BMJ Open

Uncovering the high burden of hypertension and its predictors among adult population in Hosanna town, southern Ethiopia: a community-based cross-sectional study

Nebiyu Dereje ,[1] Alemu Earsido,[1] Layla Temam,[2] Ashenafi Abebe[3]

To cite: Dereje N, Earsido A, Temam L, *et al*. Uncovering the high burden of hypertension and its predictors among adult population in Hosanna town, southern Ethiopia: a community-based cross-sectional study. *BMJ Open* 2020;**10**:e035823. doi:10.1136/bmjopen-2019-035823

► Prepublication history and additional material for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2019-035823).

Received 18 November 2019
Revised 01 September 2020
Accepted 10 September 2020

[1]Department of Public Health, Wachemo University, Hosanna, Ethiopia
[2]Department of Medicine, Wachemo University, Hosanna, Ethiopia
[3]Department of Statistics, Wachemo University, Hosanna, Ethiopia

Correspondence to
Nebiyu Dereje;
neba.jahovy@gmail.com

ABSTRACT

Objective Hypertension is a global public health problem, with its burden increasing particularly in developing countries. However, it has not yet received due attention in Ethiopia. The aim of this study was to determine the prevalence and associated factors of hypertension among adult population in Hosanna town, southern Ethiopia.

Design Community-based cross-sectional study.

Setting Hosanna town, southern Ethiopia.

Participants Adult population aged ≥18 years (n=634) were recruited by a multistage stratified sampling technique.

Outcome measures A face-to-face interview using structured questionnaire was carried out by trained nurses. Anthropometry and blood pressure were measured following standard procedures. Hypertension status was defined as systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg in two separate measurements or reported use of prescribed antihypertensive drugs for raised blood pressure. Factors associated with hypertension were identified by multivariable binary logistic regression analysis.

Results The overall prevalence of hypertension was found to be 17.2% (19.3% and 14.2% among men and women, respectively). About 40% were unaware that they were hypertensive prior to the study. Older age ≥35 years (adjusted OR=3.9, 95% CI: 1.4 to 10.8), alcohol use (adjusted OR=3.4, 95% CI: 1.4 to 8.3), consumption of saturated oil (adjusted OR=6.5, 95% CI: 1.5 to 17.5) and unspecified different types of oil (adjusted OR=8.2, 95% CI: 1.9 to 25.1) and overweight/obesity (adjusted OR=2.9, 95% CI: 1.9 to 4.6) were found to be independently associated with hypertension.

Conclusions The prevalence of both diagnosed and undiagnosed hypertension is alarmingly high in the town. These findings underscore the need to design health information provision systems on the risk factors of hypertension and promote good health practices. Blood pressure screening programmes at community levels to identify and treat undiagnosed hypertension should be considered.

Strengths and limitations of this study

- Community-based study allows generalisation of the findings to the population.
- A tool adapted from the standard WHO STEPS approach for surveillance of chronic non-communicable diseases was used.
- Some of the variables (eg, nutritional) were assessed for a week prior to survey and might not represent the usual pattern.
- Recall bias might affect the result of the study.

INTRODUCTION

Hypertension is a state of high blood pressure and a leading risk factor for cardiovascular diseases (CVDs), globally.[1–4] Non-communicable diseases (NCDs) accounted for 72.3% of global deaths in 2016, of which more than 50% were attributed to cardiovascular problems.[1 2] There is a declining trend in CVDs in developed countries due to effective interventions, but the burden of CVDs is on the rise in developing countries such as Ethiopia.[1 4–6]

In Ethiopia, according to the finding from the WHO STEPS survey of 2015, the prevalence of hypertension was found to be 15.8%.[7] There are also few studies that reported the prevalence of hypertension ranging from 8% to 35%.[5 8–16] Moreover, the prevalence of undiagnosed hypertension (those who are neither aware of the raised blood pressure nor are taking any antihypertensive medication) is high in Ethiopia. Undiagnosed hypertension may pose a serious problem, as it is asymptomatic. Although little is known about the study area, reasons reported for the high burden of hypertension disorder in Ethiopia are lifestyle change and effect of urbanisation and globalisation.[6–11 17]

Our study area (Hosanna town) is known for its rapid urbanisation and population growth due to in-migration of the surrounding rural people. The lifestyle of these rural people gets altered when they start living in the town, which may pose them at risk of hypertension. However, to our knowledge, there is only one study in the town conducted in 2014 by recruiting adults aged 25–64 years.[18] However, the study was not representative and was limited in assessing several risk factors of hypertension. Although the prevalence of hypertension is known to be varying from place to place and time to time, previous studies conducted in Ethiopia have reported inconsistent and inconclusive findings regarding the risk factors. Moreover, prior studies were limited in assessing dietary risk factors, overweight/obesity, physical activity and behavioural risk factors. Evidence of the burden of hypertension is inadequate to direct the decision-making abilities of the health system policymakers, programmes and actors, which in turn has an implication on budget allocation and resource distribution. There have been many investments to prevent and control communicable diseases in the town, but appropriate attention has not yet been given for the control of NCDs, including hypertension. Therefore, this study aimed to determine the prevalence of hypertension and its associated factors among adult population (≥18 years) using a community-based study design and WHO STEPS approach for surveillance of chronic NCDs.[19] The findings of this study can be used to guide hypertension prevention and control activities in Ethiopia and in similar low-income countries.

MATERIALS AND METHODS

Study setting and population

Data for this study were obtained from the community-based cross-sectional study conducted from 15 May to 20 May 2017 among selected adult population (≥18 years) in Hosanna town, southern Ethiopia.

Sample size and sampling procedures

The sample size (n=634) was estimated using a single population proportion formula by considering 95% confidence level, 5% margin of error, 41% prevalence of undiagnosed hypertension in sub-Saharan Africa[20] and design effect of 1.5% and 10% non-response rate. The sample size determined was for the prevalence study, and the correlations are secondary analysis.

Multistage stratified sampling technique was used to recruit the samples included in the study. In the first stage, of the total three subcities of the town, three kebeles (lowest administrative unit in Ethiopia) from each were selected randomly by lottery method (a total of nine kebeles). The number of households to be included from each kebele was allocated proportionally to the population. Then, households to be included in the study were selected by simple random sampling technique (computer-based random number generator) using the health extension workers' family folder and registry as a sampling frame. In Ethiopian health system, the lowest health facility located near a community is called health post. In this facility, the health extension workers provide basic services such as immunisation, family planning, antenatal care, health education, nutritional supplements and some level of treatment for different disease conditions. To facilitate these, the health extension workers have a family folder for each household (family) in their catchment. Each of the family folders contains information such as the address of the household, list of individuals in that family and their age groups, and different household characteristics (eg, type of latrine they have). The health extension workers follow all the population in their catchment based on the family folder and update any vital events such as birth and death. Moreover, the health extension workers have the overall list (registry) of the population in their catchment area. The research team used this list of individuals as a sampling frame to select participants for the study. All the eligible individuals in the selected households were included in the study. The individuals who were critically ill and unable to respond to the interview were excluded from the study.

Patient and public involvement

Neither patients nor the public were involved in the development of this study.

Data collection procedures

A structured questionnaire which is adapted from the WHO STEPS instrument was used to collect data (see online supplemental file 1). The WHO STEPS questionnaire is a standard instrument for surveillance of NCDs and their risk factors.[19] Information on sociodemographic characteristics, behavioural and medical-related questions, and physical and blood pressure measurements was collected. The data collectors were eight trained clinical nurses who were working in the study area and able to speak local language.

Face-to-face interview was conducted at home level after the interviewers explained the purpose of the study and obtained the participant's informed consent to participate in the study. Eligible participants were declared unavailable if they were not found on three separate visits. After completion of the face-to-face interview, all participants were given appointment for physical and blood pressure measurements to be taken at the nearest outreach sites (health centres). All study instruments were translated into local language (Amharic) by native speakers and then back-translated to English by another person who understood the language, for consistency. Instruments used for measuring physical dimensions such as weight scale and height measuring board were calibrated in a daily basis and checked after each measurement. Daily supervision was made in the field during data collection by the investigators.

Two separate blood pressure measurements were taken using digital blood pressure measuring apparatus (Beurer BM 47 Upper Arm Blood Pressure Monitor). The

right arm was used for this measurement. The displayed reading of the systolic and diastolic blood pressure was recorded. Participants took rest for 10 min between each reading. The average of two blood pressure measurements was taken. Height was measured by a sliding metre and read in centimetres to the nearest 0.1 cm and recorded. Weight was measured using a digital weighing scale (UNICEF seca) and recorded in kilograms to the nearest 0.1 kg.[7–10 19]

Physical activity was measured using the WHO physical activity questionnaire.[19] The questionnaire assesses work-related activity, walking, sport and recreational activity, and time spent on sitting per day. Work-related activities were categorised as work involving vigorous-intensity and moderate-intensity activities. Work involving vigorous-intensity activity was measured by asking the question, 'Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate (carrying or lifting heavy loads, digging or construction work) for at least 10 min continuously?' and work involving moderate-intensity activity was measured by asking the question, 'Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking (or carrying light loads) for at least 10 min continuously?' Based on this, an adult person should do at least 150 min of moderate-intensity work (aerobic physical activity) or 75 min of vigorous-intensity work (aerobic physical activity) or 60 min of combination of vigorous-intensity and moderate-intensity work (aerobic physical activity) per week. If the self-reported physical activity did not fit with the WHO recommendation, participants were categorised as physically inactive.[19]

Operational definitions and measurement of variables

Hypertension status of participants was defined as systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg in two separate measurements or reported use of prescribed antihypertensive drugs for raised blood pressure. Undiagnostic hypertension was defined as systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg, but the participants being unaware of it prior to the study.[7–10 19]

Current smoking and current alcohol use was defined as using tobacco products and alcohol within the preceding month prior to the survey, respectively.[7–10] Age of the study participants was dichotomised during the analysis as below and above the median age of the study participants (35 years) based on the data of the study (post hoc). The educational status of the study participants was categorised as illiterate, if they were unable to write and read, and literate, if they were able to write and read.

Weight divided by height squared (kg/m^2) was used to compute the body mass index (BMI). Then, BMI was categorised as normal, if it was <25 kg/m^2; overweight, if it was from 25 kg/m^2 to 29.9 kg/m^2; and obese, if it was ≥30 kg/m^2. However, for the analysis, we categorised weight into two groups as normal and abnormal BMI (merging the overweight and obese group).[7–10]

Data management and analysis

Data were checked, cleaned and entered into Epi data V.3.1 software and then imported to SPSS V.20.0 software for analysis. Incomplete and inconsistent data were excluded from the analysis. Descriptive statistics were used to summarise the data by frequency, percentage, mean and SD. The prevalence of hypertension was described using the proportion and 95% CI. Associations between independent variables and hypertension were analysed first using bivariate analysis (χ^2 test and binary logistic regression) to identify factors eligible for multivariable analysis. Those variables with a value of p<0.25 in the bivariate analysis were included in the multivariable logistic regression analysis. The magnitude of the association between independent and dependent variables was measured using OR and 95% CI, and a value of p<0.05 was considered statistically significant. Multicollinearity between variables was assessed using the multicollinearity diagnostics (variance inflation factor and tolerance test). The final multivariable binary logistic regression model was found to be fit based on the finding of the Hosmer-Lemeshow goodness-of-fit test.

RESULTS

Sociodemographic characteristics of the participants

A total of 627 participants' data were analysed (response rate of 98.9%). The majority of participants (58.5%) were men, and the mean age of the participants was 36 (±11.6) years. The age of the study participants ranged from 20 to 80 years. About two-thirds of the participants were married (65.6%) and one-third was self-employed (31.6%). Of all the participants approached, 95% indicated that they had formal education and were able to read and write (table 1).

Prevalence of hypertension

The mean systolic and diastolic blood pressure was 123.4 (±14.3) mm Hg and 75.3 (±9.3) mm Hg, respectively. The overall prevalence of hypertension was found to be 17.2% (95% CI: 14.5% to 19.9%), which was higher in men (19.3%) than in women (14.2%). The majority of hypertensive participants were found (29.6%) to be in the age group of 45–54 years. Among all the hypertensive people identified (n=108), a significant proportion (39.8%) were not aware that they had raised blood pressure prior to the study; thus, they were newly diagnosed. The majority of participants who were aware that they were hypertensive were taking dietary modifications (90.8%). Nearly half of the participants (45.9%) were ever screened for raised blood pressure; of them, 22.6% were informed that they have raised blood pressure (table 2).

Factors associated with hypertension

In the bivariate analysis, older age ≥35 years, current tobacco use, alcohol use, abnormal BMI and type of oil

Table 1 Sociodemographic characteristics of study participants in Hosanna town, southern Ethiopia, 2017 (n=627)

Variable	Category	Frequency (%)
Sex	Male	367 (58.5)
	Female	260 (41.5)
Age	<25 years	112 (17.9)
	25–34 years	203 (32.4)
	35–44 years	155 (24.7)
	45–54 years	105 (16.7)
	55–64 years	40 (6.4)
	≥65 years	12 (1.9)
Marital status	Single	216 (34.4)
	Married	411 (65.6)
Educational status	Illiterate	32 (5.1)
	Literate	595 (94.9)
Occupation	Government employed	181 (28.9)
	NGO employed	38 (6.1)
	Self-employed	198 (31.6)
	Student	59 (9.5)
	Housewife	87 (13.9)
	Retired	21 (3.3)
	Unemployed	43 (5.8)

NGO, non-governmental organisation.

Table 2 Prevalence of hypertension among adult population in Hosanna town, southern Ethiopia, 2017

Variables	Frequency (%)	95% CI
Overall hypertensive (n=627)		
Yes	108 (17.2)	14.5 to 19.9
No	519 (82.8)	80.1 to 85.5
Hypertension in the age groups		
<25 years (n=112)	7 (6.3)	2.2 to 11.2
25–34 years (n=203)	18 (8.9)	4.9 to 13.0
35–44 years (n=155)	28 (18.1)	12.0 to 24.1
45–54 years (n=105)	32 (30.5)	21.7 to 39.8
55–64 years (n=40)	15 (37.5)	22.0 to 52.8
≥65 years (n=12)	8 (66.7)	62.9 to 82.6
Ever screened for raised blood pressure by a healthcare provider (n=627)		
Yes	288 (45.9)	42.1 to 49.9
No	339 (54.1)	50.1 to 57.9
Told that they had raised blood pressure (n=228)		
Yes	65 (22.6)	17.8 to 28.9
No	223 (77.4)	71.2 to 80.3
Measures taken to control their raised blood pressure (n=65)		
Taking antihypertensive drugs	30 (46.2)	32.8 to 57.8
Dietary modifications	59 (90.8)	83.1 to 96.9
Weight loss measures	47 (72.3)	60.0 to 83.1
Doing regular exercise	21 (32.3)	20.3 to 42.2
Taking traditional medication	16 (24.6)	13.8 to 35.4

commonly used were found to be significantly associated with hypertension (table 3).

Overall, 4.6% of the participants indicated that they were current smokers of tobacco products. Among the current smokers, 38% were found to be hypertensive.

The proportion of current alcohol drinkers was 15.9%, with majority of them being in the age category of 35–44 years. Among the current alcohol drinkers, 34% were found to be hypertensive. One week prior to the survey, about 20% and 9% of participants did not consume fruits and vegetables, respectively. A quarter (25.9%) and 13% of those who did not consume fruits and vegetables were hypertensive, respectively.

A high proportion (87.5%) and more than one-third (37%) of the participants commonly used saturated fats (oils) and unspecified different types of fats (oils) for meal preparation, respectively. Thirty percent of the participants had more than two times meal outside of their home. Nearly half (51.9%) of those who commonly used saturated fats and unspecified different types of fats for meal preparation were found to be hypertensive.

Regarding the participants' physical activity, more than three-fourths (83%) of the participants' physical activity did not meet the WHO recommendations. In addition, 9.4% of the participants spent more than 8 hours per day sitting.

The mean height and weight of the participants were 169 (±4.2) cm and 66.98 (±8.2) kg, respectively. The mean BMI of the participants was 23.63 (±3.4) kg/m^2, which is 23.46 kg/m^2 among men and 23.87 kg/m^2 among women. About a quarter of the participants (24.4%) were with abnormal BMI (either overweight or obese). Nearly half of those with abnormal BMI were hypertensive.

In further multivariable analysis after adjusting for confounding variables (sex, age, smoking status and alcohol drinking), hypertension was significantly associated with age ≥35 years, current alcohol drinking, commonly using saturated and unspecified types of oils, and abnormal BMI. However, other variables such as sex, smoking status, fruit and vegetable consumption, and time spent on sitting were not significantly associated with hypertension (table 4).

The odds of hypertension among participants aged ≥35 years were four times higher compared with those of younger ones (adjusted OR=3.97, 95% CI: 1.45 to 10.83).

Table 3 Bivariate analysis showing factors associated with hypertension in Hosanna town, southern Ethiopia, 2017

Variables	Hypertension		COR (95% CI)	P value
	Yes	No		
Sex				
Male	71 (19.3%)	296 (79.7%)	1.5 (0.9 to 2.2)	0.18
Female	37 (14.2%)	223 (75.8%)	1.0	
Age				
<35 years	25 (7.6%)	306 (92.4%)	1.0	
≥35 years	83 (28.0%)	213 (72.0%)	4.8 (2.9 to 7.7)	0.007*
Current smoker				
No	97 (16.2%)	501 (83.8%)	1.0	
Yes	11 (37.9%)	18 (62.1%)	3.2 (1.5 to 6.9)	0.71
Current alcohol drinker				
No	11 (20.4%)	43 (79.6%)	1.0	
Yes	21 (46.7%)	24 (53.3%)	3.4 (1.4 to 8.3)	0.03*
Did not consume fruit and/or vegetables in the last week				
No	87 (16.1%)	454 (83.9%)	1.0	
Yes	21 (24.4%)	65 (75.6%)	1.7 (0.9 to 2.9)	0.2
Type of oil used				
Vegetable oils	3 (3.8%)	75 (96.2%)	1.0	
Saturated fat	56 (17.7%)	261 (72.3%)	5.3 (1.6 to 17.6)	0.01*
Different types	49 (21.1%)	183 (78.9%)	6.7 (2.0 to 22.1)	0.004*
Physical activity				
Did not meet WHO recommendation	92 (17.7%)	428 (72.3%)	1.2 (0.7 to 2.2)	0.49
Met WHO recommendation	16 (14.9%)	91 (85.1%)	1.0	
Time spent on sitting				
<8 hours	90 (15.9%)	477 (84.1%)	1.0	
≥8 hours	18 (30.0%)	42 (70.0%)	2.3 (1.3 to 4.2)	0.1
BMI category				
Abnormal	49 (29.9%)	115 (70.1%)	2.9 (1.9 to 4.6)	0.0001*
Normal	58 (12.5%)	405 (87.5%)	1.0	

*Significantly associated in the bivariate binary logistic regression analysis and χ^2 test.
COR, crude OR.

Similarly, the odds of hypertension among current alcohol drinkers were three times higher compared with those of non-drinkers (adjusted OR=2.9, 95% CI: 1.1 to 7.6). Moreover, the odds of hypertension among participants who commonly used saturated oil (adjusted OR=6.5, 95% CI: 1.5 to 17.5) and unspecified different types of oils (adjusted OR=8.2, 95% CI: 1.9 to 25.1) for cooking meals were higher compared with those who commonly used vegetable oils for cooking meals. Furthermore, the odds of hypertension among overweight/obese individuals were three times higher compared with those with normal weight (adjusted OR=2.7, 95% CI: 1.7 to 4.3).

DISCUSSION

The burden of hypertension and its associated cardiovascular problems are increasing in developing countries like Ethiopia.[1 3 4] This study found out the overall prevalence of hypertension to be 17.2% in Hosanna town. Nearly one in every five adults in Hosanna town had hypertension. About 4 (40%) out of 10 people in the town were not aware of that they were hypertensive prior to the study. This finding of our study has a public health implication and it should be considered as a major public health problem of the community. Hypertension is asymptomatic until complications arise and may cause serious health problems which include sudden death due to cardiac problems, if left unrecognised and untreated. The high proportion of undiagnosed (unaware) hypertension calls for different public health interventions like providing hypertension screening programmes at the community level.[20–23]

Table 4 Multivariable logistic regression analysis showing factors associated with hypertension in Hosanna town, southern Ethiopia, 2017 (n=627)

Variables	Hypertension		COR (95% CI)	AOR (95% CI)	P value
	Yes	No			
Sex					
Male	71	296	1.5 (0.9 to 2.2)	0.5 (0.2 to 1.4)	0.18
Female	37	223	1.0	1.0	
Age					
<35 years	25	306	1.0	1.0	
≥35 years	83	213	4.8 (2.9 to 7.7)	3.8 (1.4 to 10.8)	0.007*
Current smoker					
No	97	501	1.0	1.0	
Yes	11	18	3.2 (1.5 to 6.9)	0.8 (0.2 to 2.7)	0.71
Current alcohol drinker					
No	11	43	1.0	1.0	
Yes	21	24	3.4 (1.4 to 8.3)	2.9 (1.1 to 7.6)	0.03*
Did not consume fruit and/or vegetables in the last week					
No	87	454	1.0	1.0	
Yes	21	65	1.7 (0.9 to 2.9)	1.5 (0.8 to 2.6)	0.2
Type of oil used					
Vegetable oils	3	75	1.0	1.0	
Saturated fat	56	261	5.4 (1.6 to 17.6)	6.5 (1.5 to 17.5)	0.01*
Different types	49	183	6.7 (2.0 to 22.1)	8.2 (1.9 to 25.1)	0.004*
Time spent on sitting					
<8 hours	90	477	1.0	1.0	
≥8 hours	18	42	2.3 (1.3 to 4.2)	1.7 (0.9 to 3.2)	0.1
BMI categories					
Abnormal	49	115	2.9 (1.9 to 4.6)	2.7 (1.7 to 4.3)	0.0001*
Normal	58	405	1.0	1.0	

*Significantly associated in the multivariablebinary logistic regression model.
AOR, adjusted OR; BMI, body mass index; COR, crude OR.

The prevalence of hypertension in this study is comparable with the findings from other towns of Ethiopia such as Hawassa (19.7%),[8] Mekelle (19.1%)[5] and the Ethiopian national prevalence (15.8%).[7] However, the prevalence of hypertension in this study is higher than that reported from the studies conducted in other towns of Ethiopia such as Jimma (13.2%)[11] and Sidama zone (9.9%).[9] Moreover, the prevalence of hypertension in this study is higher than that reported from the study in North West Tanzania (8.0%)[24] and lower than that reported from the studies conducted in an urban slum in Nairobi, Kenya (29.4%),[25] and rural Limpopo province of South Africa (41.4%).[26] The discrepancy in the prevalence of hypertension is due to the difference in urban–rural settings of the studies, the age group of the study participants and difference in the lifestyles of the population in the study areas. Our study is based on urban adult population aged ≥18 years, whereas the study conducted in the urban slum in Nairobi, Kenya, included individuals aged 35–64 years. The higher prevalence in the rural Limpopo province of South Africa might be attributed to their higher tobacco smoking and alcohol use.[26]

This study revealed that hypertension is associated with older age, alcohol drinking, utilisation of saturated fats/oils or unspecified different types of fats/oils and abnormal BMI. Similar to other studies, we found that the prevalence of hypertension increased with age, which might be due to changes that occur in the walls of blood vessels as age increases.[5 10 11 26 27] Similarly, consumption of excessive saturated fat/oil is also associated with hypertension. This is because the body will convert saturated fats into cholesterol, which in turn will narrow the arteries and raise resistance in the blood vessels, resulting in high blood pressure.[28] Studies also identified that abnormal BMI (obesity) is associated with hypertension.[5 10 25 27–29]

This study used a community-based design, which allows generalisation to the population of the town. Moreover, the study included participants' interview and physical measurements using standard procedures, which allowed

us to triangulate the study findings from different sources. However, this study has limitations since it has used cross-sectional study design and some of the variables were taken for the study period only. For instance, nutrition-related questions were assessed for 1 week preceding the survey and might not represent the usual pattern of lifestyles and are prone to recall bias.

CONCLUSIONS

In sum, the prevalence of hypertension in the town is exceedingly high. Significant proportions (40%) of adults were unaware that they had hypertension prior to the study. This is also related to modifiable risk factors such as alcohol drinking, saturated fat/oil consumption, overweight/obesity and physical inactivity. Therefore, due consideration should be given for prevention and control of hypertension by designing health information provision systems on the risk factors of hypertension and promotion of good health practices. Particular attention should be given on the type of oil that people should commonly consume. Moreover, the health departments should facilitate blood pressure screening programmes at community levels to identify and treat undiagnosed hypertension.

Acknowledgements The authors acknowledge Wachemo University for funding this study. They also thank their native English-speaking colleague, Mr Larry Johnson, for English editing. They are also grateful to the participants of the study for their cooperation.

Contributors ND had a major role in the study design, data analysis, interpretation of the findings and writing of initial and revised manuscripts. AE, LT and AA have contributed to the study design, data visualisation and revision of the manuscript. All the authors have reviewed and revised the manuscript and approved the final manuscript as submitted.

Funding This work was funded by Wachemo University.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval This study was approved by the Institutional Review Board (IRB) of Wachemo University (approval number: WCU/IRB/086/17). All participants were informed about the study and they gave their written consent to be included in the study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

ORCID iD

Nebiyu Dereje http://orcid.org/0000-0001-5406-4171

REFERENCES

1 Global burden of diseases collaborators. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the global burden of disease study 2016. *The Lancet* 2017;390:1151–210.
2 Cooper RS, Kaufman JS, Bovet P. Global burden of disease attributable to HypertensionGlobal burden of disease attributable to HypertensionLetters. *Jama* 2017;317:2017–8.
3 Forouzanfar MH, Liu P, Roth GA, *et al*. Global burden of hypertension and systolic blood pressure of at least 110 to 115 MM Hg, 1990-2015. *JAMA* 2017;317:165–82.
4 Bromfield S, Muntner P. High blood pressure: the leading global burden of disease risk factor and the need for worldwide prevention programs. *Curr Hypertens Rep* 2013;15:134–6.
5 Gebremariam LW, Chiang C, Yatsuya H, *et al*. Non-communicable disease risk factor profile among public employees in a regional city in northern Ethiopia. *Sci Rep* 2018;8:9298.
6 Tefera YG, Abegaz TM, Abebe TB, *et al*. The changing trend of cardiovascular disease and its clinical characteristics in Ethiopia: hospital-based observational study. *Vasc Health Risk Manag* 2017;13:143–51.
7 Gebreyes YF, Goshu DY, Geletew TK, *et al*. Prevalence of high bloodpressure, hyperglycemia, dyslipidemia, metabolic syndrome and their determinants in Ethiopia: evidences from the National NCDS steps survey, 2015. *PLoS One* 2018;13:e0194819.
8 Esaiyas A, Teshome T, Kassa D. Prevalence of hypertension and associate risk factors among workers at Hawassa University, Ethiopia: an institution based cross sectional study. *Vasc Med Surg* 2018;06:1.
9 Giday A, Tadesse B. Prevalence and determinants of hypertension in rural and urban areas of southern Ethiopia. *Ethiop Med J* 2011;49:139–47.
10 Asresahegn H, Tadesse F, Beyene E. Prevalence and associated factors of hypertension among adults in Ethiopia: a community based cross-sectional study. *BMC Res Notes* 2017;10:629.
11 Gudina EK, Michael Y, Assegid S. Prevalence of hypertension and its risk factors in Southwest Ethiopia: a hospital-based cross-sectional survey. *Integr Blood Press Control* 2013;6:111–7.
12 Helelo TP, Gelaw YA, Adane AA. Prevalence and associated factors of hypertension among adults in Durame town, southern Ethiopia. *PLoS One* 2014;9:e112790.
13 Abegaz TM, Abdela OA, Bhagavathula AS, *et al*. Magnitude and determinants of uncontrolled blood pressure among hypertensive patients in Ethiopia: hospital-based observational study. *Pharm Pract* 2018;16:1173.
14 Getabalew EB, Trhas T, Roman N, *et al*. Magnitude and associated factors of hypertension in Addis Ababa public health facilities, Ethiopia. *MOJ Public Health* 2018;7:280–6.
15 Senbeta GA, Yeweyenhareg F, Miftah A. Prevalence of hypertension and pre-hypertension in Addis Ababa, Ethiopia: a survey done in recognition of World hypertension day. *Ethiop J Health Dev* 2015;29:1–79.
16 Kibret KT, Mesfin YM. Prevalence of hypertension in Ethiopia: a systematic meta-analysis. *Public Health Rev* 2015;36:14.
17 Bonsa F, Gudina EK, Hajito KW. Prevalence of hypertension and associated factors in Bedele town, Southwest Ethiopia. *Ethiop J Health Sci* 2014;24:21.
18 Asfaw LS, Ayanto SY, Gurmamo FL. Hypertension and its associated factors in Hosanna town, southern Ethiopia: community based cross-sectional study. *BMC Res Notes* 2018;11:306.
19 WHO. WHO/STEP wise approach to surveillence (STEPS), 2016. Available: https://www.who.int/ncds/surveillance/steps/instrument/en/
20 Feven A, Sebhat E, Stephen K, *et al*. Burden of undiagnosed hypertension in sub-Saharan Africa. *Hypertension* 2014;65:291–8.
21 Hilary KW, Judy AH, Janet SW. Patients with undiagnosed hypertension. *JAMA* 2014;312:1973–4.
22 Undavalli VK, M. P, H. N, Praveen M, Narni H. Prevalence of undiagnosed hypertension: a public health challenge. *Int J Community Med Public Health* 2018;5:1366.
23 Anteneh ZA, Yalew WA, Abitew DB. Prevalence and correlation of hypertension among adult population in Bahir Dar City, Northwest Ethiopia: a community based cross-sectional study. *Int J Gen Med* 2015;8:175–85.
24 Mosha NR, Mahande M, Juma A, *et al*. Prevalence,awareness and factors associated with hypertension in North West Tanzania. *Glob Health Action* 2017;10:1321279.
25 Olack B, Wabwire-Mangen F, Smeeth L, *et al*. Risk factors of hypertension among adults aged 35-64 years living in an urban slum Nairobi, Kenya. *BMC Public Health* 2015;15:1251.
26 Ntuli ST, Maimela E, Alberts M, *et al*. Prevalence and associated risk factors of hypertension amongst adults in a rural community of

Limpopo Province, South Africa. *Afr J Prim Health Care Fam Med* 2015;7:847.
27 Wamala JF, Karyabakabo Z, Ndungutse D, *et al*. Prevalence factors associated with hypertension in Rukungiri district, Uganda–a community-based study. *Afr Health Sci* 2009;9:153–60.
28 Wang L, Manson JE, Forman JP, *et al*. Dietary fatty acids and the risk of hypertension in middle-aged and older women. *Hypertension* 2010;56:598–604.
29 Peltzer K, Phaswana-Mafuya N, Karl P. Hypertension and associated factors in older adults in South Africa. *Cardiovasc J Afr* 2013;24:67–71.