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# Systematic Reviews of Prevalence and Associated Factors of Hypertension in Ethiopia: Finding the Evidence

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**Abstract:** Background: Hypertension is one of the leading causes of global burden of disease. This paper is intended to provide compressive and up to date evidence on the prevalence and investigate the associated factors of Hypertension in Ethiopia from January, 2000 to April, 2015. Methods: A quantitative epidemiological systematic literature review was conducted by searching different published articles in different data bases which is written in English including MEDLINE, PubMed, CINAHL, Google scholar, Cochrane and grey literatures. The search was restricted to population based studies on hypertension in Ethiopia published between January 2000 and April 2015. All data were extracted independently by a single reviewer using a standardized protocol and data collection form. Nine publications met the inclusion criteria. The total pooled data were nine surveys involving over 13,327 participants. Results: The reported rate of hypertension is varied widely, with the highest rate of 31.5 % in male and the lowest rate of 0.8% in female, partly because of the differences in participants mean ages, source population and study settings. This review found a high prevalence of hypertension in urban residents and different associated factors including overweight, family history of hypertension, age, sex, sleeping for less than 5 hours, Oral contraceptive use, alcohol intake, physical inactivity, eating vegetable three or fewer days per week, salt use, obesity, higher education and vigorous recreational activities were identified. Conclusion and recommendation: Hypertension was considerably prevalent in Ethiopia. Health promotion strategy tailored to the education on modifiable risk factors and establishment of blood pressure screening in primary health care context would be of immense value both in urban and rural areas. This study was highlighting the need for implementation of timely and appropriate strategies for prevention and control of hypertension. Upcoming well-powered studies, using the standardized research design and covering more regions of the country are recommended. Further Meta-analysis study is also recommended.

**Keywords:** Prevalence, Associated Factors, Hypertension, Best Evidence, Systematic Review, Ethiopia

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## 1. Background

Hypertension is one of the leading causes of global burden of disease. In the year 2000, analysis of the global burden of hypertension indicated that over 25% of world's adult population had hypertension and the proportion is estimated to rise to 29% by 2025 (1).

The global prevalence of raised blood pressure (defined as systolic and/or diastolic blood pressure  $\geq 140/90$  mmHg) in adults aged 18 years and over was around 22% in 2014 (2, 3). Across the WHO regions, the prevalence of raised blood pressure was highest in Africa, at 30% for all adults combined. The lowest prevalence of raised blood pressure was in the Region of the Americas, at 18%. In those regions, Men have slightly higher prevalence of raised blood pressure

than women. (2)

Globally CVD accounts for approximately 17 million deaths a year, nearly one third of the total. (4) Of these, complications of hypertension account for 9.4 million deaths worldwide every year. (5). Hypertension is responsible for at least 45% of deaths due to heart disease and 51% of deaths due to stroke. (4)

Globally raising blood pressure is one of the leading risk factor for mortality and is estimated to have caused 9.4 million deaths and 7 % of deaths burden- as measured in disability-adjusted life years – in 2010. The leading global risks for mortality in the world are high blood pressure (responsible for 13% of deaths globally), tobacco use (9%), high blood glucose (6%), Physical inactivity (6%), and overweight and obesity (5%). These risks are responsible for raising the risk of chronic diseases such as heart disease,

diabetes and cancers. They affect countries across all income groups: High, middle and low. (5, 6)

Raised blood pressure is a major cardiovascular risk factor. If left uncontrolled, hypertension causes stroke, myocardial infarction, cardiac failure, dementia, renal failure and blindness, causing human suffering and imposing severe financial and service burdens on health systems (7, 8).

Many factors contribute to the high prevalence rates of hypertension including eating food containing too much salt and fat; not eating enough fruits and vegetables; overweight and obesity; harmful use of alcohol; physical inactivity; ageing; genetic factors; psychological stress; socioeconomic determinants and inadequate access to health care. (2)

The increasing prevalence of hypertension is attributed to population growth, aging and behavioral risk factors, such as unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight and exposure to persistent stress. The adverse health consequences of hypertension are compounded because many people affected also have other health risk factors that increase the odds of heart attack, stroke and kidney failure. These risk factors include tobacco use, obesity, high cholesterol and diabetes mellitus. Tobacco use increases the risk of complications among those with hypertension. (9)

According to W.H.O global status report, there is an agreed set of very cost-effective – and globally applicable-NCD interventions for attaining all nine targets by 2025. Among all the targets, the 6<sup>th</sup> global target is 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances.(2)

According to W.H.O the crude adjusted estimate of raised blood pressure for those aged 18<sup>+</sup> years in Ethiopia were males 24 with 95% CI [16.9–31.7] and Female 95% CI [17.3–31.3]. (2)

Over the period 2011-2025 the cumulative lost output in low and middle-income countries associated with NCDs is projected to be US\$ 7.28 trillion (10). The annual loss of approximately US\$ 500 billion due to major NCDs amounts to approximately 4% of gross domestic product for low and middle-income countries. Cardiovascular disease including hypertension accounts for nearly half of the cost. (11).

The prevention and control of hypertension has not received due attention by many developing countries. Hypertension is one of the most modifiable risk factors for cardiovascular diseases. However, awareness about treatment and control of hypertension is extremely low among developing nations including Ethiopia. In these countries health care resources are overwhelmed by other priorities including HIV/AIDS, tuberculosis and malaria. (12)

Ethiopia is an ancient country, situated in the Horn of Africa. It is one of the cradles of mankind, for instance, “Dinknesh” or “Lucy” and Ardi was discovered in Hadar in 1974 and 1994 respectively. “Lucy” was dates back 3.5 million years and Ardi dates back 4.5 million years. Throughout its long history Ethiopia has been a melting pot of diverse customs and cultures. (13)

Ethiopia was one of few African countries that maintained its independence, founding members of UN, OAU, and seat of AU. At present Ethiopia is administratively structured in to nine regional states and two city administrations. (13)

Even though there are some pocket studies across different regions, to my knowledge reliable information’s about the prevalence and associated factors of hypertension results in different regions of Ethiopia have not been pooled and done together. These kinds of evidences are important for understanding the magnitude of the problem, the risk groups and it will have a paramount effect in effective preventive and control strategies for policy makers, researchers, educators, and all other concerned bodies. So, this initiated me to conduct a systematic review in this area.

The objective of the present study was to synthesize the current prevalence and investigate the associated factors for hypertension in Ethiopia; based on the studies published between January, 2000 and April, 2015.

## 2. Methods

The reporting of this review adhered to the preferred reporting items for systematic reviews and meta-analysis (PRISMA) statements. (14)

### 2.1. Study Search

A systematic review of all papers published on hypertension in Ethiopia between January, 2000 and April, 2015, which are available on PubMed, EMBASE, Google Scholar and Cochrane were searched. The articles were searched for providing data from Ethiopia on non communicable diseases, cardiovascular diseases, hypertension, prevalence, incidence, causes, determinants, associated factors and cross sectional studies. Grey literature, from sources including the websites of world health organization and National and international hypertension organization were reviewed. The researcher manually searched the references of selected studies for any additional studies that were not captured by the electronic search using references cited in original study articles and reviews.

### 2.2. Study Selection

The eligibility criteria for this paper were papers which had clear objectives and methodology, cross sectional studies, English language, and full article, carried out in Ethiopia, and published and unpublished articles from January, 2000 to April, 2015. Published studies, which reported the prevalence of hypertension and were conducted in representative population samples, were included in the review. When information needed to consider eligibility was missing, the study was excluded.

### 2.3. Study Population

Males and females aged  $\geq 15$  years, residing in Ethiopia were participated in this research.

## 2.4. Study Outcomes

The primary outcome of this review was overall prevalence of hypertension in Ethiopia and the secondary outcome was risk factors associated with HPT.

The determination of HPT was made by SBP/DBP  $\geq$  140/90 mm Hg measured twice or the self-reported HPT and on antihypertensive medication as described by the 7th Joint National Committee (JNC7). (3)

## 2.5. Study Design

Community and institution based cross-sectional studies that were carried out in Ethiopia including more than 400 participants and reported prevalence of HPT were included. Studies were excluded if they did not provide the prevalence of HPT and failed to follow the JNC7 standards for self reported HPT (i.e., self-reported HPT without BP measurement and without taking antihypertensive medication).

## 2.6. Data Extraction

All data were extracted independently by a single reviewer using a standardized protocol and data collection form. Uncertainties were resolved by discussion with one colleague and during disagreement the final decision was made based on

the opinion of senior experts and majority decision was taken.

Data on year of publication and survey, region of study, age of participants, sampling methods, study design, response rate, sample size, and measurement of blood pressure, definition(s) used for hypertension, number of BP measurement and type of measuring device used were extracted. Prevalence of hypertension and associated factors were also obtained.

The author described the population used for the standardization of hypertension prevalence where this information was available. Where information was available, the prevalence was obtained by age, gender, socio-economic status, and rural-urban residence. Multiple papers from a study were included if these were found and consistency of results checked for the same study.

## 3. Result

### 3.1. Study Selection

In the initial search 80 articles were identified and 9 studies were deemed eligible. Figure 1 shows the PRISMA flow chart of the selection of studies. Those nine studies (n=13,327) were selected for this review.

Four of them were done in 2013, two of them were carried out in 2012 and the rest were done in 2009/2010.

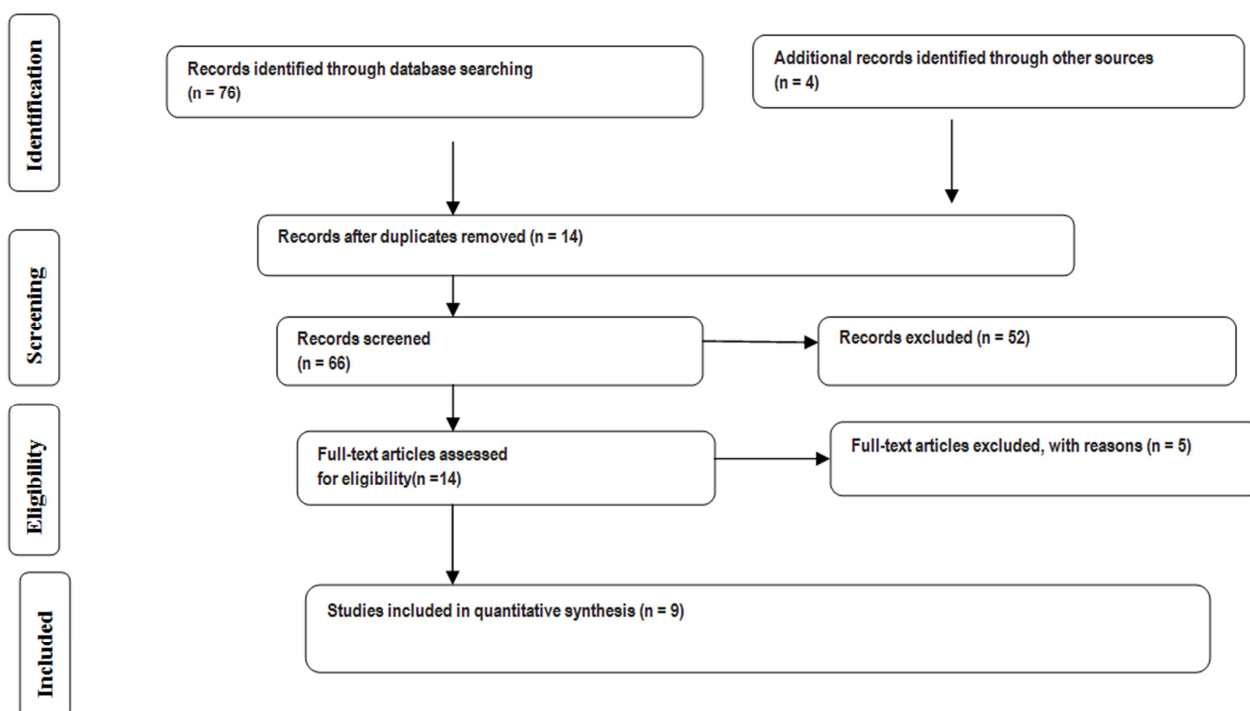


Figure 1. PRISMA flowchart of the selection of studies. Adapted from Moher et al. (14).

### 3.2. Characteristics of the Studies

All selected studies were cross sectional design (Table 1). The studies included participants, ranging from 422(15) to 4469 (16). The largest study was carried out in Oromia region in Gilgel Gibe field research center, South West Ethiopia.

All included studies were done with different standardized

age. Three numbers of studies were done with participant age  $\geq$ 15 years (15,17) and three other studies were carried out with age  $\geq$ 18 (18,19,20) years. The rest were done with participant's age of  $\geq$ 25(21),  $\geq$ 31(22) and  $\geq$ 35(23) years.

Among all, seven studies were conducted in urban areas (15, 17, 18, 20-23). The rest two studies were both urban and rural settings (16, 19). Among nine included studies, all

studies were diagnosis of HPT by JNC7 criteria.

### 3.3. Risk of Bias

Among included studies all are random sampling techniques. The maximum and minimum response rate was about 99.7% (20) and 91% (for the largest scale survey)(16) respectively, while in three studies the non response rate was absolutely zero(17, 18, 19).

### 3.4. Prevalence of Hypertension

The prevalence of hypertension in Ethiopia among different regions is presented in Table 1. Even though some regional studies have been conducted in different parts of Ethiopia, there is no national studies have been performed yet. The reported rate of hypertension is varied widely, with the highest rate of 31.5 % in male (21) and the lowest rate of 0.8% in female (22).But the prevalence in most of the studies was

between 20% and 30%.

Although there are a few studies conducted in rural setting the prevalence of hypertension in urban setting is higher than the rural counter parts. In five studies the prevalence of hypertension in male is higher than in female (17, 18, 19, 21, 22). Among all regions the highest prevalence is reported in the capital city of Ethiopia, Addis Ababa and the prevalence was 31.5% in male and 28.9% in female (21), the lowest prevalence is reported in Oromia region and the prevalence was 3.1% in male and 4.4% in female(16).

The prevalence of hypertension in age group  $\geq 25$ (21) years, $\geq 31$ (22) years and  $\geq 35$ (23) Years were reported in three studies and the prevalence was 31.5% in male and 28.9% in female(21) , 26.2% in male and 19.4% in female (22), 26% in male and 30.3% female respectively(23). This was also the highest reported results among all studies and done age group  $\geq 15$ (15, 17) years and  $\geq 18$ (19, 20) years old.

**Table 1.** Prevalence and Associated risk factors of Hypertension in cross sectional surveys in Ethiopia from January, 2000 to April, 2015.

S. No.	Author/year of publication	Year of survey	Region	Site (Urban/rural )	Mean age and SD/ Age in Years	Sample size (response rate)
1.	Akilew A. et al, <sup>23</sup> /2012	2012	Amhara	Gonder/Urban	51.5±14.4/>35 yrs	679/ 97.6%
2.	Feyie B. et al, <sup>15</sup> /2014	2011	Oromia	Bedele/Urban	29.6±15.5/ >15 yrs	422/ 93.8%
3.	Takele T. et al, <sup>18</sup> /2014	2012/2013	Amhara	Gonder/Urban	21±1.82/ >18 yrs	610/ 0%
4.	Esayas K. et al <sup>17</sup> , /2013	2012	Oromia	Jimma/Urban	42.3±13.2/>15 yrs	734/ 0%
5.	Tesfa B. et al <sup>16</sup> , /2015	2013	Oromia	Research center/Both Ur&Ru	15-64 yrs / >15yrs	4469/ 91%
6.	Fikru T. et al, <sup>21</sup> /2009	2008	Addis Ababa	Addis Ababa/Urban	25-64 yrs/ >25 yrs	4001/ 93%
7.	Mekoya D. et al <sup>19</sup> , /2014	2010/2011	Tigray	Mekelle&Humera/Ur &Ruresp	_ / > 18 yrs	1183/ 0%
8.	Assefa B. et al, <sup>20</sup> /2014	2013	Tigray	Mekelle/Urban	_ / >18yrs	711/ 99.7%
9.	Tsegab P. et al, <sup>22</sup> /2014	2013	SNNP	Durame/Urban	47.4±12.2/ >31 yrs	518/ 96.6%

**Table 1.** Continue.

S. No.	Study design/sampling method	Instrument	No. of measu/measur used	Cut off point for HPT, mm Hg	Prevalence (%) (95% CI)		Associated Risk factors
					Male	Female	
1.	CBCS/MSRS	Sphy	2/mean of 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	26.0%	30.3%	FHH,OB,SRDm,age $\geq$ 55, no cont. walking for 10/day
2.	CBCS/SRS	Sphy	2/mean of 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	13.1%	24.8%	Age $\geq$ 35, Waist circumference
3.	IBCS/SRS	Sphy	3/mean of last 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	6.9%	0.8%	Being male, OW, Sleeping $\leq$ 5hr
4.	IBCS/SRS	Sphy	2/mean of 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	15.3%	11.7%	FHH, SRDm, OW, OCP use
5.	CBCS/SRS	Digital	3/mean of 3	BP $\geq$ 140/90 or Anti-hypertensive Medication	3.1%	4.4%	Being female, educated, ALC and VRA
6.	CBCS/MSRS	Digital	3/mean of last 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	31.5%	28.9%	OW, OB, Educated, WC, and physical inactivity
7.	CBCS/MSRS	Sphy	3/mean of 3	BP $\geq$ 140/90 or Anti-hypertensive Medication	21%	16.4%	Age, sex and OW
8.	CBCS/MSRS	Sphy	3/mean of last 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	10.5%	11.2%	Age >41yrs, educated, OW and OB
9.	CBCS/SRS	Sphy	2/mean of 2	BP $\geq$ 140/90 or Anti-hypertensive Medication	26.2%	19.4%	Age >31yrs, FHH, OB, OW, Physical inactivity, eating vegetable three or fewer days per week and salt use

ALC=Alcohol, BP=Blood pressure, BMI=Body mass Index, CBCS=community based cross sectional study, Cont. = continuous, FHH=Family history of Hypertension, HPT= Hypertension, Hr= hour, IBCS= institution based cross sectional study, MSRS=Multi stage random sampling, OB=Obesity (BMI>30), OCP= oral combined contraceptives use, OW=over weight (BMI= 25.0 - 29.9), SD=Standard deviation, S.No.= serial number, Sphy=Standard mercury sphygmomanometer, SRDm= Self reported Diabetes Mellitus, SRS=systematic random sampling, Ur/Ru=Urban/Rural, VRA=vigorous recreational activity, WS= waist circumference, Yrs=years, '=minute

### 3.5. Risk Factors of Hypertension

From all studies six studies identified overweight as a potential risk factor for hypertension (17-22). In two studies self reported diabetes is reported as a risk factor for hypertension (17, 23). In other three studies family history of hypertension is identified as a risk factor for hypertension. (17, 22, 23). Age (15, 19, 20, 22, 23) and sex (16, 18, 19) are found to be associated with hypertension. Sleeping for less than five hours per a day (18), oral contraceptive pills (17), alcohol intake (17), waist circumference (15,21) physical inactivity (21-23), eating vegetable three or fewer days per week and salt use (22), obesity (20-23), higher education (16,21) and vigorous recreational activities (16) were associated with hypertension.

## 4. Discussion

Hypertension is an important public health problem in developing countries and Ethiopia is not different in this regard. Based on the available data, the present study attempted to synthesize the evidence on prevalence and associated factors for hypertension. Even though there are some researches done in Ethiopia that provide data on hypertension, very few of these give age standardized data which allow comparability between studies and it make it difficult to conduct Meta Analysis. The individual studies show a general high prevalence of HPT. The prevalence of HPT is higher both in urban and older age groups.

In most studies, the prevalence of HPT is higher in urban areas compared with rural counter parts; this could be due to the life style, increased stress level, urbanization and due to decrease physical activity. In this study it was very difficult to conduct trends in prevalence of hypertension because the studies were undertaken at different populations and age groups.

The data in this review provide estimates of the burden of hypertension in different regions of Ethiopia. Only studies which use JNC7 criteria/antihypertensive medication were included in the review; this was made for comparison purpose. Variations in BP measurement methodology, age range and study site made it difficult for comparison of study.

Studies were included based on the extent to which the methods used were likely to give results which were representative of the population from which samples were drawn. To achieve this, studies were included only if the response rate had been mentioned and was at least 90% and sample size was reasonably large (400 participants).

There is an urgent need to encourage healthy lifestyles as a means of primary prevention and also to increase awareness of hypertension through public education and creating BP screening centers in different recreational and social settings like school, church, market, mosque and others.

## 5. Strengths and Weaknesses

In the absence of vital statistics system, epidemiological studies on non-communicable diseases, with a variety of designs and in-depth analysis of risk factors and the effects of interventions, could provide a better understanding of the situations in Ethiopia and provide information to healthcare policy-making. Only a few studies were carried out with the same age group, which created some difficulties in pooling of age specific prevalence, to pool associated factors and conduct Meta Analysis.

Although this review includes hospital-based studies which are largely non-representative of the community, it can highlight gaps on the understanding of the major non-communicable diseases in the country. Future research priorities for the country should include better quantification of the major non-communicable diseases and locally-important risk factors.

## 6. Conclusion and Recommendation

The prevalence of major non-communicable diseases in Ethiopia is high, with probable underreporting, and will certainly increase in the upcoming years. Providing critical data to formulate evidence based health policy and intervention will play a tremendous role. So, future researchers shall produce evidences in different regions and shall use the same reference criteria for comparison purpose. Moreover, primary prevention tailored to provide education on modifiable life-styles addressing the health consequences of alcohol consumption, physical inactivity, and dietary pattern and to establish BP screening in primary health care context would be of immense value. On top of these, proactive thinking integrated with the primary healthcare system could be the best way to reduce the burden both in the rural and urban settings of the country. It could also enhance healthy behaviors and mitigate the rise in the incidence of major non-communicable diseases in the country. Because of the limited number of studies on HPT in Ethiopia, upcoming well-powered studies, using the standardized research design and covering more regions of the country and Meta Analysis studies are recommended.

Further investigation is important for other Chronic Non Communicable diseases such as Diabetes mellitus, cardiovascular disorders, cancer, and other diseases like chronic obstructive lung diseases.

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