rural areas 20.7% compared to urban areas 16.1% and regarding sex it is higher in males 18.6% than in females 15.6% (10) [8].

About 75% of people with HTN live in low- and middle-income countries. People in such settings often have low awareness related to HTN, its' treatment and control measures [9]. This may lead to low healthcare-seeking behavior, which in turn results in a high prevalence of undiagnosed HTN in these populations. The prevalence of undiagnosed HTN was found to be 30% in the sub-Saharan Africa (SSA); of this 73% were unaware of their HTN; only 18% received treatment and 7% had a controlled blood pressure measurement [10].

Ethiopia as a developing country, there are economic development, industrialization, nutrition transition and globalization that lead to a rapid change in lifestyles; which paramount the risk of hypertension [11]. In Ethiopia, the magnitude of undiagnosed hypertension is 15.6% and only a very small percentage of people had been aware of their high blood pressure [12].

The study reports of Ethiopia NCD STEPS, 2016 indicate that 76.6% of the total population never been measured for blood pressure per year [11]. Some studies indicate there was a high prevalence of undiagnosed hypertension among working-age groups that were major health problem which requires urgent action [13].

A variety of studies reported as being unable to read and write, BMI, alcohol consumption, increased age, socioeconomic status, family history of HTN, level of knowledge and being physically inactivity were the identified predictors of undiagnosed HTN [14-18].

Although the burden of chronic diseases problem particularly hypertension have been raised, as far as my search studies on undiagnosed hypertension in adult peoples in Ethiopian have been scarce information, and not done in the context of the community, Enemor Woreda. Few studies done somewhere did not address important variables and even the variables not statistically significant with the dependent variable, undiagnosed HTN. Therefore, this study was important to full fill such gaps and provide information on prevalence of undiagnosed hypertension and its associated factors among adult peoples living in the community.

Method and Materials

Study Setting and Period

This study was conducted in Enemor Woreda. Enemor is found in Gurage Zone, South Ethiopia. It is located 172km far away from Addis-Ababa, Capital city of Ethiopia. Based on the Woreda administration report; A Woreda has 22,735 population and 4,639 households. It has four Kebeles; which was Guchira Kebele had 1074 households; Gunchira Mazoria Kebele had 701; Gunchure 01 Kebele had 1313 and Gunchure 02 Kebele had 1551.

This study was conducted from April to May 30.

Study Design

A cross sectional study design was used

Population

Source Population

All people living in Enemor Woreda

Study Population

Selected households present in Enemor Woreda kebeles

Inclusion and Exclusion Criteria

Inclusion Criteria

A person above the age of 18 years or equal was included in the study

Exclusion Criteria

Medically confirmed cases of HTN, pregnant women and being seriously ill.

Sample Size Determination

The sample size for this study was calculated by using a single population proportion formula and the calculated sample size was calculated using prevalence of undiagnosed hypertension 24.8 % conducted in Amhara, Ethiopia [17]. A design effect of 2 was considered since it was multi stage sampling.

$$n = 2 * (Z_{\alpha/2})^2 (pq) / d^2 = 2 * (1.96^2 (0.248 * 0.752) / (0.05)^2) = 573$$

So, the overall calculated sample size with 10% non-response rate was 630.

Sampling Procedure

Enemor Woreda had four kebeles, the smallest population unit in Ethiopia. Households were selected by using systematic random sampling method from each Kebeles. The sample size was selected proportionally from each household using systematic sampling technique every seven intervals, K= 7.

Table1: Proportional allocation of total sample size based on total households in selected Kebeles

Selected Kebeles	Total Population	Total Household	Proportional Allocation of Sample
Gunchure 01 Kebele	6434	1313	178
Gunchure 02 Kebele	7601	1551	211
G. mazorya Kebele	3634	701	95
Kuchura	5264	1074	146
Total		4639	630

Operational Definitions

Undiagnosed Hypertension: is defined as SBP \geq 140 mmHg or DBP \geq 90 mmHg without previous history or anti-hypertensive treatment during the survey [19].

Physical Activity: The one who involves in moderate activities for less than or equal to 10 min/day, and vigorous activities for greater than 10 min/day [20].

Harmful Alcohol Use: who consumes alcohol consumption more than 14 units/week for men and more than 8 units/week for women in the last 12 months; Unit of alcohol = vol (in ml) X % alcohol/ 1000. For local alcoholic beverages: Tella (4%), Tej (10%) and Areki (40-45%) alcohol content, (as Glass 250ml and bottle as 330ml) [19].

Cigarette Smokers: who uses cigarette form of tobacco in the last 30 days [21].

Low Consumption of Fruits and Vegetables: Fewer than 5 servings of fruit and/or vegetables per day. (1serving =one orange/apple/banana or three tablespoons of cooked vegetables) [11].

Knowledge: If the respondent scored above or equal to mean score of knowledge questions categorized as good knowledge, while below the mean considered as poor knowledge [22].

Data Collection Tool and Procedure

Instruments and Measurements of Data Collection

The instrument was adapted from “Ethiopian NCD STEPS25” and a “modified WHO STEP-wise approach surveillance instrument version 3.26” [21]. The instrument consists of three main sections: socio-demographic characteristics, knowledge or perception towards HTN and behavioral characteristics such as tobacco smoking, alcohol consumption and physical inactivity. It was prepared in English, then translated into Gurage and Amharic language and then retranslated back to English to check its consistency.

Using a pretested questionnaire, house to house interview was conducted. After completing the interview, weight, height and blood pressure of the study participant was measured. Blood pressure was measured three times in a sitting position using a standard mercury sphygmomanometer. The study participant took rest for 3-5 minutes between the consecutive measurements. The measurement was taken after confirming that the study participant was not smoked or drunk any caffeinated beverage within 30 minutes before measuring the blood pressure. The average of the three blood pressure measurements was calculated to determine the blood pressure of the participant. We calibrated instruments and standardized techniques to take the measurements. Weight was measured using an electronic scale. The instrument was checked and adjusted to zero for each measurement. Height was measured in the standing position.

Data Quality Assurance

Training was given for data collectors and supervisors. Pre testing of questionnaire was done to ensure the quality of data at 5% of the sample size. Principal investigators did spot-check and reviewing all the completed questionnaires to ensure completeness and consistency of the information.

Data Processing and Analyses

Data were entered in Epi data version 3.1 and exported to SPSS version 26. Descriptive statistics was computed to describe frequency, percent, graphs and tables. The Hosmer–Lemeshow and omnibus test goodness-of-fit statistic was tested. Bivariate logistic regression analysis was carried out to identify candidate variables for multivariable logistic regression analysis. Factors with a P-value of ≤ 0.2 in the bivariate logistic regression analysis

were included in the multivariable model. A multivariable logistic regression model was used to identify predictors of the dependent variables; undiagnosed HTN with 95% confidence intervals (CI). The result was declared statistically significant if the P-value < 0.05 .

Ethical Issues

Ethical clearance was obtained from Wolkite University, College of medicine and health science, Institutional Review Board. Verbal informed consent was obtained from each study participant. Confidentiality was kept by making anonymous and assuring information will not be accessible to anyone. Privacy was maintained by arranging silent and comfortable place to the study subjects. Participants have the right to participate or not and to withdraw at any time when they feel discomfort.

Result

Characteristics of Respondents

From 630 total sample sizes; 574 study subjects were participated in the study with a response rate of 91.1%. About 289 (50.3%) of respondents were within the age range of 30-49 years. Among the respondent’s majority 362(63.1%) were females and only 34 (5.9%) were unable to read and write. The marital status of respondents indicates that 538 (93.7%) were married. Two hundred four (35.3%) of the respondents were followers of Orthodox Christianity followed by Muslims which accounts 160 (27.9%). Regarding their monthly income, 321(55.9%) of the respondents have income level of 2000 ETB and above. Out of total respondents 302 (52.6%) were from rural areas (Table 2).

Table 2: Socio-demographic characteristics of study participants (n = 590)

Characteristics	Frequency	Percentage (%)
Sex		
Male	212	36.9
Female	362	63.1
Age		
18-29	117	20.4
30-49	289	50.3
≥ 50	168	29.3
Religion		
Orthodox	204	35.5
Muslim	160	27.9
Protestant	156	27.2
Catholic	54	9.4
Marital status		
Married	538	93.7
Divorced	36	6.3
Level of education		
Unable to read and write	34	5.9
Able to read and write	281	49
Primary school	223	38.9
High school and above	36	6.3
Occupation of mothers		
Farmer	176	30.7

Non- employee	291	50.7
Employed	35	6.1
Other	72	12.5
Monthly income		
Less than 2000	253	44.1
Greater or equal to 2000	321	55.9
Residence		
Urban	302	52.6
Rural	272	47.4

Physical Activities

The vigorous activities ≥ 10 minute/day: 396 (69%) sawing hardwood, 163 (28.4%) ploughing, 37 (6.4%) playing football and 75 (13.1%) weight lifting >20 kg as daily physical activities. The study participants involved in moderate activities at least 10 minute/day were mainly 412 (71.8%) washing clothes by hand, 401 (69.9%) drawing (Fetching) water and 537 (93.6%) walking. The prevalence of sedentary life style or physically inactive was 24 (4.2%) (Table 3).

Table 3: Daily physical activities of the study participants

Variables	Category	No	≤ 10 minute	>10 minute
		No. (%)	No. (%)	No. (%)
Vigorous activities	Sawing hardwood	108 (18.8)	70 (12.2)	396 (69)
	Ploughing	303 (52.8)	108 (18.8)	163 (28.4)
	Playing football	431 (75.1)	106 (18.5)	37 (6.4)
	Weight lifting (>20 kg)	443 (77.2)	56 (9.8)	75 (13.1)
Moderate activities	Gardening	127 (22.1)	219 (38.2)	228 (39.7)
	Washing clothes by hand	63 (11)	99 (17.2)	412 (71.8)
	Drawing (Fetching) water	80 (13.9)	93 (16.2)	401 (69.9)
	Walking	24 (4.2)	13 (2.3)	537 (93.6)
	Riding pedal bicycle	550 (95.8)	11 (1.9)	13 (2.3)

Behavioral Characteristics and History of Morbidities

About 108 (18.8%) of the study participants were current cigarette smokers, 143 (24.9%) were Khat chewers, 110 (19.2%) had drunk alcohol in the previous year. 106 (18.5%) of them had a sedentary lifestyle. 88 (21.9%) of the study participants had BMI ≥ 25 kg/m² (Table 4).

Table 4: Behavioral characteristics, personal and family history of morbidities of the study participants

Variables	Number	Percentage (%)
History of hypertension		
Yes	180	31.4
No	394	68.6
Cigarette smoking		
Yes	108	18.8
No	466	81.2
Alcohol drinking		
Yes	110	19.2
No	464	80.8
Chat Chewing		
Yes	143	24.9
No	431	75.1
Sedentary life style		
Yes	106	18.5
No	468	81.5
Dietary habit		
Enjera with wot	217	37.8
Qocho	357	62.2
BMI		
<25	486	84.7
≥ 25	88	15.3
Having known diabetes mellitus		
Yes	107	18.6
No	467	81.4
Health seeking behavior		
Yes	466	81.2
No	108	18.8

Knowledge, Perception and Practice of the Study Participants

Among the interviewed people, about 325 (56.5%) seeks treatment for HTN symptoms. About 144 (25.1%) of respondents, responded that HTN can be prevented, while 252 (43.9%) knew that HTN could cause complications. Moreover, 253 study participants (44.1%) perceived their susceptibility to HTN. Majority of respondents, 324 (56.4%) had good knowledge towards hypertension. The number of people who said stressful life situation is a reported cause of hypertension was 475 (82.8%), whereas all respondents said that regular blood pressure measurement is important. The detail was described in table 6 as follows (Table 5).

Table 5: Perception and practice of the study participants towards hypertension

Variables	Number	Percentage (%)
Reported causes of hypertension		
Stressful life situation	475	82.8
High salt and fat diet	57	9.9
Sedentary lifestyle	42	7.3

Knew symptoms of hypertension		
Yes	261	45.5
No	313	54.5
Hypertension can be prevented		
Yes	144	25.1
No	430	74.9
Hypertension causes complication		
Yes	252	43.9
No	322	56.1
Regular blood pressure measurement is important		
Yes	574	100
Seek care for hypertension symptoms		
Yes	325	56.6
No	249	43.4
Ever had blood pressure measurement		
Yes	107	18.6
No	467	81.4
Perceived susceptibility to hypertension		
Yes	253	44.1
No	321	55.9

Levels of Knowledge Toward Hypertension

From the study participants 56.4% had good level of knowledge while 43.6% had poor level of knowledge to hypertension.

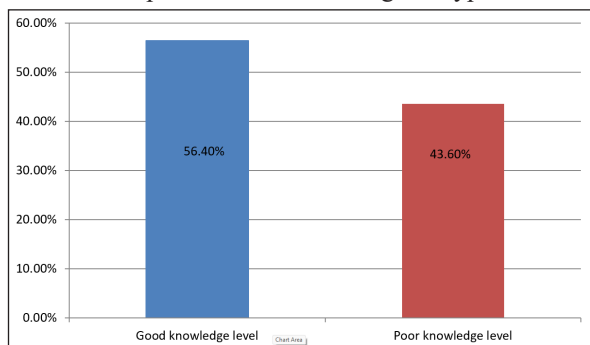


Figure 1: Knowledge of the study participants towards hypertension

Table 6: Bivariate and multivariate logistic regression analysis result for association between variables

Characteristics	Undiagnosed Hypertension		COR (95% CI)	AOR (95% CI)	P-value
	Yes	No			
Sedentary life style					
Yes	70(12.2)	36(6.3)	1.79(1.15,2.77)	2.24(1.37,3.67)	0.00
No	244(42.5)	224(39)			
Cigarette smoking					
Yes	45 (7.8)	63(11)	0.52(0.34,0.80)	0.45(0.28,0.73)	0.00
No	269 (46.9)	197 (34.3)			
Health seeking behavior					

From the total of participants, 260 (45.3%) of respondents had undiagnosed hypertension, while 314 (54.7%) had no hypertension (Figure 1).

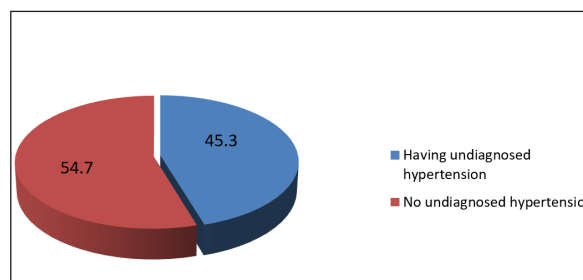


Figure 2: Prevalence of undiagnosed hypertension among adult peoples living in the community

Factors Associated with Undiagnosed HTN

In a bivariate analysis, level of educational, BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income showed significant statistical association with undiagnosed HTN. In multivariate analysis, level of educational, BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income were significant predictors of undiagnosed HTN.

Respondents having sedentary life style had about 2.2 times higher risk of undiagnosed HTN (AOR=2.24, 95% CI 1.37, 3.67; P=0.000] than those who did not. People who had BMI of 25 and above had 2.4 times an increased risk of undiagnosed HTN compared to those below 25 (AOR=2.42, 95% CI 1.43, 4.09; P=0.000]. On the other hand, compared to respondents who smoke, those respondents who did not smoke were 2.2 times less likely to have undiagnosed HTN [AOR:0.45 (0.28,0.73)]. Participants who had health seeking behavior were 2.4 times less likely to have undiagnosed HTN [AOR: 0.41(0.25, 0.66)] than those who had no health seeking behavior. Also, compared to respondents who have monthly income less than 2000 Ethiopian birr, those who have above were 1.5 times less likely to have undiagnosed HTN [AOR: 0.68(0.48,0.97)]. Also, compared to those who eat Enjera with Wot, those who eat Qocho were 1.8 times less likely to have undiagnosed HTN [AOR: 0.57(0.40, 0.83)]. Similarly, compared to those who have poor knowledge towards hypertension, those who have good knowledge were 3.7 times less likely to have undiagnosed HTN [AOR: 0.27 (0.15, 0.46)] (Table 6).

Yes	240 (41.8)	226 (39.4)	0.49(0.31,0.76)	0.41(0.25, 0.66)	0.00
No	74 (12.9)	34 (5.9)			
Dietary Habit					
Enjera with wot	102 (17.8)	115 (20)	0.61(0.43,0.85)	0.57(0.40,0.83)	0.00
Qocho	212 (36.9)	34 (5.9)			
Body mass index (BMI)					
< 25	278 (48.4)	208 (36.2)	1.93(1.22,3.06)	2.42(1.43,4.09)	0.00
≥25	36 (6.3)	52 (9.1)			
Monthly income					
< 2000	126 (22)	127 (22.1)	0.70(0.50,0.98)	0.68(0.48,0.97)	0.03
≥2000	188 (32.8)	133 (23.2)			
Knowledge					
Good	147 (25.6)	177 (30.8)	0.41(0.29,0.58)	0.27(0.15,0.46)	0.00
Poor	167 (29.1)	83 (14.5)			

Discussion

Prevalence of Undiagnosed HTN

In this study the prevalence of undiagnosed hypertension was 260 (45.3%; which was in line within (95% CI (41.3%-49.3%)). This finding was similar with the study findings in Lebanon 42.7% (21) [18]. This study finding was higher than the study reported in Vietnam 17.4% (29) , United States of America (USA) 22.0%, Sri Lanka 31.7% (31), India 10.1%, in western India 26%, Sudan 38.2% and Hawassa, Ethiopia 12.3% [10,23-26]. While this study finding was lower than the study reported in Indonesia 70% (28).

Factors Associated with Undiagnosed HTN

A sedentary lifestyle was seen two times people who had undiagnosed hypertension than those who had no sedentary life. This finding was similar to the study conducted in South India and Bahir Dar City, Northwest, Ethiopia [17]. This might be due to lack of physical exercise and activity.

This study showed that people who had BMI of 25 kg/m² and above were more than two times an increased risk of undiagnosed HTN compared to those below 25 kg/m². This finding was mimic with study employed in West China, India, Nigeria, Cairo, Egypt, Sudan, Hosanna town, Ethiopia and Hawela Tula Sub-City, Hawassa, Southern Ethiopia [10,25-30]. It might be due to peoples whose BMI above the normal were mostly at risk for metabolic disorders and other non-communicable chronic disorders.

On the other hand, respondents who smoke those respondents who did not smoke were 2.2 times less likely to have undiagnosed than those who smoked. This was similar with the studies reported from USA, India, South India and Hawela Tula Sub-City, Hawassa, Southern Ethiopia [10,23,24,30]. This due to smokers may become early clinical apparent and early detection of the hypertension.

Participants who had health seeking behavior were 2.4 times less likely to have undiagnosed HTN than those who had no health seeking behavior. No similar finding with this report. This might be due to those peoples who had health seeking behavior may diagnosed in their hypertension than those who had no seeking behavior.

Also, compared to respondents who have monthly income less than 2000 Ethiopian birr, those who have above were 1.5 times less likely to have undiagnosed HTN. This was similar to the study reported from Bangladeshi, and Chinese [27,31]. The reason might be due peoples who had low income might not visit the health institution to check their health status.

Also, compared to those who eat Enjera with Wot, those who eat Qocho were 1.8 times less likely to have undiagnosed HTN. There was no similar finding with this result. This may be due Qocho was a special cultural inorganic food prepared from plant (Enset) and might not have effect on chronic non communicable diseases.

Similarly, compared to those who have poor knowledge towards hypertension, those who have good knowledge were 3.7 times less likely to have undiagnosed HTN. This result was similar with the finding from Bahir Dar City, Northwest, Ethiopia [17]. This due to people who had adequate knowledge about hypertension may apply protective factors and avoided modifiable risk factors for hypertension.

Conclusion

The overall prevalence of undiagnosed hypertension was 45.3% and level of educational status; BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income were significant predictors of undiagnosed hypertension.

Recommendation

Increasing life style modification and enhancing health seeking behavior of the adult people living in the community has a great impact on the diagnosis and management of hypertension.

Data Sharing Statement

Upon a reasonable request, data are available from the corresponding authors only.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from Wolkite University, College of Health Science Institutional Review Board and permission was sought from each data collection site. Verbal informed

consent was obtained from each selected participant to confirm their willingness. Explanation of the survey purpose, description of the benefits, and an offer to answer all inquiries was made to the respondents. Also, the affirmation that they were free to withdraw consent and to discontinue participation without any form of prejudice was made. Privacy and confidentiality of collected information were ensured throughout the process as no names were written down.

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