



WOLKITE UNIVERISY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

MAGNITUDE OF OVER NUTRITION AND ASSOCIATED FACTORS AMONG
HYPERTENSIVE PATIENTS IN WOLKITE UNIVERSITY SPECIALIZED HOSPITAL,
SOUTHERN ETHIOPIA 2022: INSTITUTION BASED CROSS-SECTIONAL STUDY

BY: MELAKU GEBRE (BSc in public health)

A THESIS SUBMITTED TO THE DEPARTMENT OF PUBLIC HEALTH, COLLEGE OF
MEDICINE AND HEALTH SCIENCES, WKU COLLEGE IN PARTIALFULFILLMENT OF
THE REQUIREMENTS FOR THE MASTER OF PUBLIC HEALTH NUNTRITION

AUGUST, 2022

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Declaration

I hereby declare that this MPH thesis is my original work and has not been presented for a degree in any other university, and all sources of material used for this thesis have been duly acknowledged.

Name: -----

Signature: _____

This MPH thesis has been submitted for examination with our approval as Thesis advisors.

----- (MPH, Assistant Professor)

signature: _____

----- (MPH, Assistant Professor)

signature: _____

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First, I would like to provide my recognition to God almighty, who helped and kept me in this position. Next my heartfelt thanks go to Wolkite University for their sustainable support and good will till completion of the courses.

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Acronyms & Abbreviations

Ass`t Prof_____ Assistant professor

BP _____ Blood pressure

Cm_____ Centimeter

CI _____ Confidence interval

DALYs_____ Disability Adjusted life of Year

DBP_____ Diastolic blood pressure

DASH_____ Dietary Approaches to Stop Hypertension

DGA_____ Dietary Guidelines of American

EPHI_____ Ethiopia public health institute

HNT_____ Hypertension

Kg_____ Kilogram

MOH_____ Minister of health

MmHg_____ Millimeter mercury

M²_____ meter square

NCD _____ None communicable disease

SBP_____ Systolic blood pressure

SPSS_____ Statistical Package for Social Sciences

U.S. CDC_____ United States Centers for Disease Control

WHO_____ World health origination

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Abstract

Background: Obesity and overweight is major risk factor for its development. However, evidence on the magnitude of obesity and overweight and associated factors among hypertension patients in Ethiopia and including in study area is scarce. So, this study aimed to assess the magnitude of obesity and overweight and associated factors among hypertensive patients at Wolkite University specialized chronic care clinic.

Methods: A facility-based cross-sectional study was conducted among randomly selected 338 adult hypertensive patients who are on follow up at Wolkite University Specialized Hospital from May to November 2022 using interviewer-administered questionnaires. The dietary consumption data was collected by using a validated and reliable qualitative food frequency questionnaire over a one-week period to capture usual consumption patterns. Information from participants on sociodemographic, socioeconomic, and other factors was also collected. The data was entered into Epi Data version 3.1 and transported to SPSS version 20.0 for analysis. Descriptive statistics such as mean, median and frequency tables were computed. We used bivariate and multivariate logistic regression factors associated with over nutrition. The strength of the association between independent variables and outcome variables was measured by using an adjusted odds ratio with a 95% confidence interval. **Results:** A total of 331, (98%) were included, with an overall prevalence of over nutrition of 27% (95% CI: 24.1–29.2), 22.5% had overweight and 4.5% had obesity. Being female (AOR =3.32; 95% CI: 1.65-6.63), eating cereals and legumes (AOR =3.20; 95% CI: 1.67-6.10), eating vegetables and fruits (AOR = 6.26; 95% CI: 3.76–10.41), and living in an urban area (AOR =3.4; 95% CI: 2.5-4.7) were significantly associated with over nutrition. **Conclusion and Recommendation:** This study revealed high prevalence of overweight/obesity among study participants .Study was found that eating habit of vegetables and fruits, cereals and legumes, sex and residence were significantly associated with overweight and obesity .**Key words:** prevalence of overweight and obesity, hypertension, Wolkite specialized hospital, Cross- sectional.

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Introduction

1.1. Background

Overweight, defined as a body mass index (BMI) of 25.0–29.9 kg/m², and obesity as BMI 30.0 kg/m² and above, represent progressive buildup of adipose tissue to levels that damage the physical and psychosocial health and well-being of an individual (1). Epidemiological data indicate that the current global obesity epidemic began approximately 40 years ago (2). However, some studies suggest that the rise in obesity rates started earlier, and that the progression of the epidemic has been somewhat irregular (2). Globally, there is rising prevalence of overweight and obesity and associated hypertension in both developing and developed countries(3). The rising levels of obesity in developing countries is thought to be a result of urbanization, increased consumption of high calorie foods, adoption of a western lifestyle and adoption of a more Sedentary lifestyle(4). World health organization (WHO) has described obesity as the worst non-infectious epidemic in history (5) and it is the second leading cause of preventable death following tobacco use (5). HTN is a major public health problem as it is the leading cause of cardiovascular diseases and is responsible for 9.4 million deaths each year in the world and it has been estimated that one out of four adult's worldwide (1.39 billion people) have hypertension(6). The upsurge in the prevalence of hypertension is closely connected to the rise in obesity(7). Among all obesity related diseases, HTN is most strongly and clearly related with obesity(8). There is a seven times and three fold greater risk of hypertension in obese and overweight individuals respectively compared to those of healthy weight(9). Furthermore, it is estimated that around 65% of HTN is attributable to excess weight(10). The pathophysiology connecting obesity and HTN is primarily attributed to inappropriate activation of the sympathetic nervous system (SNS) and renin-angiotensin-aldosterone system (RAAS) adipocyte dysfunction, and impaired pressure natriuresis that is exacerbated by physical compression of the kidneys (11). Studies shows that, weight loss of 5–10 kg in women with obesity substantially lowers the risk of developing hypertension by up to 25% (7).

1.2. Statement of Problem

Globally, the prevalence of obesity doubled in 73 countries between 1980 and 2020, and in 2020 about 2 billion adults were obese (12). Nearly 2.8 million people die globally annually because of being overweight or obese. The obesity epidemic is spreading to low-income and middle-income countries as a result of new dietary habits and sedentary ways of life, fueling chronic diseases and premature mortality (4). In Brazil, the prevalence of obesity was around 20% in men, and 20-30% in women. An urban population based study in Argentina determined that the prevalence of obesity was 35.7%, and central obesity was 52.9% (13). Overweight and obesity is top most contributor to the leading killer diseases globally and it is associated with more than 45 comorbidities including diabetes, cardiovascular diseases, cerebrovascular diseases, osteoarthritis, gallbladder diseases, respiratory tract diseases as well as psychological and emotional distress. The likelihood and severity of hypertension is closely interrelated with body mass index. Overweight in people with hypertension could cause cardiovascular disease, increased thrombogenic factors (14).

The causes of the obesity epidemic are most frequently ascribed to two factors: the combination of institutionally driven decreases in physical activity (for example, reductions in school physical education classes and the sedentary nature of most modern vocations); and over nutrition resulting from modern food marketing practices and technology (such as inappropriately large portion sizes in restaurants and processed foods and the ready availability of inexpensive high-calorie fast food)(2). However, evidence also suggests that additional factors might contribute to the obesity epidemic, including sleep debt, endocrine disruptors and intrauterine and inter-generational effects, and these have been extensively reviewed elsewhere(2). Previous studies done in different settings identified several risk factors for overweight and obesity among hypertensive patients, including physical in activities , comorbid T2DM , higher economic status , residence area , gender , older age ,dietary habits and alcohol consumption(15). Moreover, accumulating evidence suggested that unhealthy diet and lifestyle could play a significant role in the ongoing epidemics of obesity, hypertension and other symptoms of metabolic syndrome(16) .

Modifiable behaviors, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs(17). They contribute to the occurrence of a cluster of disorders known as the metabolic syndrome abdominal obesity, hyper tension, dyslipidemia, and disturbed metabolism of glucose or insulin which in turn accounts for a significant share of the global burden of disease(17). In recent decades, the global pattern of unhealthy diets driving the occurrence of metabolic disorders and NCDs has become more important in low-to-middle income countries (LMICs) because of the double burden of diseases in such countries(18). What people eat has changed dramatically over the last few decades. This has been driven by shifts towards calorific and fatty foods, eating out, and an increase in food portion sizes, combined with a lower intake of fruit, vegetables, and high-fiber foods(19). Healthy diets are unaffordable for the poor in every region of the world and people are increasingly exposed to ultra-processed, unhealthy foods and diets that lead to poorer health(20). The World Health Organization (WHO) ‘Best Buys’ include interventions to reduce salt and sugar intake, such as front-of-pack labelling, fiscal tools and educational initiatives, and measures to eliminate industrial trans-fats(21). These unhealthy diets consist of food and drinks with high levels of energy (calories), salt, sugar, and fats, notably industrial trans fats (also known as trans-fatty acids, TFAs or iTFA)(22).

Study done Pacific Island Countries have undergone a major transformation in recent history, with energy-dense, nutrient-poor processed foods having largely replaced traditional whole foods(23) . Dietary shifts accelerated since the 1960s, particularly in urban populations, and are characterized by large increases in fat consumption. Food supply data show that total available energy and fat supply has increased in all countries by as much as 64% since 1965(24). Dietary changes have multiple, related causes, such as increases in wealth, social change linked to urbanization, foreign direct investment and greater economic and trade integration(25). Promoting healthy diets and lifestyles to reduce the global burden of non-communicable diseases requires a multi sectoral approach involving the various relevant sectors in societies.

The agriculture and food sector figures prominently in this enterprise and must be given due importance in any consideration of the promotion of healthy diets for individuals and population groups(26). In the US, hypertension is the most common primary diagnosis with 35 million outpatient office visits annually(27). Based on data from 2007 to 2010, over \$50 billion is spent in treating one of every three adults 20 years of age or older in the US who have hypertension and costs continues to rise (27). Among the estimated 78 million US adults with hypertension, 82 % are aware of their condition, and 75% of those diagnosed with hypertension are managed with antihypertensive medications(27). The prevalence of HTN is the highest in the African continent where it affects 46% of adults aged 25 year and over (27). Studies shows that obesity are risk factors for hypertension, dyslipidemia, and diabetes mellitus(28). The latest statistics show that 18.4% of women and 7.8% of men on the continent live with obesity up from 12% and 4.1%(28). Despite the fact that obesity and overweight is a problem of high-income countries, low- and middle income countries (LMICs), in particular urban settings of sub-Saharan African countries face the challenge of an increasing trend(29). Hence, adherence to healthy dietary patterns is an important component for the prevention of HTN.

In Africa in south-south Nigeria the prevalence of hypertension was 36.69% with mean systolic and diastolic blood pressure of 147.28 ± 21.76 mmHg and 88.27 ± 15.18 mmHg respectively(30). Study done in Tanzania indicated that Overweight and obesity prevalence among women of child bearing age in increased from 51.3 to 60.0% and 24.7 to 35.2%, respectively, between 1998 and 2017. The urban-rural disparities in overweight and obesity decreased steadily between 1998 and 2017 (31). Similarly the prevalence of overweight and obesity among women of childbearing age varied by age, population group, location, current smoking status and socioeconomic status of women(31). The prevalence of overweight and obesity were different from region to region study done in Bahir-Dar city overall prevalence of overweight/obesity was 11.3%, in which 9.3% and 2% of adults were overweight and obese respectively(32) . The prevalence over weight and obesity in Jimma, south west Ethiopia was 19.5% and (24.4%) respectively and total 43.9% were at risk of developing obesity(33). The prevalence over weight and obesity in Hawassa city, southern Ethiopia was 28.2%(34).

The reason for selection of this title was the above one and most study done did not addressed dietary habits. In Ethiopia, Furthermore, as per investigator knowledge there is limited evidence regarding the magnitude of overweight/obesity and its associated factors among hypertensive patients in Ethiopia, including the study area. Hence, this study tried to solve this gap and provide basis for health professionals and policy-makers in designing appropriate intervention strategies to solve this problem.

1.3. Significance of the study

Over nutrition increases the risks of serious diet-related chronic diseases, including type 2 diabetes, hypertension, cardiovascular disease, and stroke. This study might help to know current magnitude of over nutrition and its associated factors among hypertensive patients in the study area. It might be help to indicate possible interventions aimed to decrease morbidity and mortality caused by overweight or obese caused diseases and quality of life increasing. Study may benefit health care providers to provide health education on healthy effects of diet on nutritional status for hypertensive patients. This study might be helpful for policy maker in the planning and implementation .This study might be used us a base line for further investigations.

2. Literature Review:

2.1. Factors associated with over nutrition among hypertension patients

Study done in Malaysia shows that female gender, with an increased in body weight has a significantly increased the risk of hypertension(35). Study done in USA demonstrate that the blood pressure of middle-aged Americans is more directly associated with centrally deposited body fat(36). Study done in Korea on effects on nutritional education shows that Blood cholesterol was significantly reduced from 200.7 mg/dL to 188.7 mg/dL after nutrition education, although there were not significant changes in blood pressure or blood triglyceride level and bodyweight were significantly reduced, especially in women, after nutrition education nutrition knowledge was increased significantly , and some eating behaviors such as 'having fruits & vegetables for snack' and 'having brown rice, barley rice than white rice' after nutrition education(37). Study done effectiveness of PRECEDE model shows that Glycated hemoglobin A1c and systolic blood pressure (SBP) levels decreased significantly in the PRECEDE group (multivariate analysis of covariance, with baseline glycated hemoglobin A1c, SBP, and variables showing statistically significant differences between groups at baseline visits). similar study shows that the decrease levels in diastolic blood pressure (DBP), triglycerides and LDL cholesterol were nonsignificant and BMI did not change(38). Study shows that Urbanization is one determinant of the nutrition transition and the resulting upsurge of chronic diseases, such as abdominal obesity, type 2 diabetes, hypertension, dyslipidemia, and CVD(39).

Evidences shows that both obesity and nutrition-related non-communicable disease (NR-NCD) issues in the developing world often assert that the situation facing developing countries is unique(40). But is the experience related to the rapid onset of obesity and NRNCDs in the lower- and middle-income countries of Asia, Africa, the Middle East, Latin America and Oceania different from what occurred in Western European countries, the United States and Japan at a similar stage in their economic development(41).

Study done in USA shows that the prevalence of obesity and overweight decreases as educational level increases(42). Study done in south Africa shows that Sex, age, educational level, marital category, income, smoking, alcohol use, diabetes and hypertension were significantly associated with central obesity(43). Study done in Uganda shows that the factors associated with overweight and obesity among HNT patients were female gender, age, SES, fruit and vegetable intake, T2DM and neuropathy(1). Study done in Jimma south west Ethiopia, shows that there were association monthly income, residence, family history of overweight and obesity and physical inactivity with overweight/ obesity(14).

2.2 Dietary habits of Hypertensive patients

Healthy dietary habits is defined as “the individuals consumption of calories fall within the recommended diets allowance at least 3 days a week and the individual has reduced intake of un recommended foods an average of 1 day per week”(44). In a "nutrition transition", the consumption of foods high in fats and sweeteners is increasing throughout the developing world, while the share of cereals is declining; intake of fruits and vegetables remains inadequate(25).Global energy imbalances and related obesity levels are rapidly increasing. The world is rapidly shifting from a dietary period in which the higher-income countries are dominated by patterns of degenerative diseases (whereas the lower- and middle-income countries are dominated by receding famine) to one in which the world is increasingly being dominated by degenerative diseases(24). Study done Australian shows that, dietary habits characterized by high consumption of low-fiber bread, pasta, noodles and rice, meat dishes, poultry dishes and egg dishes, mixed cereal dishes, salted nuts and low consumption of milk and yoghurt (low-fat), vegetable juice, vegetables and high-fiber bread were inversely associated with blood pressure and nutritional status (45).Similar Studies shows that Vegetarian Dietary pattern diets rich in vegetables, fruits, grains, legumes, and nuts are observation had described lower blood pressure and nutritional status (46) .

Another study done on Prevalence of food intake among individuals with hypertension and diabetes shows that the daily intake of raw salad and fruits was higher among individuals who only had DM whilst the daily frequency of dairy products intake was higher among those with hypertension(47). Study done on the prevalence of the indicators of healthy food consumption among elderly persons with DM and/or SAH with those without these diseases, it was observed that only the consumption of fried foods changed positively between the periods 2009-2010 and 2013-2014 and is was significant only for women, with maintaining/acquiring the infrequent consumption of fried foods (<2 times/week) 8.2% higher among elderly women with HTN(48). Study done Korea shows that there were three major dietary patterns in both sexes, namely “traditional”, “western” and “dairy and carbohydrate” patterns and participants in the highest quartile of western pattern scores had significantly higher blood pressure, serum total cholesterol, and triglyceride levels than those in the lowest quartile. Although not statistically significant, a trend toward a positive association between the western dietary pattern with obesity and hypertension risk(49). Another study done in USA shows that moderate alcohol consumption has been shown to lower blood pressure and excessive alcohol consumption can raise blood pressure(50). All most all Studies agree that there is a strong association between high amount of alcohol consumption with obesity and hypertension among individuals who had diabetes than those without diabetes(51). study done in University of Wollongong shows that the "nuts, seeds, fruit, and fish" dietary pattern was significantly and inversely associated with associated with systolic BP and diastolic BP and BMI(52). Study done by University of Ghana, Legon, Ghana shows that the median number of times the food groups beneficial to hypertension management were consumed in the preceding week to the interview was 1 for green leafy vegetables, 1 for dairy products, 2 for fruits, and 4 for legumes. The median number of times for Consuming harmful food groups was 3 for salted fish and 7 times for fats and oils. Significantly more participants in the age group above 50 than the younger participants had elevated SBP and those with BMI equal to or greater than 25 were more likely to have both elevated SBP and DBP(53).

2.3. Magnitude of over nutrition among hypertensive patients

Hypertension is more common among the obese than among none obese and, conversely, a significant proportion of hypertensive persons in the population are overweight(54). Most population based studies tend to show a rise of blood pressure with increase of body weight or adiposity(54). A significant association between hypertension and obesity has been noted in several epidemiological studies. Study done in Russia shows that there is association between hypertension and obesity was observed in (81.9%) patients, 56 (77.8%) with abdominal obesity, 116 (97%) had a higher percentage of body fat(55). Study done in University of Michigan in USA shows that 37% of the African Americans suffered from HBP and 40% were considered obese(56). Another study done in USA shows that Blood Pressure Study of the Society of Actuaries showed that 6% of men (ages 15 to 69) and 11% of women (ages 15 to 69) were 20% or more in excess of "average weight" (for height and age) and It is likely that the detrimental effect of obesity is mediated, at least in part, by the association between blood pressure and weight levels(54).

Study done among hypertensive patients in Poland shows that 62% of women and only 23% of men had normal body weight, while overweight was found in 21% of women and 46% of men and obesity was recorded in 14% of women and 31% of men(57). Study done in Korea shows that the prevalence of obesity or overweight among hypertensive patients were 31.0% and 76.3% respectively (58). Study done among older hypertensive patients with chronic heart failure shows that Obesity was observed in 81.9% patients, 77.8%) with abdominal obesity, 97% had a higher percentage of body fat like lean body mass index, body fat index, percentage of lean body mass and percentage of body fat did not differ in patients depending on the level of comorbidity(59). A study done among hypertensive patients in Ghana shows that the overall prevalence of overweight and obesity were ranged from 20 to 62% and 4 to 49%(60). A cross sectional Study done in Nigeria shows that the prevalence of over nutrition among hypertensive patients were 30.3% overweight, 6.0% obesity (61).

Another study done in southwestern Nigeria shows that the prevalence of overweight and obesity was 10.2%, and it was significantly higher among females (12.5%) than males (7.0%)(62). A cross-sectional study done among hypertensive patients in Kenya shows that the prevalence of overweight and obesity were 82.1% (63). A case-control study done among hypertensive patients in Gondar city, northwest Ethiopia, shows that the prevalence of overweight and obesity were 32.4% and 16.2% respectively(64). A cross-sectional study among hypertensive patients in Addis Ababa shows that the prevalence of overweight 44.6% and obesity were 9.6%(65). A cross-sectional study among hypertensive patients in Durame city, southern Ethiopia, shows that (44.6%) participants were overweight and 30(9.6%) obese(65). The reason for selection of this title were the above one and most study done did not address dietary habits. In Ethiopia, furthermore, as per investigator knowledge, there is limited evidence regarding the magnitude of overweight/obesity and its associated factors among hypertensive patients in Ethiopia, including the study area. Due to this listed reason, our study may find the problem and gap that may be used for intervention such as cultural effects and awareness gap on health problems caused by over nutrition.

Conceptual frame work

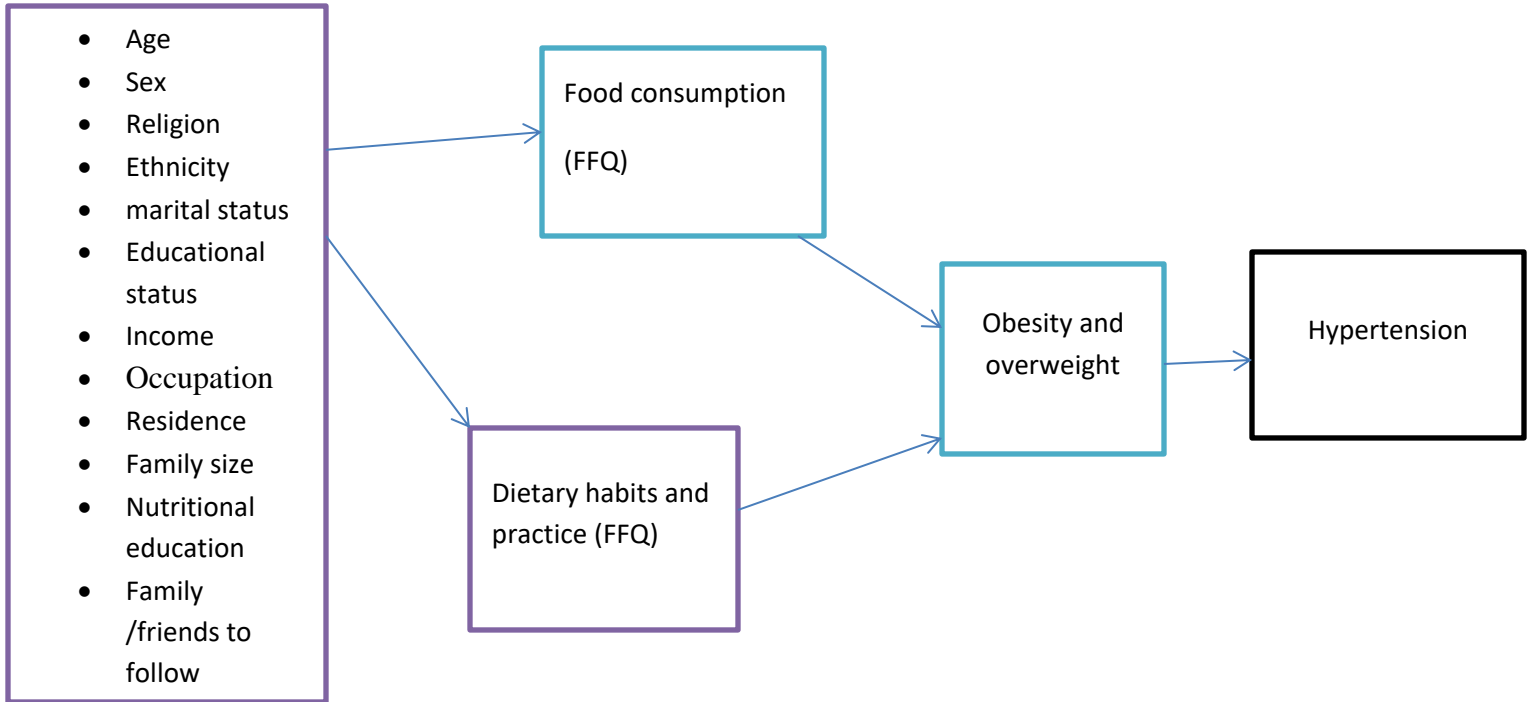


Figure1. Conceptual framework of the study based on the study variable adopted from UNICEF(66).

3. Objectives

3.1. General Objective

To assess magnitude of over nutrition and associated factors among adult Hypertensive Patients on follow up at in Wolkite University Specialized Hospital in 2022.

3.2. Specific objectives

1. To assess magnitude of over nutrition among hypertensive patients
2. To assess factors associated with over nutrition among hypertensive patients in Wolkite University Specialized Hospital.
3. To assess dietary habits of hypertensive patients in Wolkite University Specialized Hospital.

4. Methods and Materials

4.1. Study Area

The study was conducted among adult hypertensive patients at Wolkite University Specialized Hospital. Wolkite University Specialized Hospital (WUSH) is both a referral and teaching hospital with 123 beds serving for, approximately, 150,000 admissions and 80, 000 outpatient visits a year. It serves for a catchment population of about 5 million people. Hypertensive patients get follow up care and antihypertensive medications at hypertension clinic every month. The clinic provides service for 1694 ambulatory hypertensive patients.

4.2. Study Design and period

An institution based cross –sectional study was conducted from May to November, 2022.

4.3. Population

4.3.1. Source Populations

The source population was all hypertensive patients with age ≥ 18 years of age with high blood pressure (BP $\geq 140/90$ mmHg during diagnosis) who were attending chronic care clinic at Wolkite University Specialized Hospital in the last one year.

4.3.2. The study population

The study population was randomly selected patients with age ≥ 18 years with high blood pressure of BP $\geq 140/90$ mmHg during diagnosis) who currently on antihypertensive medication in Wolkite University specialized Hospital during study period to May November 2022.

Study unit

Hypertensive Patients who was participated in the study

Sampling unit

Hypertensive Patients who are selected based on the eligibility criteria in the study/sampling frame/

Inclusion Criteria

All adult hypertensive patients who were on follow-up in the outpatient clinic

Exclusion criteria

- 1) Pregnant women.
- 2) Patients age less than 18 years and patients who are critically ill were excluded.

4.5. Sample Size Determination

The required sample size was determined by using a single population proportion formula with the following assumptions: 95% CI, 5% margin of error and population proportion value of 50% to get maximum sample size that can be help us to increase validity of this study. Finally, we was consider 10% for non-response rate the required sample size is

$$n = (Z\alpha/2)^2 P (1- P)/d^2$$

$$n = (1.96)^2 0.5(1- 0.5)/ (0.05)^2 =3.8416*0.25=0.9604/0.0025=384+38=422.$$

The required sample size was determined by using finite population correction proportion because our study population is less than 10,000 (N=1694). Assuming 95% confidence level the, 5% margin of error and population size N=1694 and sample size from proportion value of 50% lager one were n=422. Finite population correction formula $nf = n/1+n/N=422/1+422/1694$.

$$n=422/1+0.24911=422/1.24911=337.8=338.$$

4.6. Sampling Techniques

The list of hypertensive patients currently on follow up were obtained from the Hospital chronic disease registration book. Then sampling frame was prepared by using the updated list of Hypertensive patients from registration book. Study participants were selected by using probability sampling technique that is simple random sampling technique. Finally study participants were selected by using lottery method from disease registration book.

4.7. Data Collection methods

Data was collected by using face to face interviews with structured questionnaires to acquire qualitative food frequency questionnaire (FFQ) and socioeconomic data from each selected participants who had follow up every month in the chronic care clinic. In addition, anthropometric measurements (weight and height measurement) were done to collect the data with the participants wearing light clothing without shoes using a weight scale to the nearest 0.1 kilogram (kg) and height was measured in centimeters (cm) using a portable stadiometer (SECA Germany, 0.1 cm precision while the participant was standing in an upright position without wearing shoes. Data was collected during working time in the chronic care clinic by four health officers after one-day training. Data collection process was supervised by one nutritionist.

4.8. Data collection Tools

A validated qualitative food frequency questionnaire (FFQ) was used to assess dietary intake over the period of one week prior to the study. FFQ was modified based on Ethiopian food composition table the food items were taken from EFBDG(Ethiopian food based dietary guide 2022) (67). The tools were adapted from the WHO Steps instrument for chronic disease risk surveillance (68). To modify the FFQ we were used the following steps: construction of a food list that was taken from data of Ethiopian food composition tables of foods commonly used /Local foods /in Ethiopia which is grouped in to groups such as : The food groups in Ethiopia's Food-Based Dietary Guidelines. Such as Cereal, grains, root , tubers, legumes milk and dairy products meat, fish, egg ,fruits , vegetables, Fats, oils , Sweets , sugar, hot drinks and alcoholic beverages. This regrouping of food items was based on the previous study with modification. For each food item, participants was indicated their average frequency of consumption over the past one week by checking 1 out of the 5 frequency categories. Each item was arranged (ranging from Never, 1 - 2 times per week, 3-4 times per week, 5 - 7 times per week. The dietary fruits, vegetables, whole grain, legumes, intake of alcohol, meats, sugar, sweetened foods ,soft drinks and fast foods consumption was evaluated by asking how many times in the previous one week did the respondents eat the above-listed items.

The Questionnaires was developed in English and then translated into Amharic language for simplicity then back-translated to English language for its consistency by two different language expert individuals who speak both English and Amharic fluently.

4.9. Data Quality Control

The quality of data was ensured by, a pre-test done on 5% of the sample in Atat Primary Hospital and calibration of instruments that are used for data collection digital electronic weight scales for Weight and a stadiometer used for measurement of height was done by body flat against board and standing in the line of Straight. One day training was given for data collectors and questionnaire was checked for completeness. Missed values, unlikely responses were cleaned up. Accordingly, all the necessary modifications were made.

4.10. Data Processing and Data Analysis

The data was coded, entered into Epi data version 3.1 and transported to SPSS version 20.0 for analysis. Normality of continuous variables was done using a Kolmogorov–Smirnov test. The results were presented in tables and texts using descriptive statistics such as mean, standard deviation and percentage to describe the study population in relation to relevant variables.

For assessment of the major dietary pattern displayed by using frequency table. Body mass index (BMI) was calculated as by using weight in kg divided by height in meters squared.

The wealth index was developed using principal component analysis of the 10 dummy coded asset variables by information on ownership of a range of durable assets such as car, refrigerator, television, radio, material of dwelling floor and roof, toilet facilities, electricity supply, source of drinking water, ownership of agricultural land and farm animals , households own a mobile phone(69). The developed factor scores were ranked in three categories. Assumptions for the appropriateness of factor analysis were checked using the presence of substantial correlations (> 0.3), Kaiser-Mayer-Olkin for sample adequacy for the set of variables (> 0.5) and Bartlett’s test of sphericity (0.05). All assumptions were met. Then, the factor score was ranked and presented in the form of wealth quintiles.

A bivariable and multivariable binary logistic regression was conducted to assess factors associated with over nutrition.

Variables with a p-value below 0.25 and important variables were candidate for the multi-variable logistic regression model. Statistical significance was declared at a p-value below 0.05.

All statistical tests were considered significant at a p-value less than 0.05. The model's fitness was checked using the Hosmer-Lemeshow model and omnibus tests. Crude and adjusted odds ratios (COR and AOR with 95% confidence intervals were reported.

4.11. Variables of the Study

Dependent Variables

Over nutrition

Independent Variables

- I. Socio-demographic and socioeconomic characteristics of study patients such as sex, age, educational status, marital status, income, family size, occupational status, residence, number of people in household and monthly income.
- II. Dietary habits

4.12. Operational Definitions

Healthy Dietary habits : the individuals consumption of calories fall within the recommended diets allowance at least 3 days a week and the individual has reduced intake of un recommended foods an average of 1 day per week (70).

Over weight: Overweight is defined as abnormal or excessive fat accumulation that presents with body mass index (BMI) over 25 (71).

Obesity: obesity is defined as abnormal or excessive fat accumulation that presents with a body mass index (BMI) over 30 (71).

Over nutrition: Over nutrition is a form of malnutrition (imbalanced nutrition) arising from excessive intake of nutrients, leading to accumulation of body fat that impairs health (i.e., overweight/obesity) over-nutrition is when the patients is classified as having overweight or obesity (71).

The body mass index (BMI): if BMI is less than 18.5, it falls within the underweight range, if BMI is 18.5 to <25, it falls within the healthy weight range, If BMI is 25.0 to <30, it falls within the overweight range and If BMI is 30.0 or higher, it falls within the obesity range(72).

4.13. Dissemination plan

Result will be submitted to Wolkite University department of Public Health. Result shall be disseminated for Gurage Zone Health department and shall be presented to different workshops and Publication on peer reviewed journals.

5. Ethical consideration

Ethical clearance was obtained from ethical clearance committee of Wolkite University College of Medicine and Health Science. Permission letter will be written to Wolkite University Specialized Hospital to conduct the study and, the other permission letter was also obtained from the Hospital. Finally informed verbal consent was obtained from each respondent. All information collected from the respondents was treated as confidential in that no name was recorded on the questionnaire and the collected data was kept using a computer password. The participants had a right to withdraw from participation.

6. Results

6.1. Socio-demographic and socio-economic characteristics of participants

From the total of 338 individuals with hypertension invited, 331 participated in our study, with a response rate of 98%. The majority of the participants (54.3%) was males, married (80%), Gurage (79%), had no education at all (54%) and 58% lived in a rural setting. Regarding the religious affiliation of study participants, 44.1% were Muslim followed by Orthodox Christian (36.2%). Most of participants 31% were farmer and 75% were categorized as low income. The mean family size of the participants was 5.4 with the $SD\pm 2.1$ (Table).

6.2. Clinical Characteristics of respondents

About 58% of the participants were not received information on healthy eating and majority of the participants 73% had no family or friend follow up on their dietary habits (Table 1).

Table1. Socio-demographic, economic clinical characteristics of Hypertensive patients, south Ethiopia, 2022(n=338)

Variables	Category	Frequency	Percent (%)
Marital status	Married	264	80
	Unmarried	18	5.4
	Divorced	19	5.6
	Widowed	30	9
	Total	331	100
Sex	Male	180	54.3
	Female	151	45.7
	Total	331	100
Religion	Orthodox	120	36.2
	Muslim	146	44.1
	Protestant	34	10.2
	Catholic	31	9.5
	Total	331	100
Age	18-39	128	38.6
	40-59	162	49
	≥60	41	12.4
	Total	331	100
Ethnicity	Gurage	260	79
	Oromo	23	7
	Amhara	38	11
	Others	10	3
	Total	331	100

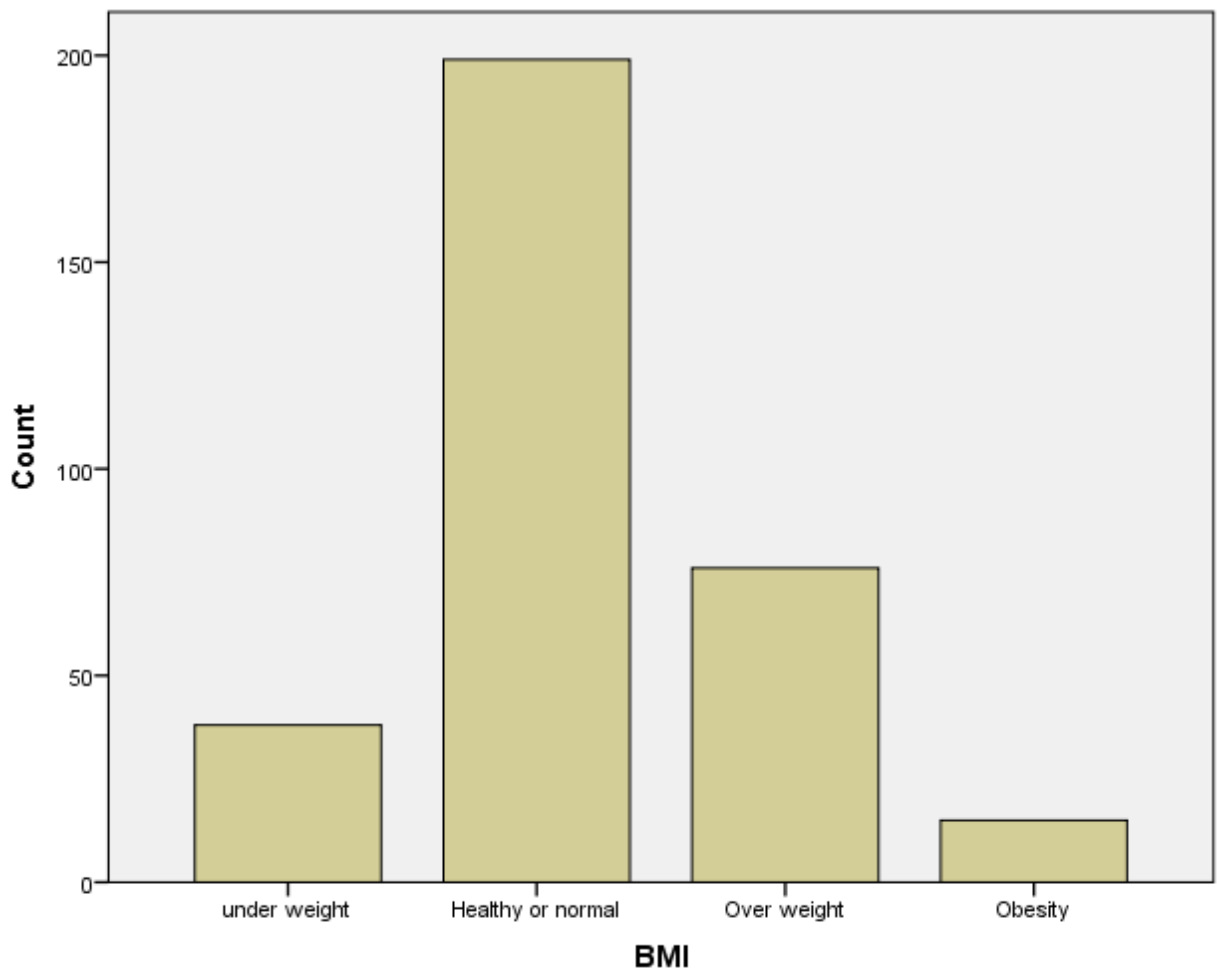
Table 1 continues.....

Educational Status	Illiterate	179	54
	Primary school	73	22
	Secondary school	37	11
	High school above	42	13
	Total	331	100
Occupation	Farming	102	31
	House wife	90	27
	Private business	92	28
	Government	39	12
	Daily labor	8	2
	Total	331	100
Wealth Index	Poorest	142	43
	Poor	85	32
	Medium	64	25
	Wealthy	40	12
	Total	331	100
Residence	Urban	139	42
	Rural	192	58
	Total	331	100
Family size	1-3	61	18.4
	4-6	172	52
	Above 6	98	29.6
	Total	331	100
Received nutritional Education	Yes	140	42
	No	191	58
	Total	331	100
Have your family/friends to follow your recommended diet	Yes	89	27
	No	242	73
	Total	331	100

6.3. Prevalence of over nutrition (Overweight and obesity)

In this study, body mass index was used for defining prevalence of overweight/obesity for each study subject. The overall prevalence of overweight and obesity among study population was 27% (95% CI: 24.1–29.2), of which 22.5 % (95% CI: 20.3-24.6) were overweight and 4.5% (95% CI: 3.7–5.2%) were obesity.

Fig 2. Nutritional status of hypertensive patients in the WUSH May to August 2022



6.4. Dietary habits of respondents

Most of 57% of the respondents had consumed cereal-based foods more than three times. Most of 58.5% them consumed roots and tubers and 50% consumed legumes more than three times per day. Majority of 70% had consumed vegetables and similarly 70% of respondents had consumed fruits more than three times. Majority of, 61% respondents had consumed dairy products and 39% of respondents did not consume any animal-source foods. Among the respondents, 66% did not use plant based oil and only 34% of them used plant base oil. Almost all of 90% were consumed coffee every day and Half of 51% respondents were took soft drinks more than three times and majority of 71.4% respondents did not take alcohol and the rest of 28.6% them took less than one time (Table 2).

Table 2 Major dietary consumption patterns of hypertensive patients south Ethiopia Wolkite 2022(n=338)

Variables		Frequency	Percentage (%)
Consuming cereal in a week	Never	115	35
	1-2 × per week	27	8
	3-4 × per week	69	21
	5-7 × per week	120	36
Consuming Roots and Tuber in a week	Never	113	34
	1-2 × per week	25	7.5
	3-4 × per week	45	13.5
	5-7 × per week	148	45
Consuming Legumes in a week	Never	126	38
	1-2 × per week	40	12
	3-4 × per week	50	15
	5-7 × per week	115	35
Consuming Fruits in a week	Never	63	19
	1-2 × per week	38	11
	3-4 × per week	45	14
	5-7 × per week	185	56
Consuming Vegetable in a week	Never	68	21
	1-2 × per week	31	9
	3-4 × per week	63	19
	5-7 × per week	169	51
Consuming Milk and its products in a week	Never	93	29.5
	1-2 × per week	32	9.5
	3-4 × per week	79	23
	5-7 × per week	127	38

Table 2 continues.....

Consuming Meat and poultry in a week	Never	128	39
	1-2 × per week	45	14
	3-4 × per week	95	29
	5-7 × per week	63	19
Fats and oil/ Plant based/ oil/liquid/ for cooking in a week	Never	217	66
	1-2 × per week	12	4
	3-4 × per week	17	5
	5-7 × per week	85	25
Consuming Sweet and sugar /soft drinks/ sweetened beverages in a week	Never	105	32
	1-2 × per week	57	17
	3-4 × per week	36	11
	5-7 × per week	133	40
Consuming hot drinks in a week/coffee/	Never	20	6
	1-2 × per week	7	2
	3-4 × per week	7	2
	5-7 × per week	297	90
Consuming alcohol in a week	Never	227	68
	1-2 × per week	25	8
	3-4 × per week	33	10
	5-7 × per week	46	14

6.5. Factors independently associated with overweight/obesity

A enter method binary logistic regression analysis was done to identify factors associated with over nutrition. The associations between socio-demographic, socio-economic, dietary/eating habits with over nutrition were analyzed using bi variable and multivariable binary logistic regression analysis. Under the bi variable logistic regression analysis, over nutrition was significantly associated with sex, residence, income, Occupation, family support, nutritional education, eating habit of vegetables and fruits, eating habit of cereals and legumes and eating habit of meat that are at a p-value less than 0.05 (Table 4). Females were (COR = 3.72; 95% CI: 2.37, 5.85), 3.72 times more likely to overweight or obese respectively and those from a higher income (COR=0.17; 95% CI: 0.07-0.37) were more likely to be overweight or obese than poor. Patients who live in urban (COR = 5.07; 95% CI: 3.17, 8.12) and those with occupation of private work (COR = 10.6; 95% CI: 6.18–18.2) had increased risk of being overweight or obese. In addition, patients who were supported by family were (COR= 4.53; 95% CI: 2.29, 9.0) found to have a lower risk of being overweight or obese and patients those received nutritional education on their dietary pattern were (COR = 2.08; 95% CI: 1.27-3.42) lower risk of overweight or obese. Furthermore, patients the habit of cereals and legumes consumption (COR = 2.29; 95% CI: 1.53, 3.46) were two times lower risk of being overweight and obese. Respondents who consumed fruit and vegetables more than three times per week (COR = 4.75; 95% CI: 3.11–7.28) had a lower risk of being overweight or obese. In addition, respondents who consumed meat and poultry more than three times per week were (COR = 1.61; 95% CI: 1.07–2.41) had increased risk of overweight or obese respectively (Table 4).

Table3. Bi-variable logistic regression output showing factors associated with over nutrition (overweight/obesity) among adult hypertension southern Ethiopia Wolkite 2022(n=338)

Variables	Categories	Over nutrition		COR(95%CI)	p-value
		Yes (Freq (%))	No (Freq (%))		
Nutritional education	Yes	29(22)	105(78)	References	
	No	62(30)	142(70)	1.58 (0.49-5.05)	0.001
Sex	Male	24(16)	124(84)	Reference	
	Female	67(37)	113(63)	3.72 (2.37, 5.85)	0.001
Educational status	Illiterate	51(28)	128(72)	1.18 (0.44-3.09)	0.23
	Literate	40(25)	119(75)	Reference	
Wealth index	Low	38(17)	189(83)	Reference	
	High	53(49)	51(51)	0.17 (0.07-0.37)	0.003
Family support	Yes	36(26)	104(74)	Reference	
	No	55(28)	143(72)	4.53(2.29, 9.0)	0.001
Residence	Urban	76(54)	64(46)	5.07(3.17, 8.12)	0.003
	Rural	15(7.5)	183(92.5)	Reference	
Occupation	Private	83(28)	218(72)	10.6 (6.18–18.2)	0.002
	Government	8(22)	29(78)	Reference	
Marital status	Married	69(26)	195(74)	3.8 (1.75-8.26)	0.278
	Unmarried	6(33)	12(67)	Reference	
	Divorced	3(16)	16(84)	2.08 (1.27-3.42)	0.374
	Widowed	13(43)	17(57)	2.79 (1.21-6.42)	0.358
Consuming Roots and Tuber in a week	Less than 3x per wk	43	95	Reference	
	At least 3x per wk	48	145	3.41 (1.98-5.86)	0.285

Table3 continued

Consuming Milk and its products in a week	Less than 3x per wk	56	69	Reference	
	At least 3x per wk	35	171	2.71 (1.58-4.63)	0.383
Using plant based oil	Less than 3x per wk	63	166	Reference	
	At least 3x per wk	28	74	1.35 (0.73–2.48)	0.499
sugar /soft drinks/	Less than 3x per wk	52	110	Reference	
	At least 3x per wk	39	130	1.71 (0.84–3.51)	0.217
Meat consumption	Less than 3x per wk	35(19)	145(81)	Reference	
	At least 3x per wk	56(35)	102(65)	1.61(1.07–2.41)	0.003
Vegetable and Fruit consumption	Less than 3x per wk	17(23)	56(77)	Reference	
	At least 3x per wk	74(28)	191(72)	4.75 (3.11–7.28)	0.004
Cereal and Legumes consumption	Less than 3x per wk	29(23)	99(77)	Reference	
	At least 3x per wk	62(30)	148(70)	2.29 (1.53, 3.46)	0.002
Alcohol consumption	Yes	57(33)	117(67)	Reference	
	No	44(27)	120(73)	1.28 (0.80–2.05)	0.234

In the multivariable logistic regression analysis, four explanatory variables (sex, residence, consumption of vegetable and fruits, consumption of legumes and cereals) were significantly associated with overweight or obesity. The model fitness was checked using a Hosmer-Lemeshow goodness of fit (P-value=0.32), which showed a fitted model. Females were (AOR =3.32; 95% CI: 1.65–6.63), 3.32 times more likely to be overweight or obese higher than males and respondents did not consumed cereals and legumes were (AOR =3.20; 95% CI: 1.67–6.10) three times more likely to be over nourished than who did consumed cereals and legumes at least three times in a week. In addition, respondents with the habit of eating vegetables and fruits were (AOR = 6.26; 95% CI: 3.76–10.41), had six times decrease risk being overweight or obese than respondents did not consumed. .In addition patients from urban area were (AOR =3.4; 95% CI: 2.5-4.7) had 3.4 times increased burden of over nutrition as compared to rural (Table 5).

Table4. Multi variable logistic regression output showing factors associated with over nutrition (overweight/obesity) among adult hypertension southern Ethiopia Wolkite 2022(n=338)

Variables	Categories	Over nutrition		C0R(95%CI)	p-value	AOR(95%CI)	p-value
		Yes (Freq (%))	No (Freq (%))				
Nutritional education	Yes	29(22)	105(78)	References		References	
	No	62(30)	142(70)	1.58 (0.49-5.05)	0.002	1.21 (0.79-1.87)	0.356
Sex	Male	21(14)	117(86)	References		References	
	Female	70(36)	123(64)	3.8 (1.75-8.26)	0.001	3.32 (1.65–6.63)	0.001
Educational status	Illiterate	51(28)	128(72)	2.08 (1.27-3.42)	0.23	1.80 (0.94-3.44)	0.452
	Literate	40(25)	119(75)	Reference		Reference	
Residence	Urban	75(59)	52(41)	3.83 (1.83-8.00)	0.003	3.4 (2.5-4.7)	0.002
	Rural	16(9)	185(91)	References		References	
Family support	Yes	16(18)	73(82)	References		Reference	
	No	75(30)	174(70)	2.08 (1.27-3.42)	0.25	1.17 (0.44-3.09)	0.312
Vegetable and Fruit consumption	Less than 3x per wk	13(6.5)	184(93.5)	References		References	
	At least 3x per wk	78(58.2)	56(41.8)	9.62(5.49-16.84)	0.001	6.26 (3.76–10.41)	0.004
Cereal and Legumes consumption	Less than 3x per wk	22(19)	93(81)	Reference		Reference	
	At least 3x per wk	69(31)	154(69)	3.41 (1.98-5.86)	0.003	3.20 (1.67–6.10)	0.002
soft drinks	Less than 3x per wk	52	110	Reference		Reference	
	At least 3x per wk	39	130	2.71 (1.58-4.63)	0.234	1.17 (0.44-3.09)	0.341

7. Discussion

This study was to explore the magnitude and factors associated with overweight and obesity among hypertensive patients in wolkite university specialized hospital .Overall, in this study, we found that 27% had over nutrition 22.5% and 4.5% of patients were overweight and obese, respectively, . The pooled prevalence of overweight and obesity among adult population in Ethiopia was 20.4% and obesity 5.4% respectively (73). The overall prevalence of overweight and obesity in this study is lower than the prevalence reported by studies conducted in Addis Ababa(74) Gondar(75) and Durame (76) (44.6 and 9.6%) over weight and obese respectively. In addition, lower than the prevalence reported a of 36.3% (Nigeria) to 82.1% (Kenya), where a higher burden of obesity was reported from North to east African countries(60) respectively .

In this study, sex, residence, eating habit of vegetables and fruits, eating habit cereals and legumes were found to be determinants of overweight or obesity.

The variation in the study results might have occurred because of the differences in dietary intakes, sex, and residence among respondents in the study areas. In addition, the more respondents are from rural area and this might be reason for lower prevalence of over nutrition . In addition, the high consumption of fruits, vegetables and cereals might be reason for lower prevalence of over nutrition among hypertensive patients in the study area.

In the present study, likelihood of overweight or obesity among female was 3 times higher than males. This finding is consistent with studies conducted in Ethiopia(77),(78), (79) and elsewhere((80),(81),(82). This could be that physiological factors, lack of exercise, environmental factors, and genetics(83).

Also, concerns about dietary habits females are highly consumed sweet food than males that may result in increased weight gain(84). However, this finding was inconsistent with studies (85),(86),(87). The likelihood of overweight or obese was 3.4 times higher among urban dwellers compared to rural dwellers. This finding is consistent with studies conducted in Ethiopia (32),(88),(89). This could be related to the fact that urban residents are more likely to follow the Western diet, more likely to use public transportations to go to work daily, and less likely to engage in physically demanding work which might expose them to overweight or obesity(90).

Men living in rural areas are more likely to engage in physically demanding work such as agricultural activities and less likely to gain excessive weight(89). The odds of being overweight or obese were decreased by 6.26 times among respondents consumed fruits and vegetables at least three times in a week. This finding is supported by previous studies in Ethiopia(91),(92),(93) and this finding was also consistent with previous research from Australia and Kingdom of Saudi Arabia (94)(95).

The fact might be eating non-starchy vegetables and fruits like apples, pears, and green leafy vegetables may even promote weight loss and their low glycemic loads prevent blood sugar spikes that can increase hung(96). Another fact also tell us that fruits and vegetables are low in calories which allows a person to fill up on them and eat less calories than they may expend resulting in weight loss(97). The odds of being overweight or obese among respondents who consumed Cereal and legumes at least four times per week were 3 times decreased the risk of being overweight or obese. This finding is supported by Previous studies (98),(99),(95),(100),(101). This might be the fact that fiber-rich cereals, such as oatmeal and bran, may encourage good gastrointestinal health and decrease the risks of high blood pressure, high cholesterol and colon cancer (100).

Limitations and Strength

All needed data were collected by trained health officers and used instruments were calibrated before starting data collection every day and data was coded and entered by using software. The major drawback of this study was the study design which was cross-sectional study design does not show cause effect relationship. Since qualitative FFQ was used to assess the dietary intake it is likely to have measurement error such as difficulties in recalling consumed items, under-reporting or over-reporting about some or total number of food items and social desirability bias is also one undeniable limitation of this study.

CONCLUSIONS and Recommendations

Over nutrition among adult is a major public health problem. This study revealed high prevalence of overweight/obesity among study participants. This study was found that dietary habit of eating vegetables and fruits, cereal and legumes, sex and residence area were significantly associated with overweight and obesity. Public health interventions should consider that over nutrition is a major public health issue.

An effort should be in place for health facilities to give nutritional health education and counseling for the patients. Ministry of health should engage nutritionist in patient management of NCD. Researchers should investigate more the associations between over nutrition and hypertension. Health workers should encourage patients to follow vegetable and fruit based dietary pattern by optimizing carbohydrate intake. Patients should be aware of the harmful effects of being overweight and obese and should have regular physical activity, take part in non-exercise activities (work), and have a healthy dietary consumption, specifically minimizing sweet, sugary, and refined foods. Therefore, all stakeholders who are involved in the management of hypertension and patients who are on the clinical care should be aware of this situation.

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Annex I

Consent form English version

Hello, my name is _____, I am one of the data collectors in this study. The study I intended to assess prevalence of goiter among HH level, dietary practice, and utilization of iodized salt. To attain this purpose, your honest and genuine participation by responding to the questions prepared is very important and highly appreciated. Confidentiality and consent we would like you to answer some personal questions. Your answers are completely confidential... No one will be told what you said in connection to your name. You don't have to answer any question if you do not want to and you can stop the interview at any time. However your honest answer to these questions will help us to better understand the situation and will contribute to the measures taken to solve the study problem. We would greatly appreciate your help in participating in this study, would you be willing to participate.

If yes, proceed. If no, thank and stop here

Annex II

English version of structured questionnaire

Instruction: Circle the responses for questions with alternatives

A. Socio demographic characteristics of study patients

S. No	Questions	Choice of response	Code	Skip
1	What is your age in completed years?	_____		
2	Sex of participant	1. Male 2. Female		
3	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Others specify		
4	What is your ethnicity?	1. Gurage 2. Oromo 3. Amhara 4. Other		
5	What is your current marital status?	1. Married 2. Un married 3. Divorced 4. Widowed		
6	What is your educational status?	1. Illiterate		

		2.primary school 3. Secondary school 4.High school and above		
7	What is your occupation?	1. Farming 2. Household 3. Private business 4. Government 5. Daily labor		
8	Where was your residence?	1. Urban 2. Rural		
9	Your family size	—		
9	Do you Receive nutritional education	1.Yes 2. No		
10	Have your family /friends to follow the recommended diet	1.Yes 2.No		
11	Have you separate room	1.Yes 2.No		
12	Have you Sofa	1.Yes 2.No		
13	Have you television	1.Yes 2.No		
14	Have you radio	1.Yes 2.No		
15	Have toilet	1.Yes 2.No		

16	Have you cow	1.Yes 2.No		
17	Have you electricity supply	1.Yes 2.No		
18	Have you refrigerator	1.Yes 2.No		
19	Have you pipe drinking water	1.Yes 2.No		
20	Have you ownership of agricultural land	1.Yes 2.No		
21	Have you own farm animals	1.Yes 2.No		
22	Have you mobile phone	1.Yes 2.No		
23	Animal for transportation	1.Yes 2.No		
24	Have you car	1.Yes 2.No		

A. Qualitative food frequency questionnaire

Instruction –Dear respondent please take few moment to memorize the food and drinks you ate within the last month. These relate to your daily use of food items and also food consumed out of home, e.g. in a restaurant, bar, at work etc. I will say the food items if you consumed the food type you will tell me how often and how much you ate over the last month. When I ask you about your usual portion size you will tell me the average quantity or portion of the food item on the day of consumption, expressed as common household measures such as a ladle, small cup or spoon. We will use pictures to improve your response on the food items consumed.

If you eat for instance ‘nech teff enjera’ during four days per week (Monday, Tuesday, Wednesday, and Thursday) you will choose the option that says 4-6 times per week. If you usually consume two (2) full medium sized (eight kurtih) nech teff enjera on these days your answer will be 2 full medium sized enjera or eight kurtih (if you use kurtis for serving). You will tell me the total enjeras you consumed be it alone or in combination with others. (Examples, bado enjera + enjera be wot + enjera be avocado)

Remember: these two full enjeras are the totals of all meals (breakfast, lunch, snacks, and dinner)

- 1 .Never
2. 1-2 x per week
3. 3 - 4 x per week
- 4.5 - 7 x per week

Cereals products, bread and potatoes

Cereals Food item	Average consumption over the last week							
	1	2	3	4	Remark			
Enjera 1. Nech teff enjera 2. key teff enjera 3. teff enjera mixed with rice 4. tef enjera mixed with maize 5. teff injera mixed with sorghum								
6. Enjera firfir								
7. Pasta								

Food item								
8. Macaroni								
9. Rice								
10. kinche (aja, barley or wheat)								
11. Nifro (ye sinde)								
12. ye bula genfo								
13. Genfo (barley, wheat porridge)								
Kolo								

14. ye gebsih kolo								
15. ye gebsih ena ye shinbira								
16. Gruel (atmit)								

Bread Food item	1	2	3	4	Remark			
17. Bread: wheat or maize								
18. Bread white (nech ye sukih/ye furno duket dabo)								
19. Sanbusa								
Potatoes Food item								
20. Potato boiled (with nifro or selata)								
21. Potato fried								
22. Potato stew								

Legumes and pulses

Food item	1	2	3	4	Remark			
Pea stew/Shiro wet								
23. mitin shiro								
24. ye Bakila, shimbira or ater shiro								
25. Ye abesh wot								
26. Misirkik/aterkik wet/ split lentil stew								

27. Aterkik wet								
28. Ful (ye bakela)								

Roots and tubers

Food item	1	2	3	4	Remark			
29. Kocho								
30. Beet root stew (keysir wot)								
31. Sweet potato								
32. Carrot with potato stew/Carrot be dinich wot								

Vegetables

Food item								
33. Cabbage (tikilgomen)								
34. Kale (tikurgomen)								
35. Kosta								
36. Tomato sauce/Timatimsilsih								
37. Tomato chopped/Timatim kurtih								

38. Pumpkin stew/duba wot								
39. Fosoliya								
40. Vegetable soup / ye atikiltihshorba								
Fruits								
41. Banana								
42. Orange								
43. Mango								
44. Avocado								

45. Papaya								
Egg								
46. Chicken eggs (boiled or fried)								
Milk and dairy								
47. Milk: cow's, camel)								
48. Cheese								
49. Yoghurt								

Fish and products based on fish

Food item								
Fish								
50. Asa gulash, stew, tibs, lebleb, kotelet								
51. Tuna								

Meat and poultry

Food item								
Meat								
52. Siga wote, minchet, kikil								
53. Kitfo								
54. Gored gored/Tire sega								
55. Ye berehtibsih								
56. Ye begih/feyel tibs								
Poultry (ye dorosiga)								
57. Chicken stew/doro wet								
58. Doro alicha								

59. Doro tibs/alecha								
Fat and oils								
60. Butter, shenolega								
61. Oil (type of oil) Plant/palm/ saturated/ yerega								
Sweets								

Sweets: Food item							
62. Honey							
63. Jam							
64. Sugar							
Drinks							
Non-Alcoholic drinks							
Food item							
65. Coffee							
66. Tea							
67. Mekiyato/ buna be wetet							
Soft drinks							
68. Mirinda/							
69. Fanta							
70. Spirit							
71. Pepsi/							
72. Coca-cola							
Alcoholic drinks							
73. Beer							
74. Tella							

75. Tej						
76. Arake						
Food items: Fast foods and pastry						
78. Burger						
79. Pizza						
80. Cake (types of cake)						
80.chips						

B. Physical measurements of Study patients

1. Height (cm) -----
2. Weight (kg) -----
3. Systolic blood pressure (mm Hg) -----
4. Diastolic blood pressure (mm Hg) -----

