

# Magnitude And Associated Factors of Depression and Anxiety Among People with Hypertension in Hawassa City, Sidama Region, Ethiopia, 2022

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## Abstract

**Background:** Anxiety and depression are common among patients with hypertension. However, they are still unrecognized and untreated especially in developing countries. Identifying factors associated with anxiety and depression is helpful for early screening and management. Presence of depression and anxiety among hypertensive patients lead to lack of adherence to treatment and poor compliance to lifestyle adjustments, which increase patient's risk of morbidity and mortality.

**Objectives:** - To assess the magnitude and associated factors of depression and anxiety among people with hypertension in Hawassa city public hospitals, Sidama region, Ethiopia, 2022.

**Method:** A Hospital-based cross-sectional study was conducted in selected public Hospitals in Hawassa City Administration from April to August 2022. A total of 397 participants who have been followed hypertensive clinic were selected by systematic sampling. Depression and anxiety were assessed through Hospital Anxiety and Depression Scale. Pretested and structured questionnaire was used for data collection with face-to-face interview technique. Data were entered in to EPI info version 3.5.3 and exported to SPSS version 20 for further analysis. Descriptive statistics was used to explore the data in relation to relevant variables. Binary logistic regression analysis was employed. Odds ratio with 95% confidence intervals (CI) was computed to assess the magnitude of anxiety and depression among hypertensive patients attending public Hospitals in Hawassa city administration. Associations were determined by using AOR at 95% CI and p value less than or equal to 0.05.

**Result** – The prevalence of anxiety, depression and comorbid anxiety and depression were found to be 37.8%, 29.5% and 16.5% respectively. Factors found to have significant association with depression were being female gender, presence of comorbid illnesses and with long duration of hypertension. Factors found to have significant association with anxiety were being female sex, presence of comorbid illnesses and retired and non-paid job. Similarly being female gender, presence of chronic comorbid illnesses, family history of depression, ever alcohol drinking were associated with comorbid anxiety and depression.

**Conclusion and Recommendation:** - High prevalence of anxiety and depression were observed in Public Hospitals of Hawassa city administration. They are significantly associated with socio-demographic, clinical and behavioral factors. Clinicians and health sector leaders should consider mental health status of hypertensive patients.

**Keywords:** anxiety; associated factors; depression; Ethiopia; hypertension; hawassa city; magnitude and sidama regional state

## 1.Introduction

**Background:** Today world is facing double burden of diseases, especially with increasing burden of non-communicable disease including cardiovascular diseases, cancer, chronic respiratory diseases and diabetes

[1]. In 2016 non communicable diseases were estimated to account for 71% of the 57 million global deaths in addition to that 78% of all NCD deaths, and 85% of premature adult NCD deaths, occurred in low- and middle-income countries (LMICs) [2]. The burden of anxiety and

depression among hypertensive patients are rapidly increasing. Anxiety and depression are common disorders that result in mental illnesses. Hypertensive patients suffering from anxiety and depression are at greater risk to develop cardiovascular diseases [3]. The total number of people living with anxiety and depression in the world are estimated to 322 million and 264 million, respectively [1]. Anxiety and depression are common in diabetic, hypertensive and heart failure patients than the general population [2].

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. This raised blood pressure is one of the leading risk factors for different cardiovascular diseases. If left untreated hypertension contributes high financial burden, myocardial infarction, stroke, renal failure and burden to health systems [4].

The highest prevalence of hypertension was observed in the African Region at 46% of adults aged 25 and above [5]. In Ethiopia NCDs are estimated to account for 39% of all deaths, in 2016. Around 275,000 deaths were due to NCDs in 2015 and nearly 24% were adults 18 years and over expected to have raised blood pressure [1, 2].

Anxiety and depression have a direct relation with chronic illnesses [6, 7]. A meta-analysis study conducted reported that anxiety and depression were common among patients with chronic illness in both developed and developing countries [8]. By 2020, 5.7% increment were expected in the global burden of disease because of depression and by 2030 it become the leading cause of disability worldwide, reduce individual's productivity at work or school performance and at severe stages it can lead to suicide [6].

Depression and anxiety can cause chronic stimulation of sympathetic nervous system that results in insulin resistance and affects the function of the heart and blood vessels [9]. Epidemiological studies suggest that relationship of psychological features, such as anxiety and depression and cardiovascular diseases may involve impaired regulation of the heart by autonomic nervous system [10].

There are different factors that influence depressive symptoms among patients with cardiovascular disorders. Both depressive symptoms and hypertension are psycho-physiologic phenomena [8]. The age, lack of social support, residence, educational level, sex and high numbers of prescribed medications were found as contributing factors for the development of depressive symptoms in hypertensive patients [10, 11].

Those with non-comorbid depressive disorder, non-comorbid anxiety disorder, and comorbid depression-anxiety were more likely to have hypertension compared to persons with neither a depressive nor an anxiety disorder [12].

### 1.2 statement of the problem

Hypertensive patients with chronic diseases are at higher risk to develop mental illnesses. Differently from general population, depression is more

common among patients affected chronic illness (13). Having a chronic illness puts patients at higher risk of anxiety and depression [14]. A facility based cross-sectional study done in Ghana and Nigeria in 2013 revealed the prevalence of depression to be 41.7% and 26.6% respectively [32]. Another similar study done in Ethiopia showed the prevalence of depression to be 24.7% and anxiety 28.5% among hypertensive patients [34].

There were different factors known to affect the magnitude of anxiety, depression and comorbid anxiety and depression among hypertensive patients. A systematic review study done in Ethiopia showed that sex, age and duration of diseases were found to be contributing factors depression [17]. Also, there are other associated factors with anxiety and depression among hypertensive patients, such as low income, lack of social support, educational status and residence of the patients [11, 18, 19, 20, 21].

Anxiety and depression have various undesirable health significances in patients with chronic illnesses. Medication non adherence, rapid disease progression, interfere with a person's ability to function day to day activities and poor quality of life as well as poor health outcomes were effects of untreated and unrecognized anxiety and depression [9, 10, 22].

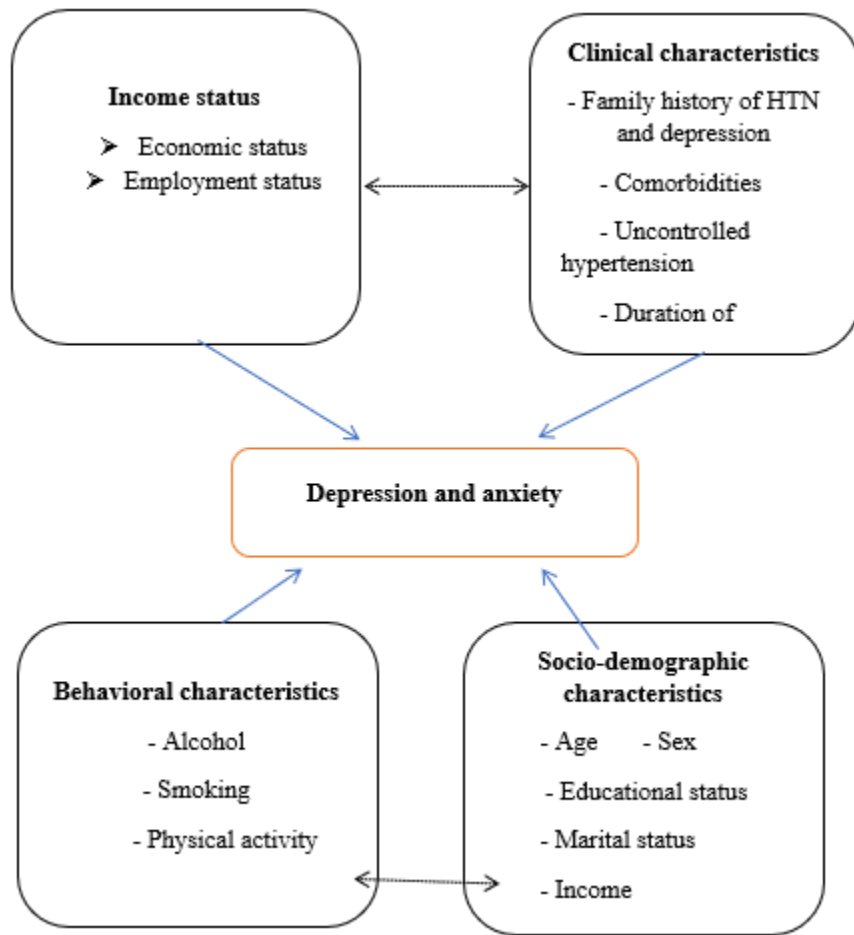
The control of hypertension may insure on individuals being adherent to measure to reduce behavioral risk factors and drug treatment as prescribed [23]. Patient adherence with medical advice is one of the strategies in the management of chronic diseases, like hypertension that can be determined by Anxiety as well as depression [24, 25, 26].

Recognizing contributing factors of anxiety and depression in hypertensive patients is supportive for early identification of cases and management. Nonetheless, magnitude and factors associated with depression and anxiety in patients with hypertension are not evaluated sufficiently in developing countries including Ethiopia. Thus, current study was aimed to assess magnitude associated factors with anxiety and depression among patients attending hypertension follow up clinics in Hawassa city public Hospital, Sidama, Ethiopia.

### 1.3 Significance of the study

This research was expected to put a ground for the identification of the magnitude of anxiety, depression and comorbid anxiety-depression among hypertensive patients in the study area. And it also planned to determine contributing factors of depression and anxiety among hypertensive patients that will help to improve patient's compliance to recommended proper lifestyle and adherence to anti-hypertensive treatment they are on, so that severity can be avoided. The findings of current study will also help hospitals and other similar institutes to better diagnose similar issues for furtherance in their process and also help as baseline information for future research. The study results will help to increase awareness among health care professionals for the early screening and treatment of this problem also.

### 1.4 Conceptual framework



**Figure 1:** Conceptual frame work on the determinants of depression and anxiety among hypertensive patients developed by researchers from different literatures [26, 27, 29, 32 33].

**1. Objectives**

- To assess the prevalence of depression among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia, 2022
- To assess the prevalence of anxiety among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia, 2022
- To identify factors associated with depression among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia, 2022
- To identify factors associated with anxiety among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia, 2022

**2. Methods:**

**3.1 Study area**

Hawassa is the administrative city of Sidama national regional state, which is located 275km away from Addis Ababa the capital city of Ethiopia. According to National census projection the total population of City for the year 2019/20 were 376,940 [12]. Out of the total population 192,239 (51%) females and 184,701 (49%) were males. There are one governmental comprehensive specialized Hospital, two general hospitals, one primary Hospital and six private primary hospitals those with hypertension follow up clinics in Hawassa City Administration. The City also has five health centers and 47 private clinics. The study was conducted in selected public Hospitals found in Hawassa City namely; Adare general hospital and Tula Primary Hospital.

**3.2 Study design and period:** A Facility based cross-sectional study was employed to assess the magnitude and associated factors of depression and anxiety among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia. The study period was August 1 to August 30/2022

**3.3 Source and study population:**

The source population were all patients diagnosed to have high blood pressure who have been visiting hypertension follow up clinics of the public Hospitals of Hawassa city, Sidama region, Ethiopia, 2022. The study population includes all selected hypertensive patients who visited public Hospitals hypertension follow up clinics during the data collection period and included in this study.

**3.4 Sample size calculation:**

For the first and second objectives, sample size was determined using a single population proportion formula.

$$ni = ((a/2)2 (p) (q)/ d^2$$

Where *ni* = required initial sample size,

*Za/2* =critical value for normal distribution at 95% confidence interval which equals to 1.96 (*Z* value at alpha = 0.05),

*p*= proportion of success; the prevalence of depressive symptoms among hypertensive patients

*q* = proportion of failure; hypertensive patients not having comorbid depression and

d= marginal error (0.05);

The sample size for prevalence of depression among hypertensive patients was calculated based on the value found from a study conducted in Addis Ababa that showed a prevalence of depression to be 29.5% among hypertensives (32)

$$n = (1.96)^2(0.295)(0.705) / (0.05)^2$$

n=320

For the second objective, the sample size was calculated using prevalence of anxiety from previous study in Addis Ababa which was 37.8% (32).

$$n = (1.96)^2(0.378)(0.622) / (0.05)^2$$

n=361

For the third objective, the sample size was determined by using common factors that were found to be significantly associated with depression among hypertensive patients, according to studies in the area. EPI-info 7 statistical software was used to calculate the sample size.

S.no	Variable	CI	Power	P	AOR	Non-response Rate	Total sample size	Ref
1	Family history of HTN	95%	80%	8.76%	3.56	10%	256	(14)
2	Comorbid DM	95%	80%	58.8%	2.45	10%	185	(16)
3	Low socio-economic status	95%	80%	11.7%	1.88	10%	334	(32)

**Table 1:** Sample size calculated for objective three by using previous factors commonly associated with depression among hypertensive patients

For the fourth objective, the sample size was determined for common factors that were also found to be significantly associate with anxiety among hypertensive patients, according to studies in different areas and EPI-info 7 was used to calculate the actual sample size.

S.no	Variable	CI	Power	P	AOR	Non-response Rate	Total sample size	Ref
1	Unable to read and write	95%	80%	24.93%	2.67	10%	256	(16)
2	Female sex	95%	80%	22.01%	3.02	10%	175	(32)
3	Older age	95%	80%	42.56%	4.55	10%	352	(32)

**Table 2:** Sample size calculated for objective four by using factors those commonly associated with anxiety among hypertensive patients

So the largest sample size was taken which is 361

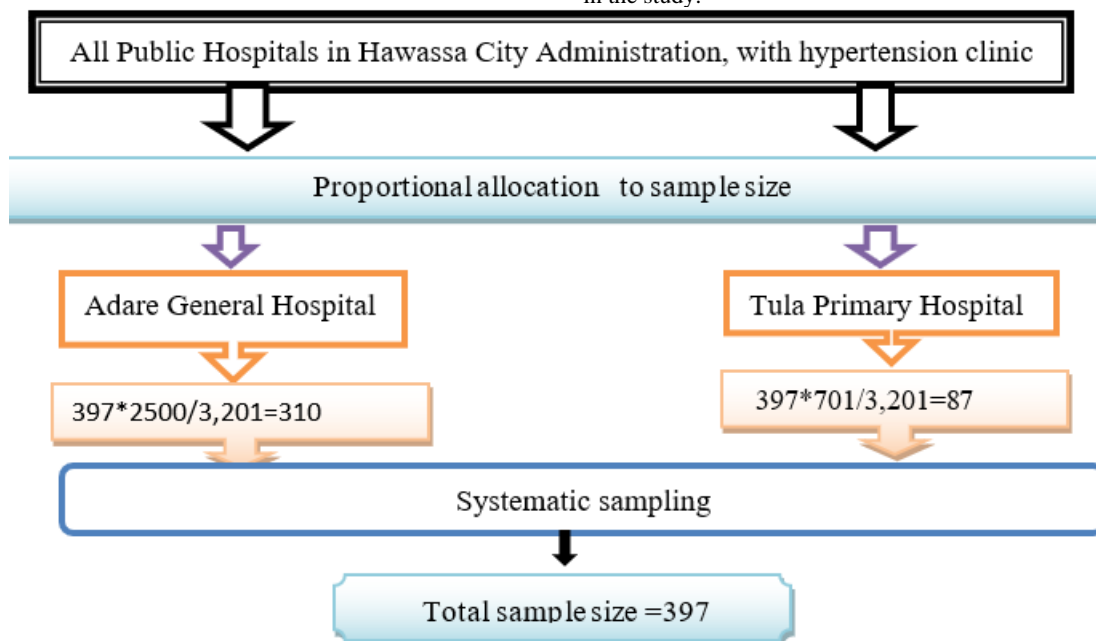
After that it was adjusted for 10% non-response rate,

$$N_i = (361 * 10\%) + 361 = 36 + 361 = 397$$

So, the final sample size was 397

**3.5 Sampling technique:** In Hawassa City there are 4 public hospitals that gave hypertension follow-up services; of those two were selected using a

lottery method by using simple random sampling. The hospitals were to be Adare General Hospital and Tula Primary Hospital. The study was conducted in hypertension follow up clinics of the selected hospitals. Sample size for each hospital were proportionally allocated based on the previous three months' patient visit load from the register. Accordingly, 310 from Adare General Hospital and 87 Tula Primary Hospital respectively then systematic random sampling technique was used to reach each sample hypertensives and every 8<sup>th</sup> hypertensives was included in the study.



**Figure 1:** Schematic presentation of sampling technique of a study on the magnitude and associated factors of depression and anxiety among hypertensive patients attending public Hospitals in Hawassa city, Sidama region, Ethiopia, 2022.

### 3.5 Inclusion and exclusion criteria

All adult (older than 18 years) hypertensive patients who have been under treatment for hypertension in selected public Hospitals of Hawassa city for last six months prior to study were included.

Pregnant mothers who could have gestational hypertension which can be resolved after delivery were excluded. Similarly those patients with coma during their follow up were also excluded from the study.

**3.6 Study variables:** The Anxiety, Depression and comorbid depression and anxiety were outcome/dependent variables. The contributing/independent variables were classified as socio-demographic and economic factors like Age in years, sex, marital status, monthly income, employment, education and religion. Behavioral factors like alcohol consumption, cigarette smoking and physical activity. Clinical factors like comorbidities, status of blood pressure control, duration of hypertension, family history of hypertension and depression.

### 3.7 Operational definition and terms

**Hypertension:** Is defined as a rise in blood pressure when systolic blood pressure  $\geq 140$  mm Hg and/or diastolic blood pressure  $\geq 90$  mm Hg (44).

**Depression:** Score of greater than or equal to 8 for HAD depression sub-scale.

**Anxiety:** Score of greater than or equal to 8 for HAD anxiety sub-scale.

**Controlled blood pressure** is systolic  $< 140$  or diastolic  $< 90$  and uncontrolled blood pressure is systolic  $\geq 140$  or diastolic  $\geq 90$  (45).

**Current smoker:** Adults categorized as current smoker when they are using cigarette in the past one month and When individuals smoked at least once in their life time they were categorized as ever smoker.

**Current drinker:** Adults categorized as current drinker when they are using alcohol in the past one month and when individuals drink alcoholic beverages at least once in their life time they were categorized as lifetime drinker [41].

**Physically active:** those who are doing moderate to vigorous activity at work or leisure time for at least 30 minutes, for 4 or more days in a week [46].

**Comorbid illnesses:** arthritis, HIV/AIDS, Leprosy, stroke, heart attack, heart disease, asthma, any other chronic lung disease (COPD or emphysema), chronic kidney disease, chronic liver disease, diabetes, thyroid disease, neurological problems (seizure, epilepsy, Parkinson's), cancer

### 3.8 Data collection process and tool:

The questionnaire was initially prepared in English and translated into Amharic then back translated into English by language experts to check its consistency. The questionnaire included socioeconomic and demographic characteristics (age, sex, educational status, marital status, permanent residence employment and income) behavioral characteristics (alcohol consumption, cigarette smoking, and physical activity) and Clinical characteristics (family history of hypertension, family history of depression and duration of hypertension). The participant's blood pressure and comorbidities were taken from their medical records. The questionnaire was developed and modified based on the World Health Organization instruments for stepwise surveillance (WHO STEPS) of chronic disease risk factors [41].

Depression and anxiety were evaluated using the Hospital Anxiety and Depression Scale (HADS) [35]. Hospital Anxiety and Depression Scale (HADS) has 14 questions, seven of them are about anxiety (HAD-A) and the rest of them are about depression (HAD-D). Based on subject's response, score for each of the question in the sub-scales are sum up. In each of the sub scales the scores range from 0 to 21 and the items have

four points scale. The higher the score is the more severe the symptoms. The scores are classified as follows:

Normal [0–7], Mild depression or anxiety [8–10], marked depression or anxiety [11–21] [23]

Both depression and anxiety were scored separately.

A study showed that the HADS is a very effective tool for diagnosis of depression and anxiety symptoms in outpatients of a general hospital [29]. HADS primarily focuses on non-physical symptoms so that we can apply it for the diagnosis of depression, regardless of subject's significant physical ill health [38]. The tool has been validated in Ethiopia [35].

For participants who will be found to be markedly depressed or anxious in the screening tool, additional information will be given by the interviewers and a link will be provided with psychiatric clinic of the hospitals for the confirmation of the diagnosis. The adapted questionnaires were modified and contextualized to fit the local situations and the research objective.

Data were collected by 4 BSc nurses and 2 MPH holder supervisors at the follow up clinic. Two days training was given for data collectors and supervisors how they approach the study groups and fill the questionnaires by the principal investigator. The training included a briefing on general objectives of the study, approach of study participants, approach each item in the instrument, data collecting procedure, to include or exclude the target data source and how to access the study participants, data submission, data handling and time management.

Data collectors and supervisors had been familiarized with each questions of the interview schedule especially on the translated one through reading and discussing. The clarifications of each questions regard to its purpose were made clear. An orientation was given on how to fill out the questions of the structure of the interview schedule, both open and closed-ended questions, the skip patterns, observation questions, questions with one and multiple responses. Morley emphasis was also given them about how to establish mutual trust with respondents before asking questions.

The overall supervision was carried out by the principal investigators.

**Pilot study:** A 10% of actual sample size questionnaires were pre tested at Leku Hospital where outside the study site before actual data collection. The aim of piloting was to test the data collection tool as well as equip and familiarize the data collectors and supervisors with the data collection instruments. Based on the pilot study findings, some changes and corrections were made in the questionnaires.

### 3.9 Data Quality Control

Data quality assurance mechanisms was carefully developed and implemented at various stages of the study. For all study areas, four data collectors & two supervisors who were able to communicate in English, Amharic and Sidaamu Afoo were selected and recruited preferably those had been involved in other similar surveys. For effective and quality data collection, intensive training was given for two days to the selected data collectors and supervisors by the principal investigators to achieve the stated objectives.

The investigators and supervisors were made a exhaustive check before receiving the filled questionnaire from each data collectors and in the meantime, they were randomly select the questionnaire to cross check its completeness and errors on spot.

### 3.10 Data processing and analysis

Data were entered in to Epi info version 3.5.3 and transported to SPSS Version 20 for analysis. Frequencies, percentages and summary statistics were computed to describe the study population in relation to relevant variables. Bivariate analysis using Chi-square test and Fisher's exact test were calculated to examine association of independent variables with dependent variables. Bivariate analysis using cross tabulation was done

to see the association between each independent variables and the outcome interest and crude odds ratio (COR) with 95% CI was obtained. Then, variables observed in the bivariate analysis with ( $p$ -value  $< 0.25$ ) were subsequently included in the final models of multivariable logistic regression to control for possible confounding effect and to assess the separate effects of each variable on the outcome variable. The strength of statistical association was checked by using adjusted odds ratios (AOR) and 95% confidence intervals (CI) and  $p \leq 0.05$  was considered as statistically significant.

Data editing were done at field level by supervisors and at central level by principal investigators to correct the evident errors like an entry in the wrong place were corrected. For instance entry recorded in year when it should have been recorded in months for the age of index child were corrected and the like also done accordingly. All the necessary coding were done prior to data analysis. Data were arranged into similar categories or groups based on their common characteristics. For instance, study variables such as age of respondent and income were classified according to their common characteristics.

Before starting data entry, the filled questionnaires were reviewed for completeness and consistency of quantitative data. The missed values were verified against the sources accordingly. After cleaning, the interview schedules were coded numerically with in each hospital.

## 4. Result:

### 4.1 Description of the socio-economic and demographic

Total study sample were 397 of which 388 hypertensive patients were interviewed, which made response rate to be 97.8%. Out of the total respondents 209 (53.8%) were males. Mean age were 49.47 years (SD=11.46), with majority 131 (33.7%) were in the age group 48-57 years.

Regarding the educational status of respondents 53 (13.8%) were unable to read and write, while 90 (23.1%) attended primary education. More than two third 263 (67.8%) were married and nearly 384 (99%) were permanent resident of Hawassa City. The monthly median average income were 2500 birr (inter-quartile range of 1500 birr), one hundred thirty five (34.9%) were government employees.

Variables		Frequency (n=388)	Percent (%)
Sex	Male	209	53.8
	Female	179	46.2
Age	18-27 years	9	2.5
	28-37 years	52	13.5
	38- 47 years	111	28.7
	48-57 years	131	33.7
	58-67 years	62	16
	=>68 years	22	5.7
Employment status	NG employee	25	6.4
	Government employee	135	34.9
	Self employed	28	7.1
	Non – paid job	14	3.7
	Home maker	50	13
	Retired	70	18.2
	Unemployed (able to work)	27	6.9
Unemployed (unable to work)	38	9.8	
Marital status	Married	263	67.8
	Single	29	7.6
	Widowed	27	6.9
	Divorced	69	17.7
Educational status	Unable to read and write	53	13.8
	Primary education	90	23.1
	2ry and preparatory education	87	22.4
	College and above	158	40.8
Residence	Urban	384	99
	Rural	4	1
Monthly average income	<1,000 birr	91	23.3
	1,000-3,599 birr	259	66.8
	3,600-10,799 birr	27	6.9
	=>10,800 birr	11	2.9

**Table 3:** Description of socio-economic and demographic characteristics of hypertensive patients attending public hospitals in Hawassa, Sidama, Ethiopia, 2022

### 4.2 Clinical and individual characteristics of respondents

As it is shown in the table 4, at least one or more comorbid illnesses are presented in two fifth (41.3%) of the respondents and blood pressure is under control status in more than half (57.5%) of them. Duration of hypertension in 118 (30.5%) of the participants is greater than 10 years. Family history of hypertension and family history of depression reported by 50 (12.8%) and 76 (19.7%) of the respondents respectively. From all

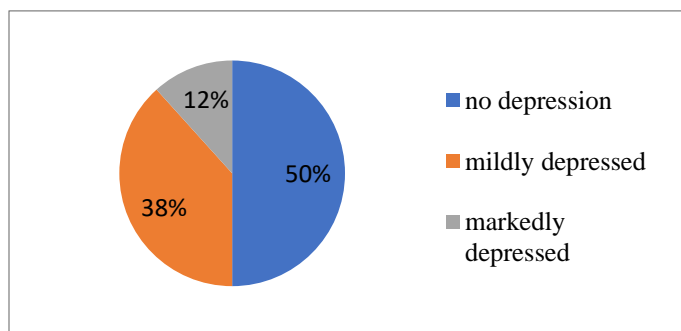
the respondents 38 (9.8%) of them smoke cigarette at least once in their life and 16 (42.5%) of them are current smokers. In addition to this, 274 (70.5%) of the participants drink alcohol once in their life and 176 (64.5%) of them currently drink alcohol. About one tenth (14%) of the respondents do physical activity at leisure time or work (Table 4).

Variables		Frequency (n=388)	Percent (%)
Comorbid illness	Yes	160	41.3
	No	228	58.7
Blood pressure control	Yes	223	57.5
	No	165	42.5
Duration of hypertension	<5 years	125	32.2
	5-10 years	145	37.3
	>10 years	118	30.5
Family history of HTN	Yes	50	12.8
	No	338	87.2
Family Hx of depression	Yes	76	19.7
	No	312	80.3
Ever smoke	Yes	38	9.8
	No	350	90.2
Current smoke	Yes	16	4.2
	No	372	95.8
Ever alcohol	Yes	274	70.5
	No	114	29.5
Current alcohol	Yes	176	45.5
	No	212	54.5
Physical activity	Yes	56	14.5
	No	332	85.5

**Table 4:** Description of clinical, behavioural and individual characteristics of hypertensive patients attending public hospitals in Hawassa, Sidama, Ethiopia, 2022

**4.3 Prevalence of depression among hypertensive patients**

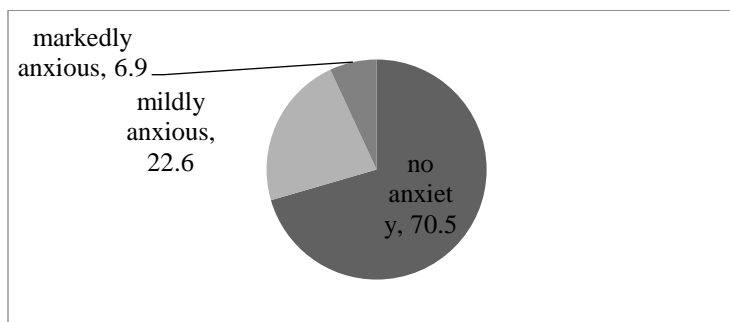
The prevalence of depression among hypertensive patients found to be 37.8% (95% CI; 33.4-42.5%) with 24.6% of them were mildly depressed and 13.2% were markedly depressed.



**Figure 3:-** The prevalence of depression among hypertensive patients visiting selected public hospitals in Hawassa, Sidama, Ethiopia, 2022

**4.4 Prevalence of anxiety among hypertensive patients**

The prevalence of anxiety among hypertensive patients found to be 29.5% (95% CI; 24.8-33.9%) with 22.6% of them were mildly anxious and 6.9% were markedly anxious.



**Figure 4:-** The prevalence of anxiety among hypertensive patients visiting selected public hospitals in Hawassa, Sidama, Ethiopia, 2022 G.C

**4.5 Prevalence of comorbid anxiety-depression among hypertensive patients**

From total participants of the study 16.5% (95% CI; 13.3-19.9%) of them had comorbid anxiety and depression and 50.9% (95% CI; 45.9-55.8%)

of the participants had either depression or anxiety. In addition to this, 43.5% of hypertensive patients with depression had comorbid anxiety and 55.8% of the hypertensive patients with anxiety had comorbid depression.

**4.6 Factors associated with depression, anxiety and comorbid anxiety and depression among hypertensive patients**

**4.6.1 Factors associated with depression**

Bivariate logistic regression analysis was done to examine the association of each independent variables with depression. Variables with P-value of less than 0.25 on bivariate logistic regression, sex, marital status, monthly income, presence of comorbid illnesses, blood pressure control, duration of hypertension, family history of depression and current alcohol drinking status were entered into multivariable logistic regression. In the final

model the strength of association was measured by AOR with 95% confidence interval and variables associated with depression with P-value <=0.05 considered as significantly associated.

As shown in table 5, in multivariable logistic regression analysis, females were 5.4 times more likely to have depression compared to males. Married subjects had 75% reduced odds of having depression compared to those who were single. Those who had comorbid illnesses were 3 times more likely to have depression when compared to those who have no any comorbid illnesses. And those with uncontrolled blood pressure were 2.8 times more likely to have depression when compared with those subjects who have controlled blood pressure. Participants with duration of hypertension 5 to 10 years are 3.2 times and more than 10 years are 5.8 times more likely to have depression compared to patients with less than 5 years of hypertension duration. Participants with family history of hypertension were 4.5 times more likely to have depression when compared to their counterparts. Currently alcohol drinker participants were 1.8 times more likely to have depression compared to those who were not alcohol drinkers currently.

Variables	Depression n (%)	No Dep n (%)	COR (95% CI)	AOR (95% CI)	P- value
Sex					
Male	53(25.6)	156 (74.4)	1	1	
Female	93(52.1)	86(47.9)	3.17(2.09-4.81)	5.37(3.08-9.35)	0.000***
Marital status					
Married	59(22.5)	204(77.5)	0.40(0.17-0.99)	0.25(0.08-0.78)	0.017*
Divorced	25(36.1)	44(63.9)	0.78(0.47-1.38)	0.94(0.48-1.83)	0.860
Widowed	7(25)	20(75)	0.46(0.20-1.15)	0.42(0.12-1.41)	0.159
Single	12(41.9)	17(58.1)	1	1	
Monthly average income					
<1,000 birr	51(55.8)	40(44.2)	1.77(0.52-5.97)	0.80(0.17-3.80)	0.779
1,000-3,599 birr	77(29.8)	182(70.2)	0.59(0.18-1.93)	0.32(0.07-1.38)	0.126
3,600-10,799 birr	14(53.6)	13(46.4)	1.62(0.41-6.34)	0.57(0.10-3.24)	0.528
=>10,800 birr	5(41.7)	6(58.3)	1	1	
Comorbid illnesses					
Yes	84(52.4)	76(47.6)	2.88(1.90-4.37)	3.03(1.78-5.16)	0.000***
No	63(41.4)	165(58.6)	1	1	
Blood pressure control					
Yes	57(25.6)	166(74.4)	1	1	
No	90(54.3)	75(45.7)	3.45(2.27-5.25)	2.80(1.65-4.75)	0.000***
Duration of HTN					
>10 years	63(53.2)	55(46.8)	4.83(2.75-8.45)	5.8(2.90-11.65)	0.000***
5-10 years	60(41.4)	85(58.6)	3.00(1.75-5.16)	3.17(1.61-6.23)	0.001***
<5 years	24(19.1)	101(80.9)	1	1	
Family Hx of depression					
Yes	50(66.3)	26(33.7)	4.39(2.61-7.38)	4.53(2.37-8.66)	0.000***
No	96(30.9)	216(69.1)	1	1	
Current alcohol					
Yes	73(41.6)	103(58.4)	1.34(0.90-2.00)	1.77(1.02-3.07)	0.041*
No	74(34.7)	148(65.3)	1	1	

\*Statistically significant at p-value<0.05, \*\* statistically significant at p-value<0.01, \*\*\* statistically significant at p-value<0.001, COR = crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval.

**Table 5:** Factors associated with depression among hypertensive patients attending public hospitals in Hawassa, Sidama, Ethiopia, 2022

**4.6.2 Factors associated with anxiety**

Bivariate logistic regression analysis was done to examine the association of each independent variable with anxiety. Variables with P-value of less than 0.25 on bivariate logistic regression, sex, employment status, monthly income, presence of comorbid illnesses, blood pressure control, duration of hypertension, family history of depression, current cigarette smoking, current alcohol drinking status and physical activity, were entered into multivariable logistic regression. In the final model the strength of association was measured by OR with 95% confidence

interval and variables associated with anxiety with P-value <0.05 considered as significantly associated.

As seen in table 6, in multivariable logistic regression analysis, female hypertensive subjects are 3.1 times more likely to have anxiety when compared with males. Those who are retired are 6.4 times and with non-paid job are 6.5 times more likely to have anxiety compared to subjects who work in non-governmental organization.

Participants with comorbid illnesses are 3.1 times more likely to have anxiety when compared with participants who have no comorbid illnesses. Subjects with duration of hypertension 5 to 10 years were 2.7



times more likely to have anxiety compared to those with duration of hypertension less than 5 years. And participants with duration of hypertension more than 10 years were 4.9 times more likely to have

anxiety compared to those with duration of hypertension less than 5 years. Those participants who drink alcohol currently were 2.2 times more likely to have anxiety compared with their counterparts.

Variables	Anxiety n (%)	No anxiety n (%)	COR (95% CI)	AOR (95% CI)	P- value
<b>Sex</b>					
Male	41(19.6)	168(80.4)	1	1	
Female	73(41)	106(59)	2.84(1.82-4.42)	3.10(1.77-5.42)	0.000***
<b>Employment status</b>					
Unemployed (unable to work)	13(35)	25(65)	2.96(0.85-10.32)	1.62(0.40-6.61)	0.504
Unemployed (able to work)	1(3.6)	26(96.6)	0.20(0.02-1.96)	0.25(0.02-2.74)	0.259
Retired	26(37.8)	44(62.2)	3.35(1.05-10.73)	6.35(1.73-23.32)	0.005**
Homemaker	16(32.1)	34(67.9)	2.60(0.77-8.72)	1.34(0.32-5.60)	0.693
No paid job	4(26.7)	10(73.3)	2.00(0.42-9.55)	6.54(1.18-36.41)	0.032*
Self employed	9(31)	19(69)	2.48(0.66-9.31)	1.87(0.41-8.48)	0.417
Government employee	41(30.3)	94(69.7)	2.39(0.78-7.35)	2.71(0.78-9.47)	0.117
Non-governmental employee	4(15.4)	21(84.6)	1	1	
<b>Monthly average income</b>					
<1,000 birr	37(41.1)	54(58.9)	2.09(0.53-8.22)	1.74(0.36-8.45)	0.494
1,000-3,599 birr	65(25)	194(75)	1.00(0.26-3.80)	1.06(0.24-4.72)	0.943
3,600-10,799 birr	10(35.7)	17(64.3)	1.67(0.37-6.71)	1.54(0.27-8.86)	0.630
=>10,800 birr	3(25)	8(75)	1	1	
<b>Comorbid illnesses</b>					
Yes	66(41.1)	94(58.9)	2.57(1.66-3.97)	3.13(1.79-5.47)	0.000***
No	49(21.3)	179(78.7)	1	1	
<b>Blood pressure control</b>					
Yes	51(23.1)	172(72.9)	1	1	
No	63(38.2)	102(61.8)	2.06(1.34-3.17)	1.22(0.71-2.09)	0.474
<b>Duration of HTN</b>					
>10 years	47(39.5)	71(60.5)	2.92(1.65-5.65)	4.85(2.29-10.26)	0.000***
5-10 years	45(30.9)	100(69.1)	2.00(1.14-3.50)	2.71(1.35-5.43)	0.005**
<5 years	20(18.3)	105(81.7)	1	1	
<b>Family Hx of depression</b>					
Yes	28(36.3)	48(63.7)	1.48(0.88-2.47)	1.79(0.95-3.39)	0.072
No	87(27.8)	225(72.2)	1	1	
<b>Current smoke</b>					
Yes	0(0)	16(100)	0.00(0.00-)	0.00(0.00-)	0.998
No	114(30.8)	258(69.2)	1	1	
<b>Current alcohol</b>					
Yes	59(33.5)	117(66.5)	1.42(0.93-2.19)	2.23(1.29-3.87)	0.004**
No	55(26.1)	157(73.9)	1	1	
<b>Physical activity</b>					
Yes	12(22)	44(78)	1	1	
No	102(30.7)	230(69.3)	1.57(0.82-3.09)	2.12(0.95-4.71)	0.065

\*Statistically significant at p-value<0.05, \*\* statistically significant at p-value<0.01, \*\*\* statistically significant at p-value<0.001, COR = crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval

**Table 6:** Factors associated with anxiety among hypertensive patients attending public hospitals in Hawassa, Sidama, Ethiopia, 2022

**4.6.3 Factors associated with comorbid depression and anxiety**

As described in table 9, bivariate logistic regression analysis was done to examine the association of each independent variable with comorbid depression and anxiety. Variables with P-value of less than 0.25 on bivariate logistic regression, sex, monthly income, presence of comorbidities illness, blood pressure control, duration of hypertension, family history of hypertension, family history of depression, current smoking and ever alcohol drinking status, were entered into multivariable logistic regression. In the final model the strength of association was measured by OR with 95% confidence interval and variables associated with comorbid depression and anxiety with P-value <0.05 considered as significantly associated.

Accordingly female hypertensive patients were 9.9 times more likely to have comorbid depression and anxiety when compared with male

hypertensive subjects. Subjects with comorbid illnesses were 2.4 times more likely to have comorbid depression and anxiety when compared with hypertensive patients who have no any comorbid illnesses.

Hypertensive patients with duration of hypertension more than 10 years were 5.2 times more likely to have comorbid depression and anxiety compared to participants with duration of hypertension less than 5 years.

Study subjects with family history of hypertension were 4.5 times more likely to have comorbid depression and anxiety when compare with subjects who have no family history of hypertension. Participants who ever drink alcohol were 3.3 times more likely to have comorbid depression and anxiety when compared to those participants with no lifetime alcohol drinking status.

Variables	Comorbid A & D n (%)	No comorbid A & D n (%)	COR (95% CI)	AOR (95% CI)	P- value
Sex					
Male	11(5.5)	198(94.5)	1	1	
Female	52(29.3)	127(70.7)	7.13(3.68-13.8)	9.88(4.44-21.96)	0.000***
Monthly average income					
<1,000 birr	30(23.6)	61(76.4)	1.45(0.37-5.75)	0.90(0.15-5.59)	0.911
1,000-3,599 birr	24(9.5)	235(90.5)	0.30(0.08-1.20)	0.26(0.05-1.56)	0.142
3,600-10,799 birr	8(28.6)	19(71.4)	1.20(0.26-5.61)	0.75(0.10-5.59)	0.776
=>10,800 birr	1	1	1	1	
Comorbid illnesses					
Yes	37(23.2)	123(76.8)	2.28(1.34-3.88)	2.35(1.18-4.70)	0.016*
No	27(11.7)	201(88.3)	1	1	
Blood pressure control					
Yes	21(9.4)	202(90.6)	1	1	
No	43(26)	122(74)	3.39(1.95-5.90)	1.89(0.92-3.89)	0.082
Duration of HTN					
>10 years	32(27.4)	86(72.6)	5.81(2.57-8.15)	5.21(2.01-9.49)	0.001**
5-10 years	24(16.4)	121(83.6)	3.03(1.32-6.97)	2.33(0.88-6.16)	0.087
<5 years	8(6.1)	117(93.9)	1	1	
Family Hx of HTN					
Yes	4(7.7)	46(92.3)	0.39(0.13-1.11)	0.84(0.24-3.02)	0.794
No	60(17.7)	278(82.3)	1	1	
Family Hx of depression					
Yes	25(32.5)	51(67.5)	3.36(1.90-5.95)	4.51(2.10-9.71)	0.000***
No	39(12.5)	273(87.5)	1	1	
Ever alcohol					
Yes	52(18.8)	222(81.2)	1.91(0.99-3.64)	3.34(1.48-7.52)	0.004**
No	12(10.8)	102(89.2)	1	1	
Current smoking					
Yes	0(0)	16(100)	0.00(0.00-)	0.00(0.00-)	0.998
No	64(17.2)	308(82.8)	1	1	

\*Statistically significant at p-value<0.05, \*\* statistically significant at p-value<0.01, \*\*\* statistically significant at p-value<0.001, COR = Crude odds ratio at 95% confidence interval; AOR = adjusted odds ratio at 95% confidence interval

**Table 7:** Factors associated with comorbid anxiety and depression among hypertensive patients attending public hospitals in Hawassa, Sidama, Ethiopia, 2022

## 5. Discussion

The current study was carried out to assess the magnitude and factors associated with depression and anxiety among hypertensive patients attending selected public hospitals in Hawassa city administration. The result revealed that the prevalence of depression among hypertensive patients to be 37.8%, and it is consistent with study result in Ghana 41.7% [32], Pakistan 40.1 [28] and India 41% [27].

In contrary to this finding, the current finding is lower than study in Afghanistan which was 58.1% [29]. The reason for the difference could be the health facilities set up of the countries. In opposite to this study, the lower prevalence of depression obtained from the study conducted in Jimma, Western Ethiopia, in 2019 found to be 24.7% [33]. Studies in Ghana and Nigeria found prevalence of depression to be 11% [26] and 26.6% [32] respectively. The difference might be due to geographical variations, readiness of health facilities and method of assessment of depression.

The prevalence of anxiety among hypertensive patients was found to be 29.5%, which is nearly consistent with study conducted in Menelik Hospital, in Ethiopia, in 2016, which was 28.5% of participants with hypertension to have anxiety (34). However, the finding of this study is smaller than a study in Afghanistan 42.3 % [29] and Saudi Arabia 38.4

% [31]. The difference could arise from cultural and environmental difference. In contrary to this study, the prevalence of anxiety among hypertensive patients in Ghana was found to be 57% [20]. The possible reason for these variations might be due to difference in instrument and the settings studies conducted [29].

The finding of this study showed that 16.5% of participants have comorbid depression and anxiety and half of subjects suffer from either anxiety or depression. High prevalence of comorbid anxiety and depression reported from a study in Afghanistan which is 28.2% [29], similarly a study in Saudi Arabia reported 29.5% to have comorbid anxiety and depression and prevalence of either of the disorders were 57.3% [31]. The above-mentioned reasons could explain the difference observed.

According to this study, hypertensive females have 5.4 times increased chance to be depressed. This is higher than a study finding from South Africa, which is 3.5 times [26] and much higher than study findings from Jimma Medical center, Western Ethiopia, a 2.6 times increased risk [33]. Similarly, majority of literature suggests the same findings [27, 28, 30, 31, 35]. Possible explanation for this variation might be socio-cultural variation. In addition to this, higher magnitude of depression in females could rise from changes in sex hormone and influences in females related

to social norms and gender issues, which are parents restrictive behaviors towards their daughter than sons affects their daughters senses of self-control and self-esteem and make them vulnerable to depression. Sexual and domestic violence could also contribute for the higher risks in females [25].

With respect to marital status, married hypertensive patients have 75% reduced chance being depressed. The study in India, Bosnia and Herzegovina reported same findings [27, 35]. Differently from this, studies in Ethiopia, South Africa, Pakistan, Afghanistan and Ghana found that marital status of hypertensive patients have no association with their depression status [26, 27, 28, 29, 32]. The possible reason for this could be married hypertensive patients are being stable, sharing the increasing burden of living cost and retaining positive healthy behaviors.

The study finding revealed that hypertensive patients with comorbid illnesses are 3 times more likely to be depressed. Similar result was obtained from the study conducted in Afghanistan that hypertensive patients with comorbid diabetes were 22.7 times more likely to have depressed [29]. A possible reason could be that comorbid illnesses may increase the stress.

In respect to blood pressure control, the result showed that hypertensive patient with blood pressure is uncontrolled are 2.8 times more likely to be depressed. The finding of this study is consistent with a study in Saudi Arabia [30]. It could be because of poor adherence of hypertensive patients to their medications result in poor blood pressure.

Also this study examined that hypertensive patient with duration of hypertension 5 to 10 years and more than 10 years have 3.2 and 5.8 times increased chance of being depressed respectively. This finding is consistent with previous study conducted in Pakistan [27]. The reason might be that as time of being comorbid increase the worries also increase and the client might be depressed.

A family history of depression are 4.5 times more like to have depression. Similar finding was also obtained from the study conducted at Jimma, Western Ethiopia, hypertensive patients with family history of depression have 7 times higher chance of being depressed [33]. The reason might be that similarity in genetically factors.

The hypertensive patient who drink alcohol have 1.8 times increased chance of being depressed. This finding is similar with study findings in South Africa, which was 1.9 times higher chance of being depressed [25]. The possible reason for this could be influence of health effect, social problem, economic and productivity loss associated with alcohol increase the risk of depression and anxiety.

According to this study, female hypertensives are 3.1 times more likely to be anxious. This finding is comparable with study findings in Ethiopia and in South Africa, a 2.57 and 3.2 times higher chance of anxiety among female hypertensives respectively [26, 34]. In addition to this, study conducted in China, found significant association with occurrence and severity of anxiety among female hypertensives patients [21]. The possible explanation could be the higher burden for females, domestic and gender based violence could also contribute.

Also this study finding showed that study participants who are retired and non-paid job are more likely to be anxious. In contrary to this few studies showed no association of occupational status with hypertensive patient of being anxious were reported [21, 26]. The reason might be retired peoples are less interact with other peoples because of their limited movement which makes them unable to share their ideas and feelings that lead them to feeling of being isolated and ignored.

The findings of this study also shown that hypertensive patient with duration of hypertension 5 to 10 years and more than 10 years are 2.7 and 4.9 times more likely to be anxious respectively when compared to subjects with duration of hypertension less than 5 years. The result is in line with studies which studied that severity of anxiety increases with

duration of hypertension when persists for more than 5 years [21]. The reason might be that due the increase of stress as time increases.

According to this study, female hypertensive patient were 9.9 times more likely to develop comorbid anxiety and depression. This is also supported with other studies' result that female hypertensive subject had 12.5 higher odd of being comorbid anxious and depressed compared to male hypertensive subjects [26]. The above suggested reasons for anxiety and depression could explain the higher odd of females to have comorbid anxiety and depression.

With respect to comorbid illnesses, the study revealed that comorbid illnesses with hypertension to increase the probability of being comorbid anxious and depressed by 2.4 times. This is consistent with the study result obtained from Indian which reported hypertensive subject with comorbid diabetes are 10.2 times more likely to have comorbid anxiety and depression [29].

This study also reported that ever alcohol drinker hypertensive subjects are 3.3 times more likely to have comorbid anxiety and depression compared to their counter parts. The above predicted reason for depression and anxiety might attribute for the higher odds of comorbid anxiety and depression among subjects with comorbid illnesses.

### Strength and Limitation of the study

Current study had numerous strengths. Among these, outcome variables (anxiety and depression) are assessed through validated tools (HADS), it was carried out in representative selected public hospitals. Likewise there were limitations of the study also. Due to its cross sectional nature of study it was difficult to know temporal relationship, there was possibility of recall bias and since the study was done in institutions, it might not be generalized to the general population with hypertension.

### Conclusion

High prevalence of anxiety, depression and their correlate were observed in selected public hospitals of Hawassa city administration. Depression was significantly associated with female gender, being married, presence of comorbid illnesses, uncontrolled blood pressure, duration of hypertension 5 to 10 and more than 10 years, family history of depression and current alcohol drinking. On the other hand, anxiety was found to be significantly associated with the being female gender, presence of comorbid illnesses, duration of hypertension 5 to 10 and more than 10 years, current alcohol drinking, retired and hypertensive subjects with non-paid job. Comorbid anxiety and depression were also found to have significant association with the being female gender, presence of comorbid illnesses, duration of hypertension more than 10 years, family history of depression and drinking alcohol ever.

**Recommendations:** Based on the findings of the study the following recommendations are suggested:- Prepare trainings for health professionals to widen their understandings about high burden and determinant factors of anxiety and depression among hypertensives, provide hypertension clinics with anxiety and depression screening tool, educate hypertensive patients about depression and anxiety risks and modifiable factors like alcohol drinking. Providing depression and anxiety screening for those who are at more risk and link to a psychiatric clinic those who are in need. Need for psychiatric evaluation, counseling, and support services for hypertensive patients as an important component for the management of hypertension especially at advanced stage. Finally Researches and policy makers are needed to develop strategies for the prevention and control of psychological distress among patients with hypertension.

### List of abbreviations

ALERT	All African Tuberculosis and Leprosy Rehabilitation and Training Hospital
BSc	Bachelor of Science
CDC	Centers for Disease Control and Prevention

CSA	Central Statistical Agency
COVID-19	Coronavirus Disease 2019
FMOH	Federal Ministry of Health
HAD	Hospital Anxiety and Depression Scale
HAD-A	Hospital Anxiety and Depression Scale, Anxiety sub-scale
HAD-D	Hospital Anxiety and Depression Scale, Depression sub-scale
HTN	Hypertension
IRB	Institutional Review Board
JNC	Joint National Committee
LMICs	Low and Middle Income Countries
NCD	Non-Communicable Diseases
OR	Odds Ratio
PHQ	Patient Health Questionnaire
SD	Standard Deviation
SPSS	Statistical Package for Social Science

## Declarations

### Ethical clearance and consent to participate

**Ethical clearance:** The research proposal of the current study was submitted and approved by Research Ethics Committee of Pharma College, School of Public Health. The institutional permissions were obtained from the Sidama Regional Health Bureau and study facilities. Similarly an informed consent was obtained from each respondents.

### Availability of data and materials

The datasets produced and/or analyzed throughout the current study are not openly accessible due to institutional regulation but are obtainable from the corresponding author for reasonable request.

### Competing interests

All authors declare that they have no competing interests.

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There was no financial support for the current study obtained from anywhere and the researchers tried to cover it accordingly.

### Authors' contributions

MF- Elaborate in the initiation of the research question, prepared the research proposal, carried out the research, did the data entry and analysis

DD- Conducted edition, advising all steps proposal development and thesis writing, cooperatively prepared research tools and develop the manuscript.

ES- conducted edition, advising each steps of thesis writing.

All authors have read and approved the final manuscript.

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