# Blood Pressure control and Associated Factors among Hypertensive Patients Attending Health Centers of Addis Ababa

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This is to certify that the thesis prepared by Firehiwot Amare, entitled: *Blood Pressure Control and Associated Factors among Hypertensive Patients Attending Health Centers of Addis Ababa* and submitted in partial fulfillment for the requirements of the Degree of Master of Pharmacy in Pharmacy Practice complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## Abstract

**Blood Pressure Control and Associated Factors among Hypertensive Patients Attending Health Centers of Addis Ababa**

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Hypertension is the major contributor to cardiovascular diseases (CVDs) related morbidity and mortality. Although antihypertensive therapy clearly reduces the risks of CVDs, blood pressure (BP) is often not adequately controlled in clinical practice. Information regarding BP control in primary care settings is limited in Ethiopia. The aim of this study was to assess BP control and associated factors among hypertensive patients attending health centers (HC) of Addis Ababa. A cross sectional study was conducted in 12 HC of Addis Ababa by including 616 patients. Data was collected by patient interview and patients' medication record review. Data was entered and analyzed using SPSS version 20.0. The mean age of study participants was 58.90 ± 13.04, majority of patients 321(52.1%) were ≥60 years old. Majority of the patients were on monotherapy 485(78.9%). Alpha 2 agonist was the commonest monotherapy used 128 (20.8%). While the combination of thiazide diuretic with angiotensin-converting enzyme inhibitor 45 (7.3%) was the common combination therapy. Majority of the participants 427(69.3%) were adherent to antihypertensive medications. BP was controlled in 191(31.0%) of patients. Age younger than 60 years (AOR= 3.06, 95% CI: 1.95, 4.79), work status; government employee (AOR= 2.47, 95% CI: 1.21, 5.02), retired (AOR=1.79, 95% CI: 1.01, 3.19), private business (AOR= 1.98, 95% CI: 1.10, 3.55); hypertension diagnosis ≥10 years (AOR= 1.88, 95% CI: 1.07, 3.31) and non-adherence to medications (AOR 1.71, 95% CI: 1.11, 2.63) were identified as

factors positively associated with uncontrolled BP while weekly BP measurement (AOR 0.56, 95% CI: 0.36, 0.89) and tertiary level education (AOR= 0.26, 95% CI: 0.13, 0.54) were negatively associated with uncontrolled BP. BP control was low and requires a concerted effort from health professionals and patients to decrease associated CVDs.

**Key words:** Hypertension, Blood pressure control, Adherence, Primary care

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**List of Abbreviations and Acronyms**

| | |
|---|---|
| ACEI | Angiotensin-Converting Enzyme Inhibitor |
| AOR | Adjusted Odds Ratio |
| ARB | Angiotensin Receptor Blocker |
| BP | Blood Pressure |
| CCB | Calcium Channel Blocker |
| COR | Crude Odds Ratio |
| CVD | Cardiovascular Disease |
| DBP | Diastolic Blood Pressure |
| HC | Health Center |
| JNC | Joint National Committee |
| MMMAS | Modified Morisky Medication Adherence Scale |
| OPD | Out Patient Department |
| SBP | Systolic Blood Pressure |
| SD | Standard Deviation |
| USA | United States of America |
| WHO | World Health Organization |

# 1. Introduction

## 1.1 Background

Hypertension is the major contributor to the global burden of disease and to global mortality (WHO, 2013). It is defined as persistently elevated arterial blood pressure (BP), systolic BP (SBP) ≥ 140 mmHg and/or diastolic BP (DBP) ≥ 90 mmHg (Chobanian *et al*., 2003; WHO/ISH Writing Group, 2003; Weber *et al*., 2014). These numbers apply to all adults older than 18 years and indicates the level of BP at which the institution of therapy reduces hypertension related morbidity and mortality (Longo *et al.*, 2012) although for patients aged 60 years or older a SBP up to 150 mm Hg and a DBP of less than 90 mmHg is now regarded as acceptable (James *et al.*, 2014).

The global prevalence of raised BP in adults aged 18 years and over was around 22% in 2014 (WHO, 2014) and the proportion is estimated to rise to over 29% by 2025 (Kearney *et al*., 2005). The prevalence of hypertension was highest in Africa, at 30% for all adults combined in 2014 (WHO, 2014). Hypertension has shown a rapid increase in prevalence affecting significant numbers of individuals in Sub- Saharan Africa (Kuller, 2007). The prevalence in Sub- Saharan Africa is in the range of 25.4%- 41.1% in men and 27.2%- 38.7% in women (Addo *et al*., 2007) . The reported prevalence of hypertension in different regions of Ethiopia varied widely (Tesfaye *et al*., 2009; Awoke *et al*., 2012; Nshissoa *et al*., 2012; Gudina *et al*., 2013; Gudina *et al*., 2014). The prevalence in the country is estimated to be between 20% and 30% (Molla, 2015; Kibret & Mesfin, 2015).

In over 90% of patients, hypertension results from unknown pathophysiological etiology and is called essential or primary hypertension. Genetic factors may play an important role in the

development of primary hypertension. Secondary hypertension which occurs in less than 10% of patients has a specific cause (Dipiro *et al.,* 2011). Secondary causes of hypertension includes renal, renovascular, adrenal, aortic coarctation, obstructive sleep apnea, neurogenic, endocrine or medications (Longo *et al*., 2012).

Clinical criteria for defining hypertension generally are based on the average of two or more seated BP readings during each of two or more outpatient visits (Chobanian *et al*., 2003; Mancia *et al*., 2007; Weber *et al*., 2014). BP readings are used to classify a patients' hypertension status as normal (BP <120/80 mmHg), prehypertension (BP-120-139/80-89 mmHg), stage 1 hypertension (BP 140-159/90-99 mmHg), stage 2 hypertension (BP ≥160/100 mmHg) or isolated systolic hypertension (SBP ≥140 mmHg and DBP < 90 mmHg) (Chobanian *et al*., 2003; FMHACA, 2014).

Drug treatments and life style interventions can be used for the management of hypertension (Chobanian *et al*., 2003). Several lifestyle interventions have been shown to reduce BP. Apart from contributing to the treatment of hypertension, these strategies are beneficial in managing most of the other cardiovascular disease (CVD) risk factors (Weber et al, 2014). Lifestyle modifications should be encouraged for all patients, regardless of stage of hypertension and includes smoking cessation, weight management, reduction of dietary sodium intake, physical activity and moderation of alcohol consumption (Mancia *et al*., 2013). In general, lifestyle changes should be regarded as a complement to drug therapy rather than an alternative (WHO/ISH Writing Group, 2003).

Drug treatment of hypertension depends on the degree of BP elevation and presence of compelling indications (Chobanian *et al*., 2003). Most patients with stage 1 hypertension should

be initially treated with a first-line antihypertensive drug, or a combination of two agents. Combination drug therapy is recommended for patients with stage 2 hypertension using preferably two first-line antihypertensive drugs (Dipiro *et al*., 2011).

According to the eighth report of the Joint National Committee (JNC 8); in the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), or angiotensin receptor blockers (ARBs); whereas in the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB. For patients with chronic kidney disease (CKD), initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes (James *et al*., 2014). All the first line drugs classes have comparable outcome benefits (Fretheim *et al*., 2012).

## 1.2 Statement of the Problem

Hypertension is a major cardiovascular risk factor. If left uncontrolled, hypertension causes stroke, myocardial infarction, congestive heart failure, dementia, renal failure and blindness, causing human suffering and imposing severe financial and service burdens on health systems (Chobanian *et al*., 2003; WHO, 2007; WHO, 2013). As a result, it is the leading cause of morbidity and mortality among non-communicable diseases, which ranks third as a cause of disability adjusted life-year causing about 7.1 million premature deaths each year worldwide and accounts for 13% of all deaths globally (WHO, 2013). Hypertension is responsible for at least 45% of global deaths due to heart disease and 51% of deaths due to stroke (WHO, 2009).

The percentage of premature deaths from CVDs ranges from 4% in high-income countries to 42% in low-income countries, leading to growing inequalities in the occurrence and outcome of CVDs between countries and populations (Mendis *et al.,* 2011). Projections from the global burden of disease suggest that from 1990 to 2020, the burden of CVD faced by African countries will double. A large proportion of the victims of CVD will be middle-aged people (Lopez *et al.,* 2006).

In Ethiopia, non-communicable diseases are estimated to account for 30% of total annual deaths of which 9% is attributed to CVD (WHO, 2014). A 24% death rate from CVD was also reported in Addis Ababa (Misganaw *et al.,* 2012). A study done in Tikur Anbessa specialized Hospital on stroke patients identified hypertension as a major risk factor in 69.3% of patients (Alemayehu & Birhanesilasie, 2013).

There is a close relationship between BP levels and the risk of cardiovascular events, strokes, and kidney disease. The risk of these outcomes is lowest at a BP of around 115/75 mm Hg.

Above 115/75 mm Hg, for each increase of 20 mm Hg in SBP or 10 mm Hg in DBP, the risk of major cardiovascular and stroke events doubles (Chobanian *et al*., 2003; Weber *et al.,* 2014). Whereas the treatment of hypertension has been shown to prevent CVDs and to extend and enhance life, hypertension remains inadequately managed everywhere and BP is often not adequately controlled in clinical practice (Mancia *et al*., 2013)

Hypertension is the most common chronic condition dealt with by primary care physicians and other health practitioners. The success of treating hypertension has been limited, and despite well-established approaches to diagnosis and treatment, in many communities fewer than half of all hypertensive patients have adequately controlled BP (Weber *et al*., 2014). There is limited data regarding the level of control of BP among hypertensive patients at a primary care level in Ethiopia. Determining the rate of control of BP and identifying factors associated with the control will helps to target those at most risk and hence reduce CVD risk associated with uncontrolled BP.

## 1.3 Literature Review

### 1.3.1 Treatment of Hypertension

#### 1.3.1.1 Non Pharmacologic Treatment

Adoption of healthy lifestyles by all persons is critical for the prevention of high BP and is an indispensable part of the management of those with hypertension (Whelton *et al.,* 2002). Several lifestyle interventions have been shown to reduce BP. Apart from contributing to the treatment of hypertension; these strategies are beneficial in managing most of the other CVD risk factors (Weber *et al.,* 2014). Life style modifications for the management of hypertension includes maintaining normal body weight, eating a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of dietary cholesterol as well as saturated and total fat; reducing dietary sodium to no more than 2.4 g of sodium, engaging in regular aerobic physical activity such as brisk walking at least 30 minutes per day most days of the week, limiting alcohol intake to no more than two drinks per day in most men and no more than one drink per day in women and lighter weight persons (WHO/ISH writing group, 2003; Chobanian et al., 2003; FMHACA,2014).

A cross sectional study conducted in Addis Ababa showed that 13.5% of males and less than 1% of females were cigarette smokers, while 10.7% adults reported regularly adding salt to their plate, 20.2% of males and 37.7% of females were overweight and more females (31.2%) than males (16.9%) were classified as being sedentary (Tesfaye *et al.,* 2009). A study from South Africa reported that 56.3% of treated hypertensive patients were implementing at least one life style modification (Onwukwe & Omole, 2012).

#### 1.3.1.2 Pharmacologic Treatment

Drug treatment of hypertension depends on the degree of BP elevation and presence of compelling indications (Chobanian *et al*., 2003). The main benefits of antihypertensive treatment are due to lowering of BP per se and are largely independent of the drugs employed (Mancia *et al.,* 2013). According to JNC 8; thiazide-type diuretics, ACEI, ARBs, and CCBs are now the initial therapy of choice (James *et al.,* 2014). A meta-analysis of randomized controlled trials also showed that all these drug classes have comparable outcome benefits (Fretheim *et al*,. 2012).

A systematic review reported that the treatment of hypertension ranged from 5% in a rural Nigerian community to 91.2% in urban North African populations. The review also stated that East African populations had the lowest levels of treatment while North African countries had the highest levels (Kayima *et al.,* 2013). Different studies described antihypertensive drugs used in the treatment of hypertension at primary care and hospital level.

A study from health center (HC) of Oman showed the most frequently used antihypertensive drugs to be β-blockers (58.2%) followed by diuretics (56.3%) (Al-saadi *et al.,* 2011). On the other hand, a study conducted in Chilean HCs showed ACEIs (59.5%), diuretics (48.0%), calcium channel blockers (CCB) (28.3%), and β-blockers (24.4%) to be the frequently used drugs (Sandova *et al.,* 2012). Similarly, a study from primary care unit of United states of America (USA) reported that the most frequently used drugs to be ACEI, thiazides, β-blockers and CCB (Ornstein *et al.,* 2004). Moreover, a study by Onwukwe & Omole in HC of South Africa reported that the most frequent group of antihypertensive medications used were diuretics (81%), ACEI (72.3%), CCB (55%) and β-blockers (4.3%) (Onwukwe & Omole, 2012).

Since more than two-thirds of hypertensive individuals cannot be controlled on one drug and combining antihypertensive medications from different classes is recommended to achieve target BP (Chobanian *et al.,* 2003). Many studies reported majority of hypertensive patients to be on combination of antihypertensive drugs (Ornestin *et al.,* 2004; Al-saadi *et al.,* 2011; Shelly *et al.,* 2011; Sandova *et al.,* 2012). On the contrary, a study from Zimbabwe showed majority of the patients to be on monotherapy (Goverwa *et al.,* 2014).

### 1.3.2 Blood Pressure Control

The success of treating hypertension and achieving optimal BP control has been limited, and despite well-established approaches to diagnosis and treatment, in many communities fewer than half of all hypertensive patients have adequately controlled BP (Weber *et al.,* 2014). Many studies have been done to assess the control of BP among hypertensive patients at different levels of the health system across the world.

Studies conducted at primary care level have reported different level of BP control. The BP control level reported for patients attending HCs includes 55.59% in Greece (Skliros *et al.,* 2003), 56.4% in Oman (Al-shidhani *et al.,* 2011), 49.8% in USA (Shelley *et al.,* 2011), 59.7% in Chilean (Sandoval *et al.,* 2012) and 57% in South Africa (Onwukwe & Omole, 2012).

Additionally, hospital based studies have also reported varying proportion of patients to have a controlled BP; Spain (58%) (Banegas *et al.,* 2004), USA (60%) (Gu *et al.,* 2012), Nigeria (35.0%) (Iloh *et al.,* 2013), Kenya (33.4%) (Mutua *et al.,* 2014), South Africa (42%) (Adebolu & Naidoo, 2014), Zimbabwe (32.8%) (Goverwa *et al.,* 2014), and Adama, Ethiopia (43.6%) (Lichisa *et al.,* 2014).

### 1.3.3 Factors Associated with Blood Pressure Control

There are numerous potential reasons for low rates of BP control, including poor access to health care and medications; lack of adherence with long-term therapy for a condition that is usually asymptomatic (Wang & Vasan, 2005). A number of factors have been reported to have significant association with control of BP by different studies. Age is one of the factors reported by different studies to be associated with the control of BP. Some studies reported that patients aged 60 years or older were more likely to have a controlled BP than those younger than 60 years of age (Silva *et al.,* 2013). On the other hand, the result of other studies showed that patients aged younger than 60 years were more likely than older patients to have controlled BP (Ornstein *et al.,* 2004; Mutua *et al.,* 2014).

Sex of the patient is another factor reported to have an association with BP control. Female patients were reported to have good odds of controlled BP than males (Ornestin *et al.,* 2004; Shelly *et al.,* 2011; Sandova *et al.,* 2012; Onwukwe & Omole, 2012). On the other hand, other studies indicated that male patients had good odds of controlled BP (Chowdhury *et al.,* 2013). However, a cohort study conducted in USA reported that gender was not associated with BP control (Elperin *et al.,* 2014).

A study from HCs of Oman showed obesity to be one of the factors associated with uncontrolled BP in which 69% of those who were obese failed to achieve their BP targets (Al-saadi *et al.,* 2011). Additionally, a study conducted in HCs of New York reported uncontrolled BP to be associated with higher BMI (Shelley *et al.,* 2011). Similar result was obtained from a hospital based study done in Zimbabwe, in which uncontrolled hypertension was found to have a significant association with being obese (Goverwa *et al.,* 2014).

The other factor reported to be associated with BP control is the frequency of contact between health care professionals and patients; in which according to the result of the study from New York, patients who had a greater number of clinician encounters were less likely to have an elevated BP (Shelley *et al.,* 2011). A study done in 20 primary care unit in USA also reported that patients who frequently visit primary care units were more likely to have controlled BP than those who don't (Ornstein *et al.,* 2004).

Chronic comorbidities are additional factors reported to have association with BP control. Among chronic comorbidities lower BP control was found among hypertensives with diabetes (Al-saadi *et al.,* 2011; Shelley *et al.,* 2011; Sandoval *et al.,* 2012; Mutua *et al.,* 2014). Reduced odds of BP control was also found among patients with renal disease (Al-saadi *et al.,* 2011). On the other hand, study from HCs of Saudi Arabia indicated that SBP control was enhanced by the presence of dyslipidemia (Al-Tuwijri & Al-Rukban, 2006). Similarly, a study from Oman indicated that those with CVDs had a relatively better control of BP than those with no comorbidities (Al-saadi *et al.,* 2011).

Number of antihypertensive drugs used in the treatment of hypertension is a factor reported by many studies to be associated with control of BP. A study from HCs of Oman reported that patients on monotherapy were more likely to attain their BP target than those on two or more drugs (Al-saadi *et al.,* 2011). A hospital based study from Kenya reported that the odds of BP control were significantly reduced if the patient was taking three or more antihypertensive drugs (Mutua *et al.,* 2014). Moreover, a cohort study from USA reported that the more antihypertensive medications a patient was provided, the more likely he/she would have uncontrolled hypertension (Elperin *et al.,* 2014). On the other hand, a study conducted in Chilean HC reported that among patients on combination therapy 57% of them achieved their target

(Sandoval *et al.,* 2012). But, a hospital based study conducted in South Africa showed no association between the number of antihypertensive medication and BP control (Adebolu & Naidoo, 2014).

Not only the number of antihypertensive drugs used but also the type/class of drug used in the treatment of hypertension was also reported to have an association with BP control. A hospital based study conducted in Kenya reported that being on a CCB was significantly associated with controlled BP (Mutua *et al.,* 2014). Additionally, a study from USA showed that the class of antihypertensive medications prescribed had a strong association with BP control in which treatment with ACEIs/ARBs, alpha blockers, alpha- beta blockers, aldosterone antagonists, β-blockers, potassium-sparing diuretics, loop diuretics, nondihydropyridine CCBs, or thiazides was found to be associated with good odds of BP control (Elperin *et al.,* 2014). However, a study conducted in HCs of Oman reported that the class of antihypertensive agent had no influence on BP control (Al-saadi *et al.*, 2011).

Another important determinant of BP control is adherence to treatment in which according to a study from South Africa, patients with documented adherence to treatment were significantly associated with good odds of BP control (Onwukwe & Omole, 2012). Additionally, a hospital based study from Zimbabwe reported that compliance with medication regimen was found to be protective against uncontrolled hypertension (Goverwa *et al.,* 2014). Similar result was obtained in a cohort study conducted in USA in which an association was found between adherence to most antihypertensive medications and BP control (Elperin *et al.,* 2014). Adherence to antihypertensive medications was also associated with BP control in a hospital based study from Nigeria (Iloh *et al.,* 2013). On the other hand, a study conducted in South Africa reported that

there was no a statistically significant association between BP control and adherence (Adebolu & Naidoo, 2014).

Additional factors reported to have association with BP control were low education level and side effects to medication. According to a study from HCs of Chilean, low education level was found to have a negative association with BP control (Sandoval *et al.*, 2012) while a hospital based study conducted in south Africa reported that side effects to medication was significantly associated with good odds of BP control (Adebolu & Naidoo, 2014).

# 2. Objectives

## 2.1 General Objective

To assess BP control and associated factors among hypertensive patients attending the outpatient department (OPD) of HCs of Addis Ababa.

## 2.2 Specific Objectives

- To assess the level of BP control.
- To describe the type of antihypertensive drugs used in the management of hypertension.
- To determine rate of adherence to antihypertensive medications.
- To identify factors associated with uncontrolled BP.

# 3. Methodology

## 3.1 Study Area and Period

Addis Ababa is the capital city and the largest city in Ethiopia, with a population of 2.98 million in 2011 with annual population growth rate of 2.89% (Ethiopia demographic profile, 2014). The city has 10 sub cities. HCs provide primary health care services to the population of the city. There are 85 HCs in the city; one HC serves 15,000-25,000 population (MOH, 2010). The study was conducted in 12 HC of Addis Ababa namely; Shegole HC, Selam HC, Guto-Meda HC, Shiro-Meda HC, Teklehaymanot HC, Lideta HC, Wereda 03 HC, Wereda 06 HC, Wereda 09 HC, Wereda 12 HC, Kaliti HC and Gelan HC from 3 August 2015- 30 October 2015.

## 3.2 Study Design

HC based cross sectional study was conducted.

## 3.3 Population

### 3.3.1 Source Population

All hypertensive patients attending the OPD of selected HCs of Addis Ababa.

### 3.3.2 Study Population

All hypertensive patients attending the OPD of selected HCs of Addis Ababa who fulfill the inclusion criteria of the study during the study period.

### 3.3.3 Inclusion and Exclusion Criteria

**Inclusion criteria**

- Age ≥ 18 years
- On pharmacologic therapy for hypertension for at least 6 months
- On follow up at the OPD of the HC for at least 6 months
- follow up for at least 6 months only at the HC

**Exclusion criteria**

- Pregnant women
- Refusal to participate in the study

## 3.4 Sample Size and Sampling Technique

### 3.4.1 Sample Size

The sample size was calculated using the formula used to estimate single proportion with a finite population correction (Daniel, 2005).

$$n = \frac{Nz^2pq}{d^2(N-1) + z^2pq}$$

To calculate the sample size (n): 1.96 was substituted for Z which is the standard normal value at 95% confidence level, p which is the proportion of controlled BP was taken as 50%, the value of q was taken as 1-p, d which is the margin of error was taken as 0.05 and 1155 was substituted for N which is the average number of hypertensive patients at the HCs.

Accordingly the calculated sample size was found to be 288.12~ 288. Since a multi stage design was used the calculated sample size was multiplied by 2 for the design effect which gives 576. When a10% contingency was added, the final sample size becomes 634. Sample size at HC was allocated using probability proportional to size hence 149 from Selam HC, 35 from Shegole HC, 34 from Shiro meda HC, 33 from Guto meda HC, 114 from Lideta HC, 26 from Teklehaymanot HC, 81 from Wereda 03 HC, 40 from Wereda 09 HC, 33 from Wereda 06 HC, 34 from Wereda 12 HC, 26 from Kaliti HC and 29 from Gelan HC were taken.

### 3.4.2 Sampling Technique

A multi stage sampling technique was used to select study participants from HCs of Addis Ababa. The 10 sub cities of Addis Ababa were considered as geographical clusters and used as a primary sampling unit. From the 10 sub cities 4 were selected namely Gulelle sub city, Lideta sub city, Nifasilk- Lafto sub city and Akaki-Kaliti sub city by simple random sampling. The HCs in the selected sub cities were used as a secondary sampling unit. As a result, 4 HCs from Gulelle sub city: Shegole HC, Selam HC, Guto-meda HC and Shiro-meda HC; 2 HCs from Lideta sub city: lideta HC and Teklehaymanot HC; 4 HCs from Nifasilk- Lafto sub city: Wereda 03 HC, Wereda 06 HC, Wereda 09 HC, and Wereda 12 HC and 2 HCs from Akaki-Kaliti sub city: Kaliti HC and Gelan HC were selected by simple random sampling. Study participants from each HC were selected by systematic random sampling. The sampling interval at each HC was calculated by dividing the number of hypertensive patients at the HC to the sample size of the study at the HC. As a result, the sampling interval was 2 at Shegole HC, 2 at Selam HC, 2 at Guto-Meda HC, 2 at Shiro-Meda HC, 2 at Teklehaymanot HC, 2 at Lideta HC, 2 at Wereda 03 HC, 2 at Wereda 06 HC, 2 at Wereda 09 HC, 2 at Wereda 12 HC, 2 at Kaliti HC and 2 at Gelan HC and every other patient was interviewed and his/her medical record reviewed on the same day.

### 3.5 Study Variables

#### 3.5.1 Independent Variables

- Sociodemographic characteristics (age, sex, body mass index, waist circumference, education level, marital status, occupation)
- Disease related factors (family history of hypertension, frequency of follow up, frequency of BP measurement, co-morbid condition/s)
- Life style related factors (smoking status, alcohol drinking status, physical exercise, salt content in a food)
- Drug related factors (type of antihypertensive drug/s, number of antihypertensive drug/s, side effect, treatment modification)
- Adherence to medication

#### 3.5.2 Dependent Variable

- BP control

### 3.7 Data Collection

#### 3.7.1 Data Collection Instrument

A data abstraction format was used to record the necessary information from patients' medication record (annex III), a structured questionnaire was used to interview patients (annex V) and the 8 item modified Morisky medication adherence scale (MMMAS) was used to assess adherence. Height, weight and waist circumference of patients were measured on the day of the interview.

### 3.7.2 Data Collection Technique

A medical record review was performed and a data abstraction format was completed for each eligible patient to obtain co-morbid condition/s, BP measurements and type/s of antihypertensive medication/s. Patients were interviewed to obtain socio-demographic, disease related, life style related and drug related information and assess their adherence to medication.

### 3.7.3 Data Collectors

One nurse at each HC was recruited as a data collector. All the data collectors were given a one day training prior to data collection on how to interview patients and use the data abstraction format to gather information from patients and patients' medication record.

## 3.8 Data Quality Control

To ensure the quality of data, pre-test was done on 5% of the total sample which is on 32 randomly selected patients at Addisu Gebeya HC to ensure the agreement of the data abstraction format and the structured questionnaire with the need of the study. Any error found during the process of pre-test was corrected and modification was made into the final version of the data abstraction format and the structured questionnaire. The data collectors were trained for one day before the process of data collection. Supervision and checking was made by the principal investigator to ensure the completeness and consistency of the collected data. All collected data were examined for completeness and consistency during data management, storage and analysis.

### 3.9 Data Entry and Analysis

The data was entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics including: frequency, percent, mean and standard deviation (SD) were used to summarize study variables and evaluate distribution of responses. The level of BP control was assessed by using the average of three BP records obtained from three different visit (Alexander *et al.*, 1999). Logistic regression was used to analyze the associations between independent variables and BP control by using crude odds ratio (COR) and adjusted odds ratio (AOR) at 95% confidence level. A p-value of less than 0.05 was considered statistically significant.

### 3.10 Ethical Consideration

Ethical clearance was obtained from the ethics review committee of Addis Ababa University, School of Pharmacy and Addis Ababa city administration health bureau institutional review board. A support letter was obtained from the health bureau to Lideta sub city health office, Nifasilk-Lafto sub city health office, Akaki Kality sub city health office and Gulelle sub city health office. A support letter was written from the four sub cities health offices to HCs residing in each sub city. Permission was obtained from each HC medical director to access medication records and conducts the study. The benefit and risks of the study was explained to each participant included in the study and oral informed consent was obtained from each patient involved in the study. To ensure confidentiality, name and other identifiers of patients and health care professionals was not recorded on the data collection tools.

### 3.11 Operational Definitions

**Controlled BP:** BP<150/90 mmHg in hypertensive patients aged 60 or older, or BP <140/90 mmHg in hypertensive patients aged less than 60 years and all ages of hypertensive patients with diabetes or chronic kidney disease (James *et al*., 2014).

**Uncontrolled BP:** BP≥150/90 mmHg in hypertensive patients aged 60 or older, or BP ≥140/90 mmHg in hypertensive patients aged less than 60 years and all ages of hypertensive patients with diabetes or chronic kidney disease (James *et al*., 2014).

**Adherent:** a patient with a MMMAS score of ≥ 6 (Morisky *et al.,* 2008).

**Non adherent:** a patient with a MMMAS score of < 6 (Morisky *et al.,* 2008).

**Body Mass Index:** was calculated as weight in kilograms divided by height in square meters and interpreted as underweight (BMI<18.5), normal weight (18.5 - 24.9), overweight (25.0 - 29.9) and obese (≥30.0) (WHO, 2015).

**Central obesity:** a waist circumference of > 102 cm in males and >88 cm in females (FMHACA, 2014).

**Physically active:** an individual who perform physical exercise for at least 30 minutes per day for at least 5 day per week (FMHACA, 2014).

**Physically inactive:** an individual who perform physical exercise for less than 30 minutes per day for less than 5 day per week (FMHACA, 2014).

# 4. Results

## 4.1 Socio-Demographic Characteristics

Overall 634 participants were included in this study with response rate of 616 (97%). Majority of study participants were females 346 (56.2%). The mean age of the respondents was 58.9 (SD=13.0) and majority of them 321 (52.1%) were age of 60 or above, 419 (68.0%) were married and 213 (34.6%) had no formal education and 200 (32.5%) were house wives as shown in table 1.

**Table 1:** Socio-demographic characteristics of hypertensive patients attending health centers of Addis Ababa, 2015.

| Variable | Frequency | Percent |
|---|---|---|
| **Sex** | | |
| Female | 346 | 56.2 |
| Male | 270 | 43.8 |
| **Age** | | |
| < 60 years | 295 | 47.9 |
| ≥ 60 years | 321 | 52.1 |
| **Marital status** | | |
| Married | 419 | 68.0 |
| Widowed | 120 | 19.5 |
| Divorced | 46 | 7.5 |
| Single | 31 | 5.0 |
| **Educational status** | | |
| No formal education | 213 | 34.6 |
| Primary education | 209 | 33.9 |
| Secondary education | 110 | 17.9 |
| College/university | 84 | 13.6 |
| **Work status** | | |
| House wife | 200 | 32.5 |
| Private business | 144 | 23.4 |
| Retired | 123 | 20.0 |
| Government employee | 95 | 15.4 |
| Unemployed | 33 | 5.4 |
| Others* | 21 | 3.4 |

*Daily laborer, Farmer, Construction, Guard

### 4.2 Anthropometric and Clinical Characteristics

Among the study participants 368 (59.7%) were normal weight and 196 (31.8%) were overweight. The measurement of waist circumference showed that 202 (58.4 %) of female had a waist circumference above 88 cm while 53 (19.6 %) of male participants had a waist circumference above 102 cm. The clinical characteristics of patients showed that 198 (32.1%) participants had a family history of hypertension and 559 (90.7%) had a monthly follow up at the HC while 4 (0.6%) measure their BP every day. From the 122 (19.8 %) patients with comorbid conditions 98 (15.9%) were diabetic. The mean duration of time since the diagnosis of hypertension was 5.59 ± 5.77 with a range of 0.5-43 years as shown in table 2 below.

**Table 2:** Anthropometric and clinical characteristics of hypertensive patients attending health centers of Addis Ababa, 2015.

| Variable | Frequency | Percent |
|---|---|---|
| **Body mass index** | | |
| Under weight | 14 | 2.3 |
| Normal weight | 368 | 59.7 |
| Over weight | 196 | 31.8 |
| Obese | 38 | 6.2 |
| **Waist circumference** | | |
| **Female** | | |
| ≤88cm | 144 | 41.6 |
| >88cm | 202 | 58.4 |
| **Male** | | |
| ≤102cm | 217 | 80.4 |
| >102cm | 53 | 19.6 |
| **Family history of hypertension** | | |
| Yes | 198 | 32.1 |
| No | 418 | 67.9 |
| **Duration of hypertension diagnosis** | | |
| < 5 years | 368 | 59.7 |
| 5-10 years | 141 | 22.9 |
| ≥ 10 years | 107 | 17.4 |
| **Frequency of follow up** | | |
| Weekly | 4 | 0.6 |
| Every two weeks | 33 | 5.4 |
| Monthly | 559 | 90.7 |
| Every two months | 16 | 2.6 |
| Others* | 4 | 0.6 |
| **Frequency of BP measurement** | | |
| Monthly | 304 | 49.4 |
| Weekly | 150 | 24.4 |
| Every two weeks | 135 | 21.9 |
| When feeling ill | 16 | 2.6 |
| Every day | 4 | 0.6 |
| Others** | 7 | 1.1 |
| **Comorbid conditions** | | |
| Diabetes mellitus | 98 | 15.9 |
| Asthma | 6 | 1.0 |
| CVD | 5 | 0.8 |
| HIV/AIDS | 3 | 0.5 |
| Others*** | 10 | 1.6 |

*every three months, ** twice weekly, every two months ***musculoskeletal disease, gout, migraine, CVD-cardiovascular diseases, HIV- Human immune virus, AIDS-acquired immune deficiency syndrome

### 4.3 Life Style Related Factors

Among the participants 6(1%) were current smokers and 75 participants reported the use of alcohol. With regard to physical exercise; 185 (30.0%) of participants reported to perform physical exercise from whom 88(14.3%) were physically active. Among the study participants 483 (78.4 %) reduce salt in their food.

**Table 3:** Life style modifications among hypertensive patients attending health centers of Addis Ababa, 2015.

| Variable | Frequency | Percent |
|---|---|---|
| **Cigarette smoking status** | | |
| No | 610 | 99.0 |
| Yes | 6 | 1.0 |
| **Alcohol drinking status** | | |
| Yes | 75 | 12.2 |
| No | 541 | 87.8 |
| **Physical exercise** | | |
| Yes | 185 | 30.0 |
| No | 431 | 70.0 |
| **Physically active** | | |
| Yes | 88 | 14.3 |
| No | 528 | 85.7 |
| **Reduce salt in food** | | |
| Yes | 483 | 78.4 |
| No | 133 | 21.6 |

### 4.4 Antihypertensive Therapy

The overall utilization of antihypertensive drugs by group showed thiazide diuretics to be the most commonly used 225 (36.5%) followed by ACEIs 180 (29.2%), CCBs 159 (25.8%), alpha 2 agonist 144 (23.8) and β-blockers 45 (7.3%). As shown in table 5 below, majority of the patients were on monotherapy 486 (78.9%). Alpha 2 agonist (methyldopa) was the most common monotherapy used 128 (20.8 %) while the combination of thiazide and ACEI were the most common combination drugs used 46 (7.5%).

**Table 4:** Drug therapy among hypertensive patients attending health centers of Addis Ababa, 2015.

| Drugs | Frequency | Percent |
|---|---|---|
| **Monotherapy** | 485 | 78.7 |
| Methyldopa | 128 | 20.8 |
| Enalapril | 123 | 20.0 |
| Hydrochlorthiazide | 108 | 17.5 |
| Nifedepine | 108 | 17.5 |
| Amilodipine | 1 | 0.2 |
| Atenolol | 13 | 2.1 |
| Propranolol | 4 | 0.6 |
| **Two drugs combinations** | 125 | 20.3 |
| Hydrochlorthiazide+ Enalapril | 45 | 7.3 |
| Hydrochlorthiazide+ Nifedepine | 42 | 6.8 |
| Hydrochlorthiazide+ Atenolol | 13 | 2.1 |
| Hydrochlorthiazide+ Propranolol | 3 | 0.5 |
| Hydrochlorthiazide+ Methyldopa | 9 | 1.5 |
| Enalapril + Nifedepine | 1 | 0.2 |
| Enalapril + Atenolol | 1 | 0.2 |
| Enalapril + Propranolol | 2 | 0.3 |
| Enalapril + Methyldopa | 2 | 0.3 |
| Nifedepine + Methyldopa | 3 | 0.5 |
| Atenolol + Methyldopa | 1 | 0.2 |
| Atenolol + Amlodipine | 3 | 0.5 |
| **Three drugs combinations** | 6 | 1 |
| Hydrochlorthiazide+ Enalapril + Atenolol | 4 | 0.6 |
| Enalapril + Nifedepine + Atenolol | 1 | 0.2 |
| Hydrochlorthiazide+ Enalapril + Methyldopa | 1 | 0.2 |

The drug regimen of 523 (84.9 %) patients was not modified at their last visit. From the treatment modifications 62 (10.1%) was switch in therapy.

**Table 5:** Treatment modification among hypertensive patients attending health centers of Addis Ababa, 2015.

| Treatment modification | Frequency | Percent |
|---|---|---|
| No modification | 523 | 84.9 |
| Switch to another drug | 62 | 10.1 |
| Addition of drug | 19 | 3.1 |
| Increase in dose | 3 | 0.5 |
| Decrease in dose | 1 | 0.2 |
| Deletion of drug | 2 | 0.3 |
| Increase in frequency | 1 | 0.2 |
| Decrease in frequency | 5 | 0.8 |
| Total | 616 | 100.0 |

The mean period of antihypertensive drug therapy was 4.6 (SD=4.9) with a range of 0.5- 40 years. Majority of the patients 17 (67.7%) have been taking antihypertensive therapy for less than five years while 74 (12%) have been taking antihypertensive drugs for more than 10 years. Most of the respondents obtain their medications for free 294 (47.7%). Among the study participants 209 (33.9%) reported the experience of at least one side effect from the medication/s as shown in table 6.

**Table 6:** Duration of antihypertensive therapy and source of antihypertensive medications among patients on follow up at health centers of Addis Ababa, 2015.

| Variable | Frequency | Percent |
|---|---|---|
| **Duration of therapy** | | |
| < 5 years | 417 | 67.7 |
| 5-10 years | 125 | 20.3 |
| ≥10 years | 74 | 12 |
| **Source of medication/s** | | |
| Free of charge | 294 | 47.7 |
| By sponsorship | 44 | 7.1 |
| Self-sponsored | 278 | 45.1 |
| **Side effect** | | |
| Yes | 209 | 33.9 |
| No | 407 | 66.1 |
| **Side effects** | | |
| Headache | 103 | 16.7 |
| Weakness | 92 | 14.9 |
| Dry mouth | 38 | 6.2 |
| Postural hypotension | 37 | 6.0 |
| GI Complaint | 7 | 1.1 |
| Erectile dysfunction | 5 | 0.8 |
| Others* | 21 | 3.4 |

*Cough, Edema, Loss of appetite, Foot pain GI- Gastro intestinal

### 4.5 Adherence to Antihypertensive Medications

More than two third of the study participants were found to be adherent to their medication according to a self-reported measure of adherence using the eight item MMMAS.

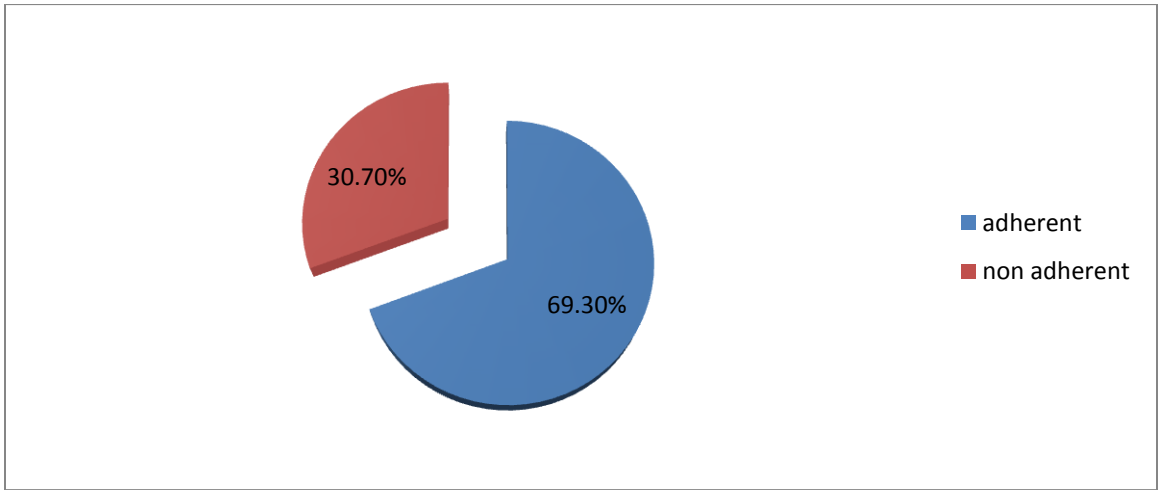


**Figure 1:** Adherence to antihypertensive medications among hypertensive patients attending health centers of Addis Ababa, 2015.

### 4.6 Blood Pressure Control

The mean SBP was 146.95 (SD=14.92) while the mean DBP was 88.34 (SD=8.33). More than one third of study participants had a controlled SBP while half had a controlled DBP. The overall control of BP was achieved in one third of the study participants.

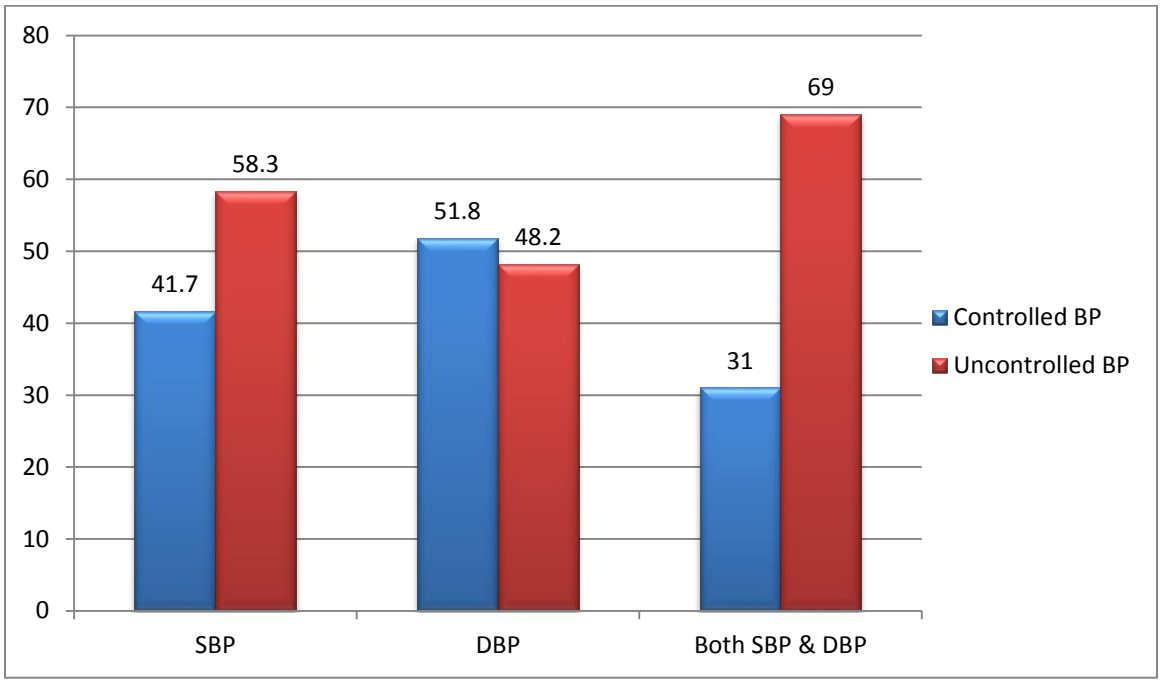


**Figure 2:** Blood pressure control among hypertensive patients attending health centers of Addis Ababa, 2015.

### 4.7 Determinants of Uncontrolled Blood Pressure

The association of independent variables with the dependent variable was investigated using both univariate and multivariate logistic regression technique. In univariate logistic regression analysis; age, marital status, education level, work status, frequency of BP measurement, duration of hypertension diagnosis, source of medication, drug group and medication adherence showed association with BP control and hence were used in multivariate analysis.

The result of the multivariate analysis showed age to be significantly associated with uncontrolled BP in that patients aged <60 years were three times more likely to have uncontrolled BP than those ≥60 years (AOR= 3.06, 95% CI: 1.95, 4.79, P=0.00). Patients with tertiary level education were 74% (AOR= 0.26, 95% CI: 0.13, 0.54, P=0.00) less likely to have uncontrolled BP than those with no formal education. Work status was also found to have association with uncontrolled BP in that when compared with house wives, government employees were 3 times more likely (AOR= 2.47, 95% CI: 1.21, 5.02, P=0.01); retired patients and patients on private business were 2 times more likely to have uncontrolled BP (AOR=1.79, 95% CI: 1.01, 3.19, P=0.04) and (AOR= 1.98, 95% CI: 1.10, 3.55, P=0.02) respectively. Duration of hypertension diagnosis was also associated with uncontrolled BP in that patients with a diagnosis longer than 10 years were 2 times more likely to have uncontrolled BP than those with a diagnosis of < 5 years (AOR= 1.88, 95% CI: 1.07, 3.31, P=0.03).

Patients with a weekly BP measurement were 44% less likely to have uncontrolled BP than those with a monthly BP measurement (AOR 0.56, 95% CI: 0.36, 0.89, P=0.02) and non-adherent patients were two times more likely to have uncontrolled BP than adherents (AOR 1.71, 95% CI: 1.11, 2.63, P=0.02) as shown in table 7.

**Table 7:** Determinants of uncontrolled BP among hypertensive patients attending health centers of Addis Ababa, 2015.

| Variable | Blood pressure control | | COR (95% CI) | AOR (95% CI) |
|---|---|---|---|---|
| | Controlled (%) | Uncontrolled (%) | | |
| **Age category** | | | | |
| ≥ 60 years | 130(21.1) | 191(31.0) | 1.00 | 1.00 |
| < 60 years | 61(9.9) | 234(38.0) | 2.61 (1.82, 3.74)* | 3.06 (1.95, 4.79)* |
| **Marital status** | | | | |
| Married | 122(19.8) | 297(48.2) | 1.00 | 1.00 |
| Single | 7(1.1) | 24(3.9) | 1.41 (0.59, 3.36) | 1.58 (0.59, 4.18) |
| Divorced | 15(2.4) | 31(5.0) | 0.85 (0.44, 1.63) | 0.94 (0.45, 1.95) |
| Widowed | 47(7.6) | 73(11.9) | 0.64 (0.42, 0.98)* | 0.76 (0.46, 1.27) |
| **Education level** | | | | |
| No formal education | 70(11.4) | 143(23.2) | 1.00 | 1.00 |
| Primary education | 60(9.7) | 149(24.2) | 1.22 (0.80, 1.84) | 0.81 (0.51, 1.31) |
| Secondary education | 27(4.4) | 83(13.5) | 1.51 (0.89, 2.53) | 0.70 (0.37, 1.35) |
| College/university | 34(5.5) | 50(8.1) | 0.72 (0.43, 1.21) | 0.26 (0.13, 0.54)* |
| **Frequency of BP measurement** | | | | |
| Monthly | 84(13.6) | 220(35.7) | 1.00 | 1.00 |
| Every day | 2(0.3) | 2(0.3) | 0.38 (0.05, 2.75) | 0.59 (0.06, 5.61) |
| weekly | 63(10.2) | 87(14.1) | 0.53 (0.35, 0.79)* | 0.56 (0.36, 0.89)* |
| Every two weeks | 36(5.8) | 99(16.1) | 1.05 (0.67, 1.66) | 1.12 (0.68, 1.84) |
| When feeling ill | 3(0.5) | 13(2.1) | 1.66 (0.46, 5.95) | 1.23 (0.32, 4.74) |
| Others | 3(0.5) | 4(0.6) | 0.51 (0.11, 2.32 ) | 0.38 (0.07, 1.97) |
| **Work status** | | | | |
| House wife | 76(12.3) | 124(20.1) | 1.00 | 1.00 |
| Private business | 34(5.5) | 110(17.9) | 1.98 (1.23, 3.20)* | 1.98 (1.10, 3.55)* |
| retired | 40(6.5) | 83(13.5) | 1.27 (0.79, 2.04) | 1.79 (1.01, 3.19)* |
| Government employee | 22(3.6) | 73(11.9) | 2.03 (1.17, 3.55)* | 2.47 (1.21, 5.03)* |
| unemployed | 9(1.5) | 24(3.9) | 1.63 (0.72, 3.70) | 1.84 (0.75, 4.55) |
| others | 10(1.6) | 11(1.8) | 0.67 (0.27, 1.66) | 0.68 (0.25, 1.87) |
| **Duration of diagnosis** | | | | |
| < 5 years | 119(19.3) | 249(40.4) | 1.00 | 1.00 |
| 5-10 years | 47(7.6) | 94(15.3) | 0.96 (0.63, 1.44) | 1.01 (0.62, 1.63) |
| ≥ 10 years | 25(4.1) | 82(13.3) | 1.57 (0.95, 2.58)* | 1.88 (1.07, 3.31)* |
| **Source of medication/s** | | | | |
| Free of charge | 100(16.2) | 194(31.5) | 1.00 | 1.00 |
| By sponsorship | 17(2.8) | 27(4.4) | 0.82 (0.43, 1.57) | 1.01 (0.47, 2.16) |
| Self-sponsored | 74(12.0) | 204(33.1) | 1.42 (0.99, 2.04)* | 1.36 (0.89, 2.09) |
| **Drug group** | | | | |
| Thiazides | 38(6.2) | 70(11.4) | 1.00 | 1.00 |
| ACEI | 36(5.8) | 87(14.1) | 1.31 (0.75, 2.28) | 1.14 (0.62, 2.10) |
| CCB | 37(6.0) | 72(11.7) | 1.06 (0.60, 1.85) | 1.05 (0.57, 1.94) |
| β-blockers | 10(1.6) | 7(1.1) | 0.38 (0.13, 1.08) | 0.34 (0.10, 1.11) |
| Alpha 2 agonist | 28(4.5) | 100(16.2) | 1.94 (1.09, 3.45)* | 1.75 (0.91, 3.34) |
| Thiazide + ACEI | 11(1.8) | 35(5.7) | 1.73 (0.79, 3.78) | 1.45 (0.62, 3.41) |
| Thiazide + CCB | 18(2.9) | 24(3.9) | 0.72 (0.35, 1.49) | 0.75 (0.33, 1.72) |
| Thiazide + β-blockers | 6(1.0) | 10(1.6) | 0.91 (0.31, 2.68) | 0.86 (0.27, 2.76) |
| Other combination | 7(1.1) | 20(3.2) | 1.55 (0.60, 3.99) | 1.42 (0.49, 4.04) |
| **Adherence** | | | | |
| Adherent | 147(23.9) | 280(45.5) | 1.00 | 1.00 |
| Non adherent | 44(7.1) | 145(23.5) | 1.73 (1.17, 2.56)* | 1.71 (1.11, 2.63)* |

*P< 0.05 – statistically significant, BP- blood pressure, ACEI- angiotensin converting enzyme inhibitors, CCB- calcium channel blockers

## 5. Discussion

The result of the study showed that only one third of hypertensive patients on pharmacologic treatment had a controlled BP (31%). Inadequate control of BP appears to be a significantly prevalent problem challenging the primary care of Addis Ababa, as is the case globally. The level of BP control found in this study (31%) is lower than obtained from HC based studies from Chilean (59.7%) (Sandoval *et al.,* 2012), Oman (39%) (Al-saadi *et al.,* 2011), Greece (55.6%) (Skliros *et al.,* 2003), USA (49.8 %) (Shelley *et al.,* 2011) and South Africa (57%) (Onwukwe & Omole, 2012). This difference in the level of BP control might be due to a more aggressive strategy in the treatment of hypertension as the use of combination antihypertensive agents was common in most of the studies. Additionally, even though the above studies were conducted in primary health care settings, difference in expertise of health professionals involved in the management of hypertension might have contributed to the discrepancy. Moreover, in some of the studies hypertensive patients on lifestyle modifications who were not taking antihypertensive drugs were included (Ornstein *et al.,* 2004; Shelly *et al.,* 2011; Sandova *et al.,* 2012) which could have contributed to a better control of BP than this study.

The level of BP control in this study was similar to the result obtained from hospital based studies conducted in Zimbabwe (32.8 %) (Goverwa *et al.,* 2014), Kenya (33.4%) (Mutua *et al.,* 2014) and Nigeria (35.0%) (Iloh *et al.,* 2013). This similarity in the level of BP control might be is a result of the similarity in the inclusion criteria of the studies as only hypertensive patients on pharmacologic therapy were included in the studies similar to the present study. On the contrary, a study conducted in USA at different level of the health system showed 60% of treated hypertensive people to have a controlled BP (Gu *et al.,* 2012) and hospital based studies from Adama, Ethiopia and Nigeria showed a BP control level of 43.6% (Lichisa *et al.,* 2014) and 42%

(Adebolu & Naidoo, 2014) respectively. This difference in level of BP control might have resulted from a more aggressive treatment in hospitals as patients attending hospitals have associated co morbidities.

The result of the study showed that 41.7% and 51.8 % of the study participants had a controlled SBP and DBP respectively. This result is similar to that obtained from a study of HCs of Saudi Arabia which reported 40.4% and 51.6% SBP and DBP control respectively (Al-Tuwijri & Al-Rukban, 2006) and a study from 20 primary care practices in USA which showed 55.7% and 77.1% control rate of SBP and DBP respectively (Ornstein *et al.,* 2004). This difference in the level of control of SBP and DBP might be due to age related increase in SBP as large proportion of study participants (52.1%) were older than 60 years of age (Basile, 2002; Schillaci & Pucci, 2010).

The mean age of the participants in the study was 58.90 (SD=13.04), the majority 52.1% being ≥60 years of age. The result of the multivariate analysis showed age to be significantly associated with uncontrolled BP in that patients aged less than 60 years were three times more likely to have uncontrolled BP than those older than 60 years (AOR= 3.06, 95% CI: 1.95, 4.79, P=0.00). Similar result was obtained from a study in Brazil (Silva *et al.*, 2013). On the other hand, the result of other studies showed that patients aged younger than 60 years were more likely than older patients to have controlled BP (Ornstein *et al.,* 2004; Mutua *et al.,* 2014). Better BP control in the elderly was observed in this study may be because of an increased prevalence of comorbidities hence high probability of intensive treatment and/or a better rate of adherence. Additionally, health professionals could have shown more concern in counseling and ordering appropriate management for elders.

Educational status was also found to be associated with BP control in which patients with tertiary education were 74% (AOR= 0.26, 95% CI: 0.13, 0.54, P=0.00) less likely to have uncontrolled BP when compared to those with no formal education. This result is consistent with a result obtained from Chilean HC study which showed low education level to have a negative association with BP control (Sandoval *et al.,* 2012). This may be is a result of increased awareness regarding the treatment of hypertension, adherence to life style modifications to decrease BP or adherence to antihypertensive drug treatment.

Work status was also found to have association with uncontrolled BP in that when compared with house wives, government employees were 3 times more likely (AOR= 2.47, 95% CI: 1.21, 5.02, P=0.01) and patients on private business were 2 times more likely to have uncontrolled BP (AOR= 1.98, 95% CI: 1.10, 3.55, P=0.02). This might be due to increase in work load and work related stress. Additionally, retired patients were 2 times more likely to have uncontrolled BP (AOR=1.79, 95% CI: 1.01, 3.19, P=0.04) than house wives. This might be because of forgetfulness and hence non- adherence to antihypertensive medications. Duration of hypertension diagnosis was also associated with uncontrolled BP in that patients with a diagnosis longer than 10 years were 2 times more likely to have uncontrolled BP than those with a diagnosis of < 5 years (AOR= 1.88, 95% CI: 1.07, 3.31, P=0.03). This may be is a result of asymptomatic nature of the disease and a decrease in health seeking behavior from patients.

The result of the study showed evidence of association of frequent BP measurement with good odds of BP control in which patients with a weekly BP measurement were 44% less likely to have uncontrolled BP than those with a monthly BP measurement (AOR 0.56, 95% CI: 0.36, 0.89, P=0.02). This may be is a result of a health seeking behavior, frequent adjustment in life

style related factors and a tendency to adhere to antihypertensive medication among those who frequently measure their BP.

Adherence to therapies is a primary determinant of treatment success. Poor adherence attenuates optimum clinical benefits and therefore reduces the overall effectiveness of health systems (Chobanian *et al.,* 2003; Kearney *et al.,* 2005). The rate of adherence to antihypertensive medications in this study was found to be 69.3 % according to a self-reported measure of adherence using the eight item MMMAS. This level of adherence is higher than what was reported from Nigeria (42.9%) (Iloh *et al.,* 2013) and Adama, Ethiopia (59.5 %) (Hareri *et al.,* 2014). However, the adherence rate in this study was closely similar to what was reported among hypertensive patients in Tikur Anbessa Specialized Hospital (69.2%) (Hareri & Abebe, 2013). According to a report from WHO, estimates of the extent to which patients adhere to pharmacotherapy for hypertension vary between 43 to 88% (WHO, 2003). The reported adherence to antihypertensive drugs is low in this study and efforts are needed to increase medication adherence so as to reduce uncontrolled BP and associated CVD among hypertensives.

Adherence to antihypertensive medications is a key to achieving an optimal BP; the result of this study showed that non adherent patients were two times more likely to have uncontrolled BP than adherents (AOR 1.71, 95% CI: 1.11, 2.63, P=0.02). This result is consistent with the result obtained from studies from South Africa (Onwukwe & Omole, 2012; Adebolu & Naidoo, 2014), Zimbabwe (Goverwa *et al.,* 2014), USA (Elperin *et al.,* 2014) and Nigeria (Iloh *et al.,* 2013). In light of this result, patients should be counseled and encouraged to adhere to antihypertensive medications.

Thiazide diuretic (36.53%), ACEI (29.22%), CCBs (25.81%), Alpha 2 agonist (23.8%) and β-blockers (7.3%) were the class of antihypertensive drugs used in the treatment of hypertension among hypertensive patients attending HCs of Addis Ababa. Results resembling such pattern in the use of antihypertensive drugs was observed in a HC based study from South Africa which reported that the most frequent group of antihypertensive medications used were diuretics (81%), ACEI (72.3%), CCB (55%) and β-blockers (4.3%) (Onwukwe & Omole, 2012). However a study conducted in Chilean HCs reported ACEIs (59.5%), diuretics (48.0%), CCBs (28.3%), and β-blockers (24.4%) to be the more frequently used drugs (Sandoval *et al.,* 2012). Similarly a study conducted in 20 primary care unit of USA reported that the most frequent drugs prescribed for hypertensive patients were ACEI, thiazides, β-blockers and CCB (Ornstein *et al.,* 2004). This difference in frequent use of ACEI over diuretic may be is a result of large proportion of diabetic and CKD patients included in Chilean and USA studies. Additional factor that might have contributed to this discrepancy include race (Chobanian *et al.,* 2003; James *et al.,* 2014). In this study, alpha 2 agonists; which are considered as a second line antihypertensive agents; were reported to be used in 23.8% of the hypertensive patients which is not the case in other studies. This difference might have resulted from gaps in knowledge among health professionals involved in the management of hypertension in the HCs.

The result of the study has shown that majority of the patients were on monotherapy (78.9%). This level of monotherapy use is closely similar to a study from Zimbabwe which reported 65.9% of the study participants to be on monotherapy (Goverwa *et al.,* 2014). However, different results were reported on studies from Chilean (34.3%) (Sandoval et al. 2012) and USA (29.1%) (Ornstein et al. 2004). The high prevalence of antihypertensive monotherapy in this study might have contributed to the low BP control level in this study as the use of multiple antihypertensive

agents is recommended by different guidelines to achieve optimal BP level (Chobanian *et al.*, 2003; Mancia *et al*, 2014; Weber *et al*, 2014;WHO/ISH, 2003; James *et al*, 2014; FMHACA, 2014). Recommendations from these guidelines have also been supported by different studies which showed the benefit of using multiple antihypertensive agents in order to achieve optimal BP level (Sandoval *et al.*, 2012). The prevalent use of monotherapy might have resulted from lack of drug availability at health facility, unaffordability of drugs by patients and less aggressive treatment (Goverwa *et al*., 2014).

Drug treatment was modified for 93 (15.1%) of patients. Switching to another drug and addition of a drug were the leading type of treatment modifications. This might be because most of the present study participants had uncontrolled BP (Andrade *et al*., 2004). The treatment modification in this study was low when compared to a study by Banegas et al (2004) which reported treatment modification in 49% of hypertensive patients from which addition of a drug and increasing dose were observed more frequently (Banegas *et al.*, 2004). This discrepancy might be is a result of aggressive treatment of hypertension in the later study and clinical inertia in the present study.

With regard to life style modifications implemented by patients on treatment for hypertension at HCs of Addis Ababa, 1% of study participants were current smokers which is smaller in percentage of smokers from a study conducted at HCs of Saudi Arabia (8.3%) (Al-Tuwijri & Al-Rukban, 2006), Oman (8%) (Al-saadi *et al.*, 2011) and Zimbabwe (16.1%) (Goverwa *et al.*, 2014). Since cessation of cigarette smoking is recommended to achieve an optimal BP among patients with hypertension this should be encouraged among patients.

Weight reduction is one of the life style modifications that should be implemented by hypertensive patients. The result of the present study showed that 38% of the study participants had BMI of $\geq 25$ kg/m$^2$ and the measurement of waist circumference showed 19.6 % of male and 58.4 % of female participants had abdominal obesity. This result is different from the result of the study by Tesfaye *et al* conducted in Addis Ababa which showed 20% of males and 38% of females to have a BMI of $\geq 25$ kg/m$^2$; 12.9% of male and 64.6 of female to have abdominal obesity (Tesfaye *et al*. 2009). This difference might be a result of difference in the age of the participants; predominance of elderly patients in the present study; difference in the characteristics of the study population; patients without a diagnosis of hypertension were included in the later study; or a change in the lifestyle of population of Addis Ababa. Since high BMI and increased abdominal circumference are risk factors for hypertension and uncontrolled BP among hypertensives, emphasis should be given to counsel patients on the importance of implementing life style modifications.

## 6. Conclusion

BP control to target goal was suboptimal and achieved only in one third of pharmacologically treated patients attending HCs of Addis Ababa. The adherence level of patients to antihypertensive therapy was also low. The frequently used antihypertensive drug classes were found to be thiazide diuretics, ACEIs, CCBs, alpha 2 agonist and β-blockers. Majority of the patients were on monotherapy. Alpha 2 agonist was the frequently used monotherapy while the combination of thiazide and ACEIs was the commonest combination therapy. Switching to another drug was the most common type of treatment modification. Age younger than 60 years, non-adherence to antihypertensive medications, work status (being a government employee, a retired and in a private business) and hypertension diagnosis of ≥10 years were identified as factors positively associated with uncontrolled BP while weekly BP measurement and tertiary level of education were negatively associated with uncontrolled BP.

## 7. Recommendations

To ensure better controls of BP among hypertensive patients attending HCs of Addis Ababa, it is recommended,

- To use evidence based medicines in the management of hypertension.
- To frequently adjust medications to achieve target BP.
- To assess adherence to medications and provide counseling accordingly.
- To counsel patients to adhere to lifestyle modifications recommendations.
- To train health professionals involved in the management of hypertension on recent developments regarding the management.

For future researchers:

- To use objective measures to assess adherence to antihypertensive medications.
- To assess barriers to using evidence based recommendations in the management of hypertension.

## 8. Limitations of the Study

- A self- reported measure of medication adherence was used which could have caused overestimation of adherence to medications.
- BP readings were taken from patients' medication records hence no information was available on how BP was measured.
- White coat hypertension could have caused underestimation of BP control as office BP readings were used.
- A cross sectional study design was used which doesn't allow for temporal relationship to be established.
- Since only public HCs of Addis Ababa were included caution should be exercised in extrapolating the results to all HCs of Addis Ababa.

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## Annexes

### Annex I- Consent Form (English)

Hello, my name is _____, I am part of a team of people who are conducting a research on control of blood pressure among pharmacologically treated hypertensive patients on follow up at health centers of Addis Ababa. I am inviting you to participate in a research study. Involvement in the study is voluntary, so you may choose to participate or not. I am now going to explain the study to you. Please feel free to ask any questions that you may have about the research; I will be happy to explain anything in greater detail.

You will be asked to answer questions regarding the medications you currently are taking and the life style modifications you are implementing. This will take approximately 20 min of your time. All information will be kept anonymous and confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons. The questionnaire will be coded to exclude showing names.

The benefit of this research is that you will be helping us to understand the control of blood pressure among hypertensive patients on follow up at health centers of Addis Ababa. This information should help us to better understand the factors contributing to control of blood pressure among hypertensive patients. There is no risk imposed on you by participating in this study. If you do not wish to continue, you have the right to withdraw from the study, without penalty, at any time. If there are any questions or enquires any time about the study or the procedures, please contact: 0913183027 or freaeam@gmail.com

Are you willing to participate? Yes ☐ No ☐

**Annex II- Questionnaire (English)**

| 1. | **Socio demographic characteristics** |
|---|---|
| 1.1. | **Age (Years)_____** |
| 1.2. | **Sex:**<br>☐ Male ☐ Female |
| 1.3. | **Anthropometry:**<br>Weight (kg):_____ Height (m):_____ Waist circumference (cm):_____ |
| 1.4. | **Religion:**<br>☐ Orthodox ☐ Muslim ☐ catholic<br>☐ Protestant ☐ other (specify)_____ |
| 1.5. | **Ethnicity:**<br>☐ Oromo ☐ Amhara ☐ Tigre<br>☐ Gurage ☐ Other (specify)_____ |
| 1.6. | **Marital status:**<br>☐ Married ☐ Divorced ☐ Single ☐ widowed |
| 1.7. | **Education level:**<br>☐ No formal education ☐ Primary School ☐ Secondary school ☐ College/University |
| 1.8. | **Work status:**<br>☐ House wife ☐ Government employee ☐ Un-employed ☐ retired<br>☐ Private Business ☐ Farmer ☐ Daily laborer<br>☐ student ☐ Other(s) [Specify]:_____ |
| 1.9. | **Family monthly income: _____** |
| 2. | **Disease related factors** |
| 2.1. | **Family history of hypertension**<br>☐ Yes ☐ No |
| 2.2. | **How long has it been since you were diagnosed with hypertension?**<br>_____ |

| | |
|---|---|
| 2.3. | **What is your frequency of follow-up at the health center?**<br>☐ Weekly ☐ Every two week ☐ Monthly ☐ Every two month<br>☐ Every three month ☐ Every six month ☐ Other specify_____ |
| 2.4. | **How often do you measure your blood pressure?**<br>☐ Weekly ☐ Every two week ☐ Monthly ☐ Every two month<br>☐ Every three month ☐ Every six month ☐ Other specify_____ |
| 3. | Life style modification |
| 3.1. | **Do you smoke cigarette?** ☐ Yes ☐ No |
| 3.2. | **Do you drink alcohol?** ☐ Yes ☐ No |
| 3.3. | **If your answer to question number 3.1. Is yes, How much alcohol do you dink per day?**<br>_____ |
| 3.4. | **Do you do physical exercise?** ☐ Yes ☐ No |
| 3.5. | **If your answer to question number 3.3. Is yes,** |
| 3.5.1. | **For how many days of the week?** _____ |
| 3.5.2. | **How long do you exercise?** _____ |
| 3.6. | **Do you reduce the amount of salt in you food?** ☐ Yes ☐ No |
| 4. | **Medication related factors** |
| 4.1. | **How do you get your medications?**<br>☐ Free of charge ☐ By sponsorship ☐ self-sponsored |
| 4.2. | **For how long have you been taking the medications to lower your blood pressure?**<br>_____ |
| 4.3. | **Have you experienced any side effects from the medications?**<br>☐ Yes ☐ No |
| 4.4. | **If your answer to question 4.3 is yes which side effects have you experienced**<br>☐ Erectile dysfunction ☐ Headache ☐ Weakness<br>☐ Dry mouth ☐ Others specify_____ |

| 5. | **Adherence** | Yes | No |
|---|---|---|---|
| 5.1. | Do you sometimes forget to take your pills? | | |
| 5.2. | People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine? | | |
| 5.3. | Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it? | | |
| 5.4. | When you travel or leave home, do you sometimes forget to bring along your medicine? | | |
| 5.5. | Did you take all your medicine yesterday? | | |
| 5.6. | When you feel like your symptoms are under control, do you sometimes stop taking your medicine? | | |
| 5.7. | Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan? | | |
| 5.8. | How often do you have difficulty remembering to take all your medicine?<br>a. Never/rarely<br>b. Once in a while<br>c. Sometimes<br>d. Usually<br>e. All the time | | |

## Annex III- Data abstraction format

**1. Comorbid condition**

☐ Diabetes ☐ Chronic Kidney disease ☐ Myocardial infarction
☐ Stroke ☐ Heart failure ☐ Hyperlipidemia ☐ Other (Specify)

**2 BP readings**

| | Date | BP reading (mmHg) |
|---|---|---|
| Visit 1 | | |
| Visit 2 (Last previous) | | |
| Visit 3 (current) | | |

**6. Medication/s**

**6.1. Medications for the treatment of hypertension**

| **Last previous** | | **Prescribed on current visit** | |
|---|---|---|---|
| Drug | Dose and frequency | Drug | Dose and frequency |
| ☐ Hydrochlorthiazide<br>☐ Enalapril<br>☐ Nifedepine<br>☐ Atenolol<br>☐ Methyldopa<br>☐ Other (specify) | | ☐ Hydrochlorthiazide<br>☐ Enalapril<br>☐ Nifedepine<br>☐ Atenolol<br>☐ Methyldopa<br>☐ Other (specify) | |

**6.2. Medicaton/s for comorbid conditions**

| Drug | Dose and frequency |
|---|---|
| | |
| | |
| | |
| | |
| | |

**Annex IV- Consent Form (Amharic)**

**<u>በጥናት ለመሣተፍ የፈቃድ ስምምነት</u>**

እንደምን አሉ? ስሜ_____ይባላል፡፡በአዲስ አበባ ጤና ጣቢያዎች የደም ግፊት መድሃኒቶችን እየወሰዱ ከትትል በሚያደርጉ ህመምተኞች እና በደም ግፊት ቁጥጥር ላይ መሰረቱን ያደረገ ጥናት የሚያጠኑ ሰዎች ቡደን አባል ነኝ፡፡ እርስዎን በጥናት ላይ እንዲሳተፉ እጋብዝዎታለሁ፡፡ በጥናቱ መሣተፍ በፍቃደኝነት ላይ የተመሰረተ ነው፡፡ ስለዚህም በጥናቱ እንዲሳተፉ ፍቃደኝንትዎን እንዲሰጡኝ እጠይቅዎታለሁ፡፡ ስለጥናቱ መጠየቅ የሚፈልጉት ጥያቄ ካለ በዝርዝር ለመመለስ ፈቃደኛ መሆኔን እገልፅልዎታለሁ፡

ጥናቱ የደም ግፊት ቁጥጥርን የሚያክሉ ችግሮችን ለማወቅ የሚደረግ ነዉ፡፡ በቃለ መጠይቁ ስለደም ግፊት መድሃኒቶች አጠቃቀም እና መድሃኒቶችን ከመውሰድ ባሻገር የደም ግፊትዎን ለመቀነስ ምን እንደሚያደርጉ ይጠየቃሉ፡፡ ቃለ መጠይቁ 20 ደቂቃ ይወስዳል፡፡ በቃለ መጠይቁ የሚሰጧቸው ማንኛውም መረጃዎች በሚስጥር የሚያዙ መሆኑን እገልፃለሁ፡፡ የሚሰበሰበው መረጃ ተጠቃሎ የሚቀርብ እና የእያንዳንዱን ሰው መረጃ በተናጠል የማያሣይ መሆኑን እገልፃለሁ፡፡

ከጥናቱ የሚገኘው መረጃ በደም ግፊት ህመምተኞች ዘንድ ያለው የመድሃኒት አጠቃቀም እና የደም ግፊት ቁጥጥር ችግሮችን መነሻ በማሣየት መፍትሔ እንድናፈላለግ ይረዳናል፡፡ በጥናቱ በመሣተፍዎ የሚፈጠርብዎት ችግረ አይኖርም፡፡ በቃለ መጠይቁ መሃል ቃለመጠይቁን መቀጠል ባይፈልጉ ማቋረጥ እንደሚችሉ እገልፃለሁ፡፡ በጥናቱ ላይ ጥያቄ ካለዎት በስልክ ቁጥር 0913-183027 ወይም በኢ-ሜይል (freaeam@gmail.com) ቢጠይቁ በደስታ እቀበላለሁ፡፡

በጥናቱ ላይ ለመሣተፍ ፈቃደኛ ነዎት? ☐ አዎ ☐ የለም

**Annex V- Questionnaire (Amharic)**

| 1. | **ማህበራዊ መረጃዎች** |
|---|---|
| 1.1. | **እድሜ (በዓመት)፡**_____ |
| 1.2. | **ፆታ፡** ☐ ሴት ☐ ወንድ |
| 1.3. | ክብደት (በኪሎ)፡_____ ቁመት (በሜትር)፡_____ የወገብ ዙሪያ (በሴንቲ ሜትር)፡_____ |
| 1.4. | **ሀይማኖት:**<br>☐ አርቶዶክስ ☐ ሙስሊም ☐ ካቶሊክ ☐ ፕሮቴስታንት<br>☐ ሌላ ካለ ይገለፅ_____ |
| 1.5. | **ብሔር:**<br>☐ ኦሮሞ ☐ አማራ ☐ ትግሬ ☐ ጉራጌ ☐ ሌላ ካለ ይገለፅ_____ |
| 1.6. | **የጋብቻ ሁኔታ:**<br>☐ ያገባ ☐ ያላገባ ☐ የተፋታ ☐ የሞተበት |
| 1.7. | **የትምህርት ሁኔታ:**<br>☐ ያልተማረ ☐ የመጀመሪያ ደረጃ ትምህርት ☐ ሁለተኛ ደረጃ ትምርት ☐ ኮሌጅ/ዩኒቨርሲቲ |
| 1.8. | **የስራ ሁኔታ:**<br>☐ የቤት እመቤት ☐ የመንግስት ሰራተኛ ☐ ሥራ እጥ ☐ ጡረተኛ ☐ ተማሪ<br>☐ የግል ስራ ☐ ገበሬ ☐ የቀን ሰራተኛ ☐ ሌላ ካለ ይገለፅ_____ |
| 1.9. | **ወርሃዊ ገቢ (በብር):** _____ |

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|---|---|
| 2. | **ከበሽታው ጋር የተያያዙ ጉዳዮች** |
| 2.1. | **ደም ግፊት በቤተሰብዎ አለ፡** ☐ አዎ ☐ የለም |
| 2.2. | **የደም ግፊት እንዳለብዎ ካወቁ ስንት ጊዜ ሆንዎት?**_____ |
| 2.3. | **ክትትል ለማድረግ በየስንት ግዚው ወደ ጤና ጣቢያው ይመጣሉ?**<br>☐ በየሳምንት ☐ በየሁለት ሳምንት ☐ በየወሩ ☐ በየሁለት ወሩ<br>☐ በየሶስት ወሩ ☐ በየስድስት ወሩ ☐ ሌላ ካለ ይገለፅ_____ |
| 2.4. | **በየስንት ግዚው የደም ግፊትዎን ይለካሉ?**<br>☐ በየሳምንት ☐ በየሁለት ሳምንት ☐ በየወሩ ☐ በየሁለት ወሩ<br>☐ በየሶስት ወሩ ☐ በየስድስት ወሩ ☐ ሌላ ካለ ይገለፅ_____ |
| 3. | **ከአኗኗር ዘይቤ ጋር የተያያዙ ጉዳዮች** |
| 3.1. | **ሲጋራ ያጨሳሉ?** ☐ አዎ ☐ የለም |
| 3.2. | **የአልኮል መጠጥ ይጠጣሉ?** ☐ አዎ ☐ የለም |
| 3.3. | **ለጥያቄ ቁጥር 3.1. መልስዎ አዎ ከሆነ፤ በቀን ምን ያህል የአልኮል መጠጥ ይጠጣሉ?**<br>_____ |
| 3.4. | **የዘወትር የሰውነት እንቅስቃሴ ያደርጋሉ?** ☐ አዎ ☐ የለም |
| 3.4.1 | **ለጥያቄ ቁጥር 3.3. መልስዎ አዎ ከሆነ፤**<br>**በቀን ለምን ያህል ጊዜ (ደቂቃ) የሰውነት እንቅስቃሴ ያደርጋሉ?** _____ |
| 3.4.2. | **በሳምንት ለምን ያህል ቀናት የሰውነት እንቅስቃሴ ያደርጋሉ?**_____ |
| 6.2. | **በሚመገቡት ምግብ ውስጥ ጨው ያሳንሳሉ?** ☐ አዎ ☐ የለም |
| 7. | **ከመድሃኒት ጋር ተያያዥነት ያላቸው ጉዳዮች** |
| 7.2. | **የሚወስዱዋቸውን መድሃኒቶች የሚያገኙት እንደት ነው?** ☐ በነጻ ☐ የሚከፍልልኝ አለ ☐ እየገዛሁ |
| 7.3. | **የደም ግፊት መድሃኒት መውሰድ ከጀመሩ ስንት ጊዜ ሆንዎት?** _____ |

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|---|---|---|---|
| 7.4. | **መድሃኒቶችዎን በወሰዱባቸው ግዚያት የጎንዮሽ ጉዳት ኢጋጥሞዎት ያውቃል?** ☐ አዎ ☐ የለም | | |
| 7.5. | **ለጥያቂ ቁጥር 4.6. መልስዎ አዎ ከሆነ፤ የትኛው የጎንዮሽ ጉዳት ኢጋጥሞዎት ያውቃል?**<br>☐ ስንፈተ ወሲብ ☐ ራስ ምታት ☐ የአፍ መድረቅ<br>☐ ራስ ማዞር ☐ ድካም ☐ ሌላ ካለ ይገለፅ_____ | | |
| 8. | **ስለመድሃኒት አጠቃቀም** | **አዎ** | **የለም** |
| 8.2. | አንዳንድ ጊዜ መድሃኒትዎን መውሰድ ይዘነጋሉ? | | |
| 8.3. | አንዳንድ ጊዜ ሰዎች ከመዘንጋት ባሻገር በሆነ ምክንያት መድኀኒታቸውን ሳይወስዱ ይቀራሉ። ያለፉትን ሁለት ሣምንታት ሲያስቧቸው መድሃኒትዎን ያልወሰዱባቸው ቀናት ነበሩ? | | |
| 8.4. | መድሃኒትዎን በሚወስዱበት ወቅት የበሽታው ምልክቶች የባሰብዎ መስሎ ሲሰማዎ መድሃኒትዎን መውሰድ አቋርጠው ወይም አቁመው ያውቃሉ? | | |
| 8.5. | ጉዞ ሲጓዙ ወይም ከቤትዎ ርቀው ሲሄዱ መድሃኒትዎን ከእርስዎ ጋር መውሰድ ዘንግተው ያውቃሉ? | | |
| 8.6. | ትናንትና ሁሉንም መድሃኒትዎን ወስደዋል? | | |
| 8.7. | የበሽታዎ ምልክቶች የጠፉ ሲመስሰልዎ፤ መድሃኒትዎን መውሰድ አቁመው ያውቃሉ? | | |
| 8.8. | መድሃኒቶችን በቀን በቀን መውሰድ ለአንዳንድ ሰዎች አስቸጋሪ ነው። መድሃኒትዎን በፕሮግራምዎ መሰረት መውሰድ አስቸጋሪ ሆኖብዎት ያውቃል? | | |
| 8.9. | መድሃኒትዎን መውሰድ እንዳለብዎት ለማስታወስ ምን ያህል ጊዜ አስቸግርዎት ያውቃል<br>ሀ. በጭራሽ ለ. አልፎ አልፎ ሐ. አንዳንድ ጊዜ መ. አብዛኛውን ጊዜ ሠ. ሁልጊዜ | | |