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College of Health Sciences

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Frequency of Fast-food consumption and its association with metabolic syndrome among adults in Addis Ababa, Ethiopia

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APPROVED BY THE BOARD OF EXAMINERS

This is to certify the thesis prepared by Kalkidan Wondatir entitled "**Frequency of Fast-food consumption and its association with metabolic syndrome among adults in Addis Ababa, Ethiopia"** and submitted in partial fulfillment of the requirements for the Degree of Masters In Public Health Nutrition complies with regulations of the University and meets the accepted Standards with respect to originality and quality.

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List of Abbreviations and Acronyms

AACA	Addis Ababa City Administration
AOR	Adjusted Odds Ratio
ATP III	Adult Treatment Panel III
BP	Blood Pressure
BMI	Body Mass Index
CGPA	Cumulative Grade Point Average
CI	Confidence Interval
COR	Crude Odds Ratio
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
EPHI	Ethiopian Public Health Institute
FBS	Fasting Blood Sugar
FFQ	Food Frequency Questionnaire
HDL	High-Density Lipoprotein
IQR	Inter-Quartile Range
LDL	Low-Density Lipoprotein
LMICs	Low- and Middle- Income Countries
MetS	Metabolic Syndrome
NAFLD	Non-Alcoholic Fatty Liver Disease
NCDs	Non-Communicable Diseases
PPBS	Postprandial Blood Sugar
SD	Standard Deviation
SSBs	Sugar-Sweetened Beverages
SuNCD-AA	Surveillance of Non-communicable Diseases in Addis Ababa
TAG	Triacylglycerol's
T2DM	Type 2 Diabetes
UPF	Ultra-Processed Food

Abstract

Background: With the rise of urbanization and the growing influence of Western diets, particularly fast foods, the prevalence of metabolic syndrome has increased globally. In Ethiopia, the consumption of fast food is a growing public health concern in urban settings yet its association with metabolic syndrome remains understudied.

Objective: This study aimed to determine the frequency of fast-food consumption and its association with metabolic syndrome among adults in Addis Ababa.

Methods: A cross-sectional study was conducted using data from the 2021 Surveillance of Non-communicable Diseases in Addis Ababa survey among 600 adults aged 18–64. Fast food consumption was assessed via food frequency questionnaires, while Metabolic syndrome was diagnosed using the Adult Treatment Panel (ATP) III criteria. The analysis for fast food consumption included sugar-sweetened beverages/energy drinks, chocolate or other sweet spreads, store-bought ice cream, fruit juice (preserved), deeply fried foods (French fries, chicken fries..), burgers or sandwiches, store-bought pizza, chips, French fries, store-bought pastries or sweet breads and cookies or biscuits. Bivariable and Multivariable logistic regression analyses were used to identify factors associated with Metabolic syndrome. Adjusted odds ratios, along with the corresponding 95% confidence interval were estimated to measure the strength of the association between dependent and independent variables. A P-value of less than 0.05 was considered statistically significant.

Results: Out of 600 participants, 10.4% frequently consumed fast food, with sugar-sweetened beverages being the most commonly consumed item. The prevalence of metabolic syndrome was also 24.3%, 95% CI: (20.59%, 27.41%). While unadjusted analysis showed a significant association between frequent fast-food consumption and metabolic syndrome, this association turned statistically insignificant after adjusting for confounders [AOR= 1.606, (95% CI: 0.237, 10.889)], p=0.627.

Conclusion: Although fast food consumption is not found to be statistically significant with metabolic syndrome, public health interventions should target dietary habits to mitigate metabolic syndrome risk.

Keywords: Fast food consumption, food frequency questionnaire, metabolic syndrome

1. Introduction

1.1. Background

Fast food consumption, referred to as the frequent intake of quickly prepared commercially processed foods(1, 2). Fast foods which are mostly classified as unhealthy are becoming common cuisines globally. In recent years, global dietary patterns have shifted in nearly every nation with increased consumption of saturated fat , high refined sugar, salt and processed foods which are increasingly associated with poor metabolic outcomes which in turn lead to increased risk of non-communicable diseases(NCDs) globally(3, 4). Besides the mentioned risks since fast food has low fiber it leads to digestive issues such as constipation and gastrointestinal discomfort (5). In addition to that since fast foods commonly lack essential nutrients such as vitamins and minerals it might lead to deficiencies(6, 7).

The rapid shift in urbanization and lifestyle in low- and middle-income countries (LMICs) including Ethiopia brings significant shift in disease burden from infectious disease to NCDs. Diet-related NCDs are becoming a growing public health concern globally with a higher negative impact in LMICs, especially the urban settings(8).NCDs are mainly influenced by the dietary patterns and the type of food we eat. The increasing prevalence of diet-related NCDs such as cardiovascular disease including hypertension, obesity and type 2 diabetes are putting the global health care system at risk(3).

Metabolic syndrome (MetS) is a group of cardiovascular and diabetes risk factors which include hyperglycemia, raised blood pressure, elevated serum triacylglycerol (TAG) levels, low high-density lipoprotein cholesterol levels, and obesity, particularly central adiposity that put individuals at particularly high risk for NCDs(9, 10).Globally metabolic syndromes are rising significantly due to lifestyle changes and increasing urbanization. In recent years most people are practiced sedentary life style with limited physical activity and increased consumption of processed and fast foods which led to higher risk of NCDs(11-13).

In urban areas of Ethiopia, the rapid westernization and increasing adaptation of western dietary habits and the accessibility of fast foods in collaboration with the economic transition are putting the population at an increased risk of MetS(14-16).So, this study aims to assess the frequency of

fast food consumption and its association with MetS in the adult population of Addis Ababa, contributing to a deeper understanding of the dietary habits influencing public health.

1.2. Statement of the problem

As urbanization grows and Western eating habits, particularly the reliance on fast food, become more prevalent, the incidence of metabolic syndrome has increased. Most population-based studies have revealed the association between MetS and dietary habits(17, 18). Similarly, other studies also suggested that consumption of fast food increased the risk of obesity and other metabolic syndromes which later on led to NCDs(19).

The global prevalence of MetS and NCDs in adults is increasing.(20) The global prevalence of MetS is estimated to be between 20- 25% among the adult population(21).MetS is most frequent in high-income nations, with estimates of more than 30%(22).MetS epidemiologic nature is also emerging alarmingly, and becoming common in Africa contrary to previous perceptions that it was rare(23).

The burden of NCDs including MetS in Africa is quickly expanding, with prevalence estimates ranging from 20-40% in some urban populations. And from the studied countries,Morocco (16.3%) and South Africa (33.5%) reported high prevalence of MetS(24). In Ethiopia the pooled prevalence of MetS was found to be 35% with the highest prevalence being in females(25). Similarly the prevalence of MetS among occupied adults in Addis Ababa was 14.5% and 17.9%, according to Adult Treatment Panel III (ATP III) and International Diabetes Federation definitions, respectively(26, 27).

Rapid urbanization and globalization have drastically changed dietary habits in Ethiopia, which has led to an increase in the prevalence of metabolic syndrome (MetS), especially among urban residents. Obesity and other elements of MetS have been associated with increased access to consumption of fast food, which is frequently heavy in saturated fats, refined carbohydrates, and salt(28).Ethiopia has adopted a number of national initiatives to minimize non-communicable diseases (NCDs) and bad eating habits in recognition of the seriousness of this trend. In order to combat nutrition-related NCDs across the life course, the National Nutrition Program II (NNP II) promotes better eating habits, such as consuming fewer processed foods and encouraging physical exercise(29).Accordingly, the Ethiopian Food-Based Dietary Guidelines (FBDGs), which were released in 2022, offer evidence-based and culturally appropriate advice, such as lowering consumption of foods high in fat, sugar, and salt and boosting consumption of fruits, vegetables, legumes, and whole grains (30). The purpose of these guidelines is to assist in the

establishment of policies as well as the modification of individual behavior. Additionally, community-based nutrition and physical activity instruction is provided by the Urban Health Extension Program (UHEP), which focuses on low-income urban areas where poor food choices are more common (31). Despite these initiatives, national data show ongoing difficulties: according to the 2015 WHO STEPS survey, 11% of Ethiopian adults did not engage in enough physical exercise, and 98% of Ethiopian people did not consume the recommended daily intake of fruits and vegetables, both of which are significant risk factors for MetS(32). MetS was reported to be 20.1% prevalent in a research done in Eastern Ethiopia, with greater rates among women, older adults, people who lead sedentary lifestyles, and people who eat poorly (33). In order to reverse the rising trend of MetS in Ethiopia, these findings highlight the critical necessity for strict dietary recommendations and health promotion initiatives to be implemented and closely monitored.

The consequences of MetS are far-reaching and it has a significant effect on health and health-related aspects. Morbidity and mortality from cardiovascular diseases, stroke, and diabetes are notably higer in individuals with MetS, making it a significant global health problem (34).Individuals with MetS have 2-3 times higher chance of developing cardiovascular diseases (CVD) including stroke than their counterparts (21, 35).They also have a six-fold greater risk of developing type 2 diabetes (T2DM) (36). MetS is also associated with other comorbidities such as cancer, non-alcoholic fatty liver disease, and other reproductive disorder (37-39).

It is also suggested that mortality due to MetS is more than twice than those who don’t have the syndrome (40). Regarding attributable death, elevated blood pressure is one of the leading causes of death with 19% of global death attributed to it(34), followed by raised blood glucose and overweight and obesity(34).In addition to the physical burden, MetS is associated with substantial economic costs, including increased healthcare expenses and lost productivity. The economic cost of managing NCDs, particularly MetS-related conditions, is a growing concern in both developed and developing economies with a substantial effect on the country's direct and indirect health care costs(41, 42).

Even though substantial research has been conducted in Western settings to investigate the impact of fast food consumption on MetS, there is a dearth of evidence on the relationship between fast food consumption and MetS in Addis Ababa and other parts of the country. In Ethiopia, fast food consumption is increasing significantly, especially in urban settings like Addis Ababa, but the specific role it plays in the development of MetS has not been sufficiently studied(43, 44). So the observed gap in the literature dictates further research in the area with specific emphasis given to the association of fast food with MetS and the general prevalence of fast food consumption in the community.

1.3. Significance of the study

Ethiopia, especially Addis Ababa is facing significant problems related to metabolic syndrome. Addis Ababa is a city experiencing rapid urbanization and a dietary shift to a more western food style so it would be important to understand the role of fast food in the rise of MetS. By investigating the frequency of fast food consumption and its impact on metabolic syndrome, this research finding will provide essential data for public health initiatives, which might help to identify potential modifiable risk factors that will help to avert the increasing burden of MetS. Ultimately the finding of this research will contribute to the development of a tailored approach for localized dietary guidelines and will help in raising awareness regarding the health risk of poor diet; it will help policymakers, health care professionals, and educators in promoting a healthier lifestyle to combat the growing burden of NCDs in Ethiopia with an evidence-based approach.

2. Literature review

2.1. Metabolic syndrome

2.1.1. Epidemiological Significance of metabolic Syndrome

According to Adult Treatment Panel III, metabolic syndrome is defined as an alteration in three or more of the following five components: elevated glucose (G), fasting glucose ≥110 mg/dl; low HDL cholesterol, < 40mg/dl for men or <50 mg/dl for women; high triglycerides (T), ≥150 mg/dl; elevated blood pressure (B), ≥130/≥85 mmHg; abdominal obesity (W), waist circumference >102 cm for men or >88 cm for women(45). Metabolic syndrome increase the likelihood of developing type 2 diabetics and cardiovascular diseases including hypertension, stroke and other related conditions(34).

Globally the prevalence of MetS are increasing significantly due to the rising rate of obesity and lifestyle related diseases making it one of the top public health concerns (15, 46-48).It has been estimated that the prevalence of MetS ranges 20–25% of the adult population globally(21). According to the Health and Nutrition Examination Survey done in USA the prevalence of MetS was 41.8%(49). Other study conducted on 12 cohorts from 10 European countries and one cohort from the USA showed that the prevalence of MetS was 24.3% with 23.9% being in men and 24.6% in women(33).

When we see the prevalence of MetS in Africa, a systematic review and meta-analysis on different studies done in different parts of Africa showed that the pooled prevalence of Mets was 32.4% with a higher prevalence in adults >18 years with 33.1% compared to children <18 years with 13.3%(50). Similarly, when we see the prevalence of MetS in sub-Saharan Africa, a systematic review and meta-analysis result showed that the pooled prevalence of MetS is 17.1%(51).

Similarly in Ethiopia where rapid urbanization and westernized dietary habits are showing rapid increment, the prevalence of Mets is also dramatically increasing especially in urban areas contributing to the growing burden of NCDs. According to cross-sectional study done in Southern Ethiopia, the prevalence of MetS was 18.5%(52). Similarly, another study done in the Northern part of Ethiopia also showed the magnitude of MetS to be 21.8% with a relatively higher prevalence among women (24.6%)(53).Also in other cross sectional study done in Addis

Ababa the overall prevalence of MetS was 20.3% and among those 48.6% were reduced high-density lipoprotein cholesterol followed by elevated blood pressure at 36.3% and elevated fasting glucose at 32.6%(16).Besides those studies mentioned different studies also showed a higher prevalence of MetS in Ethiopia(54-56).

Although developed countries face more challenges, developing countries like Ethiopia especially the urban areas are witnessing a growing burden of MetS due to low physical activity and unhealthy dietary habits contributing to its rise. So addressing MetS in this region is essential to prevent the long-term impact and reduce the strain it put on the health care system(14, 16). Furthermore, Public health strategies focusing on prevention, early detection, and management can help reduce the future burden of MetS and its associated chronic diseases in Africa and Ethiopia.

2.1.2. Epidemiological implication of metabolic Syndrome

The growing burden of MetS has put a significant effect on public health since it increased the risk of chronic diseases which in turn places substantial burden on healthcare systems(57).

MetS is associated with several chronic diseases. It is one of the common precursors for type 2 diabetics and many studies have shown that individuals with MetS have a higher risk of developing type 2 diabetics than their counterparts (36, 58, 59). Similarly other studies also showed that MetS increases the risk of cardiovascular diseases including coronary heart disease and stroke(60, 61). In addition to those, Mets is also associated with an increased risk of non-alcoholic fatty liver disease (NAFLD), chronic kidney disease, and certain types of cancer(62, 63).So early identification of at-risk populations through screening and early interventions, such as lifestyle modifications and pharmacological treatments, is crucial to mitigating the healthcare burden(64, 65).

2.1.3. Risk Factors of Metabolic Syndrome

A number of risk factors, such as obesity, sedentary lifestyles, genetic predispositions, and bad eating habits, are linked to metabolic syndrome. One of the main components of the syndrome and a significant risk factor for its development is obesity, especially central or visceral obesity (24, 66, 67). Physical inactivity, fast food consumption(68), smoking, alcohol and genetic predisposition are also significant risk factors(54). Besides those eating high-calorie diets, excess

consumption of processed food and low intake of fruits and vegetable which are in general put under unhealthy eating significantly contribute for the development of MetS.(17, 69-71)In addition to the above-mentioned risk factors different researches also put socioeconomic factors such as income level, education level and occupation types, and being female as a risk factor for MetS with a significant increase of risk in illiterate and low and middle-income populations. Other than these factors studies also found psychological factors like stress and insomnia as significant risk factors for MetS.(54, 66, 67, 70-72)

2.2. Fast food consumption

2.2.1. Fast Food Consumption: Definition and Measurement

Fast food refers to a food that is prepared within short duration time and it commonly contains high levels of fat, sugar, salt, and calories these foods commonly include food items like Burger, pizza, sandwiches and snacks(1, 2).Fast foods are food products characterized by their easy availability, and simple preparation process, allowing customers to receive their food in a matter of minutes after making an order(73). Nowadays fast food is greatly sought out all over the globe, especially in urban settings(74, 75).Precise quantification of fast food consumption is difficult due to variations in the types of fast foods consumed and local dietary habits but different dietary measurements could be used to estimate the amount and frequency of consumption by using food frequency questionnaires, 24-hour dietary recalls, or surveys assessing the frequency and portion sizes of fast food meals consumed by individuals over a set of period(76, 77).

An individual is classified as a regular fast food consumer if they eat from the following list of foods at least two times a week. This includes various sandwiches like grilled, chicken, fried egg, and vegetable sandwiches such as "Erteb." It also covers different types of burgers, including beef, cheeseburgers, and chicken burgers, commonly available in cafeterias and burger joints. Additionally, popular pizza options like cheese, chicken, spicy beef, tuna, and veggie pizzas, typically found in cafeterias and pizza houses, are part of the list. Lastly, snacks like chocolates, cookies, cakes, donuts, potato chips, sambusas, and fried biscuits, usually sold by street vendors and in cafeterias, are also considered fast food items**(78)**.

2.2.2. Determinants of Fast-Food Consumption

Nowadays, fast-food consumption is increasing dramatically due to its easy accessibility, affordability, and high flavor. As urbanization becomes prominent and the lifestyle becomes busy, people tend to shift towards fast food consumption since they have limited time to prepare meals at home(79). Besides those the increased advertisement by fast food producing companies also played a critical role in promoting fast food consumption(80). In addition to those having low economic levels also affect fast food consumption, since fast foods are easily accessible and relatively cheap they tend to use them more often. Furthermore, changes in taste preferences, often influenced by global food trends, have made fast food increasingly popular in many developing countries, including Ethiopia(75, 81, 82).

Emotional and psychological factors also play a role in the frequency of fast food consumption. Many people hide their emotions by eating fast food as a form of comfort food or as a solution for their stress. Many studies have shown the relationship between high-level stresses especially secondary to socioeconomic challenges to have a correlation with fast food consumption(83). Different studies also show that attitudes towards fast food, subjective norms (influences from friends and family), and perceived behavioral control significantly predict the intention and actual consumption of fast food(84, 85).

Other than those mentioned determinants A multi-center multidisciplinary research conducted in UNC Charlotte University, Southeastern US indicated that Age, sex and Semester CGPA had a significant association with Fast food consumption(86).

2.3. Association between Fast Food Consumption and Metabolic Syndrome

Many studies have found fast food consumption to have a strong relationship with obesity, high blood pressure, insulin resistance, and abnormal cholesterol levels(87, 88). According to a study conducted in Brazil, the risk of MetS was higher in those who consume 150 g/day of ultra-processed food (UPF)(89). Another study also shows that Regular consumption of fast food has a significant effect on health and metabolic process which lead to weight gain and poor dietary habits(15). Similarly, other Systematic reviews and meta-analyses done on different publications show that consumption of Sugar-Sweetened beverages (SSBs) had a positive associated with an

increased risk of MetS(90). Other studies also reported that frequent consumption of fast food is associated with an increased intake of unhealthy fats (trans fats and saturated fats) and simple sugars which are a major cause of metabolic syndromes(91-93). Other than those, a study done in Tehran reported higher consumption of fast food leads to higher serum triglyceride levels and triglyceride to HDL-C ratio and after adjustment for all potential confounding variables, the risk of metabolic syndrome was 1.85 times higher for those who consume fast food(68). Another study also reported that sugars and fast foods had positive association with LDL cholesterol (94).

2.4. Why We Should Be Worried About Fast Food Consumption

As urbanization increases the global consumption of fast food is increasing which in turn leads to widespread of MetS especially in developing and urbanized regions. Nowadays fast food is becoming more accessible with an increment of delivery services and street vendors targeting especially young adults(95, 96).

Metabolic syndrome has both short-term and long-term health consequences and it is associated with a significantly higher risk of CVD, type 2 diabetes and stroke. If metabolic syndromes are left unchecked, individuals with metabolic syndrome are at greater risk of developing chronic diseases like renal disease, heart disease, and many more. So the long-term burden of this condition put one country a great economic and healthcare strain(97-99).

Both the direct and indirect cost of health consequences of metabolic syndrome is becoming challenging, especially in developing countries. As fast food consumption increases especially in newly developing countries, the healthcare system are facing a lot of challenges in treating chronic healthcare conditions like hypertension, DM, and obesity. Since this chronic condition requires long-term care it significantly increases healthcare expenditure. So preventing metabolic syndrome by reducing fast food consumption could ease this and improve the overall public health condition(57, 100).

Fast food consumption is high in individuals with low economic status since foods like vegetables, fresh fruits, and other healthier foods are perceived as expensive. And this condition puts this population at greater risk of obesity, diabetes and other metabolic problems which in general puts health disparity among the poor. Addressing this issue requires systemic changes,

including policy interventions, education, and community-based initiatives to increase access to nutritious food(101, 102). In Ethiopia, the health care system is facing a double burden with the rapid rising of non-communicable diseases associated with MetS in addition to the existing infectious diseases(14, 25). So this paper tries to fulfill the limited evidence on the prevalence of fast food consumption and also its association with metabolic syndrome which lack evidence based publications.

2.5. Conceptual framework

This conceptual framework explains factors that lead to fast food consumption which later on leads to metabolic syndrome. In addition to this, it also explores factors that might lead to metabolic syndrome and the association of those factors with fast food consumption (Figure 1).

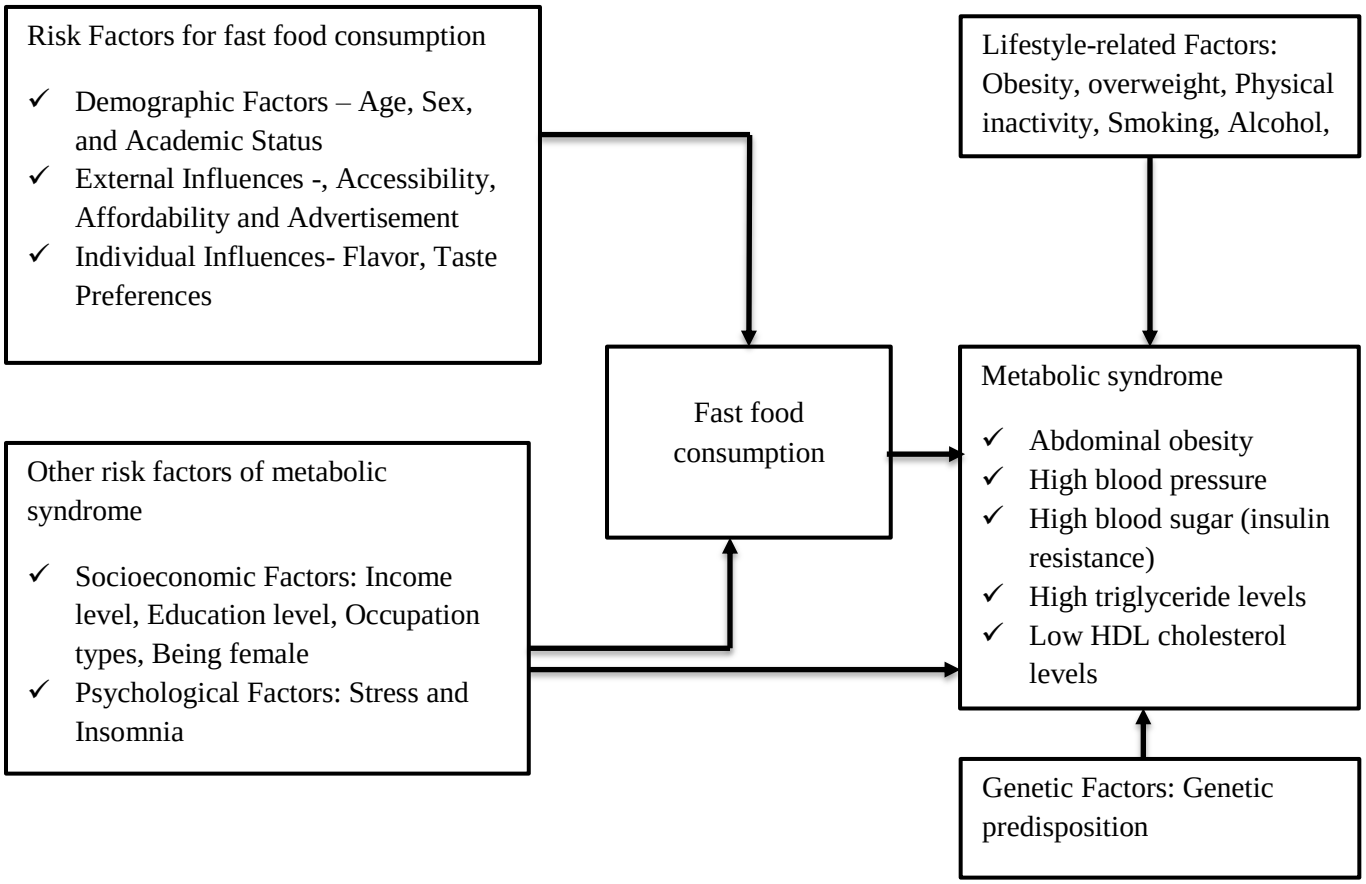

Figure 1: Conceptual framework on frequency of fast food consumption and its association with metabolic syndrome (16, 53, 54, 81, 95, 96)

3. Objective

3.1 General objective

- To determine the frequency of fast-food consumption and its association with metabolic syndrome among adults in Addis Ababa.

3.2 Specific objectives

- To determine the frequency of fast-food consumption among adults in Addis Ababa
- To assess the association between frequency fast food consumption and metabolic syndrome among adults in Addis Ababa

4. Methods and materials

4.1 Study area and period

The original survey was conducted from May to June 2021 in Addis Ababa the capital city of Ethiopia, which is estimated to have more than 4.5 million population with the majority being adults(103). The city is divided into 11 sub-cities. These sub-cities are divided into administrative districts/ small administration units, and each sub-city has its local government structures. In the city, there are 14 public hospitals, 40 private hospitals, more than 100 health centers, and numerous private clinics and small health posts.

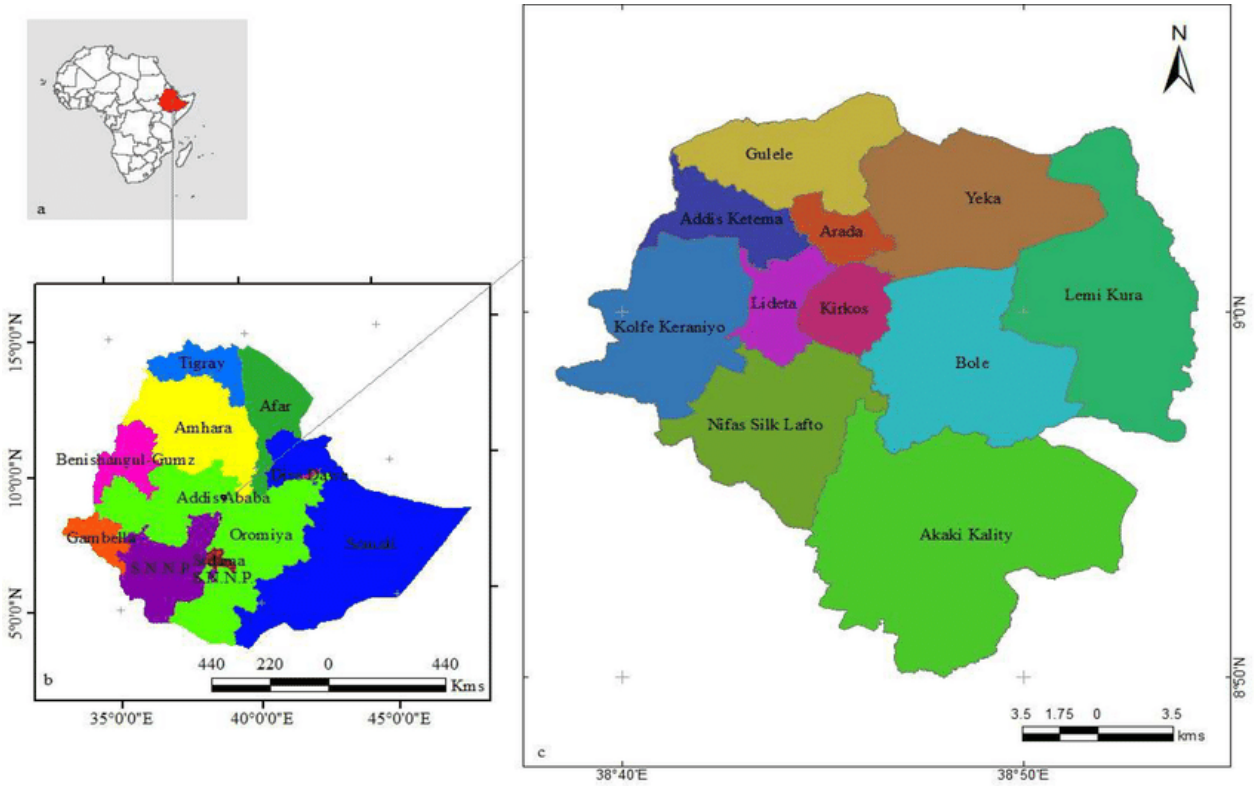

Figure 2: Map of Addis Ababa with sub-cities. Source: Ethio GIS (2022)

4.2 Study Design

This is a secondary data analysis of a cross-sectional survey –Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA) – conducted by School of Public Health, Addis Ababa University in 2021.

4.3 Population

4.3.1 Source Population

- Adults 18-64 years of age in the city were the source population for the survey,

4.3.2 Study population

- Randomly selected adults 18-64 years of age were the study population.

4.4 .Sample size and sampling technique

4.4.1 Sample size

The original survey included 600 adults into the survey.

The adequacy of the available sample to address the two specific objectives of the current study was assessed as described below. For the first objective,

$$n = \frac{Z^2 \quad p(1-p)}{d^2}$$

where:

n – number of sample size

z – confidence level, which is equal to 95%

p – 0.5

d – margin of error, which is equal to 5%

$$n = \frac{1.96^2 \quad 0.5(1-0.5)}{0.05^2} = 384$$

by considering a design effect of 1.5 the sample size is 576.

For the second objective, measuring the association between frequency fast food consumption and MetS, a total of 466 with high fast food consumption would be needed assuming a 95% confidence level, 80% power, OR of 3.3, and 3.4% prevalence of MetS in the control group(104).

Sample Size for objective 2

Table 1: The sample size for the second objective, calculated by using a double population proportion formula.

Associated factor	significance level	Power	Unexposed /Exposed Ratio	Percent of outcome in Unexposed	Percent of outcome in Exposed	Odds Ratio	Sample size	reference
Fast-food consumption	95	80	1	3.4	10	3.3	466	(104)

The largest sample size is 576, and it approximates the original survey responses, 600. So I included the total response to increase the power of the study.

4.4.2 Sampling technique and procedure

In the original survey, study participants were chosen through a multistage cluster sampling method. First, one district was selected from each of the 10 sub-cities, and then two villages ("ketena") were randomly chosen from each district using a lottery system. This resulted in a total of 20 villages being included in the study. Within each village, 20 households were randomly selected using the database of urban health extension workers as the sampling frame. Eligible individuals within these households were identified, and one participant was randomly chosen using simple random sampling. A few selected individuals who were unwilling to participate or could not be reached after multiple visits were replaced with randomly selected eligible individuals from nearby households. Everyone participated in the original survey was included in this analysis.

4.5. Study variables

4.5.1 Dependent variable

- Metabolic syndrome

4.5.2 Independent variable

- Fast food consumption

Control variables

Age, sex, Income status, educational status, employment status, physical activity, smoking, alcohol consumption, family history of hypertension and family history of diabetes

4.6. Operational Definitions

- Fast food: fast-food is defined as commercially prepared food that is typically high in calories, fat, sugar, and salt. These foods are usually prepared quickly and are often consumed away from home. An individual will be considered a high fast food consumer if s/he consumes food items among the listed foods at least once a day (78).
    - List of fast foods included: Sugar-sweetened beverages/energy drinks, Chocolate or other sweet spreads, Store-bought ice cream, Fruit juice (preserved), Deeply fried foods (French fries, chicken fries), Burgers or sandwiches, Store-bought pizza, Chips, French fries, Store-bought pastries or sweet breads, and Cookies or biscuits
    - The response was categorized in to Never or < once/ month, 1/month, 2-3/ month, Once/ week, Twice/ week, 3-4/ week, 5-6/ week, Every day, 2-3/day and 4 or more/day.
- Metabolic syndrome: According to Adult Treatment Panel III, metabolic syndrome is defined as an alteration three or more of the following five components: elevated glucose (G), low HDL cholesterol, high triglycerides (T), elevated blood pressure (B), abdominal obesity (45)
- Raised triglycerides: ≥ 150 mg/dL (1.7 mmol/L) or specific treatment for this lipid abnormality.
- Reduced HDL cholesterol: < 40 mg/dL (1.03 mmol/L) in male < 50 mg/dL (1.29 mmol/L) in female or specific treatment for this lipid abnormality.
- Raised blood pressure: Is a systolic BP ≥ 130 mm Hg or diastolic BP ≥ 85 mm Hg, or any patient on treatment of previously diagnosed hypertension.
- Elevated blood sugar: RBS ≥ 200 mg/dl or on medication for raised blood sugar) states.(105)
- Abdominal obesity – Waist Circumference ≥ 102 cm in men or ≥88 cm in women

4.7. Data Collection Technique and Tool

For this study, the data were obtained from the Surveillance of Non-communicable Diseases in Addis Ababa, which employed structured surveys and health assessments to collect baseline data on non-communicable diseases and lifestyle factors. The primary data collection tool used in the surveillance study was a standardized questionnaire by adapting the STEPwise Approach designed to capture key demographic information, health behaviors, and clinical measures relevant to NCDs and stored in a structured format for analysis. The dataset includes both self-reported behavioral data and objective clinical measures, which allowed a comprehensive analysis of the relationship between fast food consumption and the components of metabolic syndrome.

4.7.1. Anthropometric Measurements

In the original survey all participants underwent weight, height, waist and hip circumference, and skinfold measurement in the field, following standardized procedures. Weight was measured to the nearest 100 g, without shoes and heavy clothing, using a SH2003B® digital scale (accuracy ±100 g). Standing height was measured to the nearest 0.1 cm, without shoes, using a portable Heuer® stadiometer. BMI was calculated by dividing weight in kilograms by height in meters squared and categorized as underweight (<18.5), normal (18.5–24.9), overweight (25.0–29.9), or obese (≥30).

Waist circumference was measured to the nearest 0.1 cm using a non-stretchable flexible tape over minimal clothing. Waist circumference was categorized as normal (men <94 cm, women <80 cm), increased risk (men 94–102 cm, women 80–88 cm), or greatly increased risk (men >102 cm, women >88 cm).

All anthropometric measurements were taken twice, and if the difference between measurements was within acceptable limits (200 g for weight, 0.5 cm for height, and 1 cm for waist circumference), the average was used. If not, the measurements were repeated(106).

4.7.2. Lipid Profile, Blood Pressure, and Blood Sugar Measurements

In the original survey, blood pressure was measured using a F(29)olee® automated digital monitor while the participant was seated, after 15 minutes of rest. If the individual had recently exercised, smoked, consumed a heavy meal, or ingested caffeine, the measurement was delayed for at least 30 minutes. The measurement was taken twice, and if the difference between readings

was within the acceptable range (10 mmHg for systolic blood pressure and 5 mmHg for diastolic blood pressure), the average was recorded. If not, a new set of measurements was taken. Random blood glucose levels were measured from capillary blood using the Diavue® monitoring system. The lipid profile, including low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglycerides, and total cholesterol, were assessed at the national reference laboratory of the Ethiopian Public Health Institute (EPHI)(106).

Elevated triglycerides ≥150 mg/dL (1.7 mmol/L) or on drug treatment for elevated triglycerides, Reduced HDL-C <40 mg/dL (1.03 mmol/L) in men and <50 mg/dL (1.3 mmol/L) in women, Elevated blood pressure ≥130 mmHg systolic blood pressure or ≥ 85 mmHg diastolic blood pressure or on antihypertensive drug treatment in a patient with a history of hypertension and elevated fasting glucose ⩾100 mg/dL (Random blood sugar ≥ 200 mg/dl) or on drug treatment for elevated glucose(9).

4.7.3. Physical activity levels

In the original survey, physical activity level was measured by using the Global Physical Activity Questionnaire tool. The total physical activity level was calculated based on the metabolic equivalent of task-minutes per week and classified in to low, moderate and high physical activity leve(106).

4.8. Data Quality Assurance

The original data were collected using an adapted version of the STEPS questionnaire, a widely used tool for monitoring behavioral, dietary, and metabolic risk factors associated with non-communicable diseases (NCDs). The questionnaire was translated into Amharic, pretested, and tailored to fit the local context. Since we are using secondary data the accuracy and completeness of data were checked and outlier values and missing values were assessed and handled. The consistency of the data was checked by cross-checking relative variables.

Supervisors and enumerators were qualified nurses with a wealth of field expertise.The survey was collected using personal identifier information (specifically, telephone number of the study subjects) so that we can inform them about their lab results (e.g. Triglycerides and HDL Cholesterol that were not determined in the field) once the laboratory analysis is completed. Data were collected using password-protected smartphones and were stored in encrypted Digital

Ocean TM platform that was accessible only to the core members (PI and data analyst) of the research team. And Venous blood was collected by trained health professionals using clean gloves, a disposable blood collection system and disinfectant (70% Ethanol). The collected blood samples was only be used to determine the blood glucose and cholesterol levels. Any leftover biological sample was discarded upon completion of the study. All the laboratory analysis was made in Ethiopia and no sample was exported.

In the field, all participants had their height, weight, hip and waist circumferences, and skinfold measurements taken in accordance with accepted protocols. Without shoes or bulky clothes, the weight was measured with an SH2003B® digital scale (precision ± 100 g) to the closest 100 g. Utilizing a portable Heuer® stadiometer, standing height without shoes was measured to the closest 0.1 cm. Using a non-stretchable flexible tape and very little clothes, waist and hip circumferences were measured to the closest 0.1 cm. Every anthropometric measurement was done twice, and the average was utilized if the difference was within a reasonable range (200 g for weight, 0.5 cm for height, and 1 cm for waist and hip circumferences). If not, the measurements were made again(106).

4.9. Data processing and analysis

SPSS version 27 was used for data processing and analysis. Survey weights were applied to adjust for differences in probability of selection and to align the sample with the known age and sex profile of the population of the city as reported in the recent national census(106). Categorical variables were presented using frequency distributions. The normality of numeric variables was assessed using the Kolmogorov–Smirnov test, and then appropriate measures of central tendency and dispersion were applied to summarize the data. The arithmetic mean (± standard deviation, SD) was used for normally distributed data, while the median (inter-quartile range, IQR) was used for skewed distributions. In this study, fast-food consumption was originally measured using qualitative frequency categories, including: “Never or < once/month,” “1/month,” “2–3/month,” “Once/week,” “Twice/week,” “3–4/week,” “5–6/week,” “Every day,” “2–3/day,” and “4 or more/day.”To facilitate quantitative analysis, these categorical responses were first converted into numerical values representing average weekly consumption, “Once/week” was equated to 1, “Twice/week” to 2, “Every day” to 7, “2–3/day” to 17.5 (2.5 × 7), and so on. This transformation allowed for a more precise estimation of each participant's

total weekly fast-food consumption. After quantifying the frequency, cumulative frequency distributions were computed to assess the overall pattern of consumption across the study population.

To determine the threshold at which fast-food consumption was meaningfully associated with metabolic syndrome, different consumption levels were evaluated. Based on this analysis, a cut-off point of "at least once per day" was identified as providing the most meaningful distinction in relation to metabolic syndrome prevalence. Accordingly, participants were categorized into two groups: Frequent consumers: those consuming fast food at least once per day and non-frequent consumers: those consuming fast food less than once per day. Household income was categorized into five equal quin-tiles. .

The main statistical method applied was logistic regression, both the bivariable and multivariable analyses. Variables that showed association with the outcome variable in the bivariate analyses at 0.25 p-values were entered into the multiple logistic regression model. A P-value of 0.05 was considered statistically significant in this study. Adjusted Odds ratios together with corresponding 95% confidence intervals were used to interpret the findings.

The model's goodness-of-fit was assessed using three standard logistic regression diagnostics: (1) the Omnibus Test of Model Coefficients (a likelihood-ratio chi-square test), (2) pseudo-R^2 measures (Cox & Snell, and Nagelkerke), and (3) the Hosmer-Lemeshow Test. Additionally, multicollinearity among independent variables was evaluated using variance inflation factors (VIFs), with all predictors yielding VIF values below 5, indicating no evidence of multicollinearity.

4.10. Ethical considerations

The Institutional Review Board of College of Health Sciences, Addis Ababa University, and ethical review board of AACA health bureau have ethically cleared the original survey. Original data were collected after taking informed consent from the study subject. The study addressed ethical considerations to ensure participant safety, privacy, and autonomy. Blood samples were collected by trained professionals using sterile equipment, ensuring minimal risk. The consent form also emphasized that participation would not affect medical care, and data collectors were trained to ensure participants' autonomy. Participants received educational materials on non-communicable disease prevention, and those with higher health risks were provided with tailored health education and referred to medical institutions. Ethical clearance was obtained from the SPH-REC IRB for this specific secondary data analysis. The confidentiality of the data was maintained. Original survey adequately addressed the various element of informed consent in a broad and systematically structured manner.

5. Result

5.1 Socio-demographic characteristics

The total participants of the original study were 600 adult aged 18 to 64 years participated in the study, and females were for 51.7% of the total participants. 42.6% of respondents were within the 25–39 age group, followed by 35.6% of the 18–24 age group. Slightly less than half (46.8%) of the study participants were married and formal education was attained by 93% of the participants, and more than two-thirds were employed (Table 2).

Table 2: Socio-demographic characteristics of the study participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021

Socio-demographic characteristics (n = 600)	**Frequency**	**Percentage**
Sex		
Male	290	48.3
Female	310	51.7
Age (years)		
18–24	214	35.6
25–39	256	42.6
40–54	97	16.2
55–64	33	5.5
Educational status		
No formal schooling	42	7.0
Primary education	169	28.2
Secondary education	249	41.5
Higher education	140	23.3
Marital status		
Single, not ever married	269	44.8
Married/Cohabiting	281	46.8
Widowed	20	3.3
Divorced/separated	31	5.1

Table 2 (continued): Socio-demographic characteristics of the study participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021

Socio-demographic characteristics (n = 600)	**Frequency**	**Percentage**
Occupation		
Not working (including retired)	182	30.4
Trade (including petty trade)	107	17.9
Student	102	17.0
Professional/technical/managerial	91	15.1
Manual (skilled or unskilled)	78	13.0
Others	39	6.6
Religion		
Orthodox Christian	486	81.1
Muslim	92	15.3
Protestants	19	3.1
Others	4	0.6
Percentile Group of Incomehousehold		
1st percentile	127	21.2
2nd percentile	104	17.3
33rd percentile	135	22.5
4th percentile	90	15.1
5th percentile	106	17.6

5.2. Lifestyle Characteristics

This study found key lifestyle patterns with potential health implications. 4.3% (n=26) reported as having ever smoked cigarettes, and just 2.8% (n=17) currently smoking. However, alcohol consumption was more common, with 50.9% (n=306) reporting alcohol use in the past year, although regular consumption was relatively infrequent (only 2.2% reported as consuming it daily). Substance use data also indicated that 13.6% (n=81) had ever chewed chat, with 5.9% (n=35) currently using it.

Regarding physical activity, 55.5% (n=333) of the study participants were engaging in high activity levels, though 24.7% (n=148) reported low activity levels (Table 3).

Table 3: Lifestyle characteristics of the study participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021.

S.No	Variable	Response category	frequency	%
1.	Ever smoked a cigarette	Yes	26	4.3
		No	557	92.9
2.	Currently smoking	Yes	17	2.8
		No	583	97.2
3.	Smoking daily	Yes	16	2.7
		No	1	.1
4.	Passive smoking within the past 30 days	Yes	16	2.7
		No	584	97.3
5.	Consumed any alcohol such as beer, wine, spirits, Tella, Tej or other local alcohols in the past 12 months	Yes	306	50.9
		No	294	49.1
6.	Have you consumed any alcohol within the past 30 days?	Yes	278	46.3
		No	28	4.6
7.	Ever chewed a chat	Yes	81	13.6
		No	519	86.4
		No	36	6.0
8.	Currently chewing chat	Yes	35	5.9
		No	565	94.1
9.	Level of total physical activity	High	333	55.5
		Moderate	119	19.8
		Low	148	24.7

5.3. Anthropometric Profile

Sex-based variations in body composition and obesity-related risk factors were observed. 54.4% of the participants displayed a normal BMI. Females exhibited higher rates of overweight (32.7% vs. 26.4%) and obesity (12.1% vs. 5.7%) compared to males, while males had a greater prevalence of underweight (11.6% vs. 2.6%). Waist circumference also found to have differences: 49.5% of females showed elevated risk (23.2% increased, 26.3% greatly increased) versus only 18.5% of males (Table 4).

Table 4: Anthropometric profile of the participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021.

Anthropometric profile	**Male (n=290)**		**Female (n=310)**		**Both (n=600)**	
	Freq	**%**	**Freq**	**%**	**Freq**	**%**
Body mass index (kg/m2)						
Underweight (<18.5)	34	11.6	8	2.6	42	7.0
Normal (18.5–24.9)	163	56.3	163	52.6	326	54.4
Overweight (25.0–29.9)	76	26.4	102	32.7	178	29.7
Obese (≥30)	17	5.7	37	12.1	54	9.0
Waist circumference						
Normal (men <94 cm, women <80 cm)	236	81.6	157	50.5	393	65.5
Increased risk (men ≥94 to ≤102 cm, women ≥80 to ≤88 cm)	35	12.2	72	23.2	107	17.9
Greatly increased risk (men >102 cm, women >88 cm)	18	6.3	82	26.3	100	16.6

5.4. Fast food consumption frequency

Table 5 presents the consumption frequency of fast-food items ranging from "Never or < once/month" to "4 or more/day." The findings revealed that sugar-sweetened beverages were the most frequently consumed items. Whereas, chocolate or sweet spreads and store-bought ice cream were the least frequently consumed, with 509(84.9%) and 544(90.6%) of participants, respectively, reporting they never or rarely consumed these items.

Fried foods, such as French fries and chicken fries, showed moderate consumption, while store-bought pizza and burgers, or sandwiches were rarely consumed (Table 5).

Table 5: Fast food items and the frequency of their consumption among study participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021.

S.No	**Food Items**	**Percent (%)**									
		Never or < once/ month	**1/month**	**2-3/ month**	**Once/ week**	**Twice/ week**	**3-4/ week**	**5-6/ week**	**Every day**	**2-3/day**	**4 or more/ day**
1.	Sugar-sweetened beverages/energy drinks	47.2	12.3	18.3	12.6	6.4	2.0	.1	1.1		

2.	Chocolate or other sweet spreads	84.9	8.9	1.7	2.4	.4	.4	.1	1.2		
3.	Store-bought ice cream	90.6	5.3	2.4	1.5	.1	.1				.1
4.	Fruit juice (preserved)	80.8	9.1	4.9	4.6	.4	.1	.1			
5.	Deeply fried foods (French fries, chicken fries..)	71.8	9.9	6.1	4.7	3.7	2.9	.4	.5		
6.	Burgers or sandwiches	79.1	9.8	6.1	2.8	1.0	1.3				
7.	Store-bought pizza	80.7	9.1	4.0	3.7	.9	.3	.2			1.2
8.	Chips, French fries	84.4	7.2	2.1	2.3	1.7	1.4			.1	.8
9.	Store-bought pastries or sweet breads	76.1	13.6	4.6	4.8	.3	.2	.2	.2		
10.	Cookies or biscuits	66.9	12.7	10.2	4.2	2.1	1.9	.5	1.6		

Table 6 dichotomizes consumption of fast food into "Yes" (≥ once a day) and "No". About 62(10.4%) of participants reported regular consumption (at least once a day). Among individual items, cookies were the most frequently consumed 9(1.6%), followed by chocolate/spreads 7(1.2%), pizza 7(1.2%), and soft/sweetened beverages 7(1.1%). Less commonly consumed items included pastries 1(0.2%), fried food 3(0.5%), and chips 5(0.8%), while ice cream, preserved juice, and burgers/sandwiches had no reported frequent consumption. The vast majority of participants 538(89.6%) did not consume fast food frequently, indicating relatively low reliance on such foods in their diets (Table 6).

Table 6: Fast food items and the frequency of their consumption among study participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021

S.No	**Food Item**	**Frequently consumed (at once a day)**	
		Yes	**No**
1.	Cookies	9(1.6%)	591(98.4%)
2.	Pastries	1(0.2%)	599(99.8%)
3.	Icecream	0(0%)	600(100.0%)
4.	Chocolate and other spreads	7(1.2%)	593(98.8%)
5.	Soft and sweetened beverages	7(1.1%)	593(98.9%)
6.	Juice preserved	0(0%)	600(100.0%)

7.	Fried food	3(0.5%)	597(99.5%)
8.	Burger and sandwich	0(0%)	600(100.0%)
9.	Pizza	7(1.2%)	593(98.8%)
10.	Chips	5(0.8%)	595(99.2%)
	Overall, frequent fast-food consumption	**62(10.4%)**	**538(89.6%)**

5.5. Prevalence of Metabolic Syndrome

The study found that 146(24.3%), 95%CI: (20.59%, 27.41%) of participants met the criteria for metabolic syndrome.

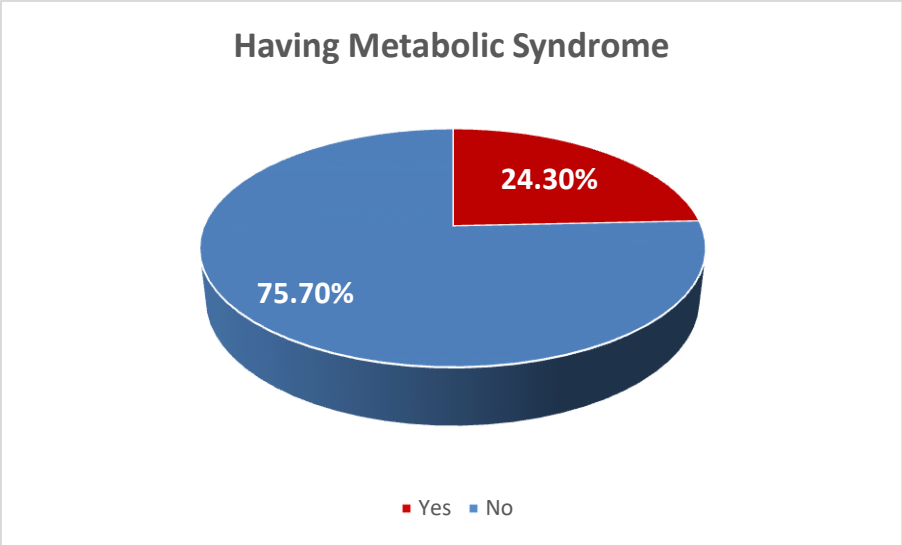

Figure 3: Prevalence of metabolic syndrome among adults in Addis Ababa, 2021.

Component analysis showed that the most prevalent individual risk factor was reduced HDL-C (63.6%), followed by elevated triglycerides (36.1%) and elevated blood pressure (34.8%). Elevated waist circumference was observed in 17.0% of participants, whereas elevated blood glucose (4.4%) was the least common metabolic abnormality (Table 7).

Table 7: Metabolic syndrome profile of the participants of the Surveillance of Non-communicable Diseases in Addis Ababa (SuNCD-AA), 2021

Metabolic Syndrome Profile	**Yes**		**No**	
	Freq	**%**	**Freq**	**%**

Elevated waist circumference	102	17.0	498	83.0
Elevated triglycerides	216	36.1	382	63.6
Reduced HDL-C	382	63.6	218	36.4
Elevated blood pressure	209	34.8	391	65.2
Elevated blood glucose	26	4.4	574	95.6
Metabolic Syndrome	**146**	**24.3**	**454**	**75.7**

5.6 Association between frequent fast-food consumption and metabolic syndrome

Table 8 presents that in the unadjusted model, frequent fast-food consumers showed 2.75 [COR= 2.75, 95% CI: (1.600, 4.723)] times higher odds (p-value <0.001) of having metabolic syndrome than non-frequent consumers, indicating a statistically significant association. However, after adjusting for potential confounders including demographic factors, lifestyle behaviors, and family medical history, the association turned statistically insignificant [AOR= 1.606, (95% CI: 0.237, 10.889)], p=0.627.

Table 8: Results of multivariable analysis on factors associated with metabolic syndrome among the participants of the Surveillance of Noncommunicable Diseases in Addis Ababa (SuNCD-AA), 2021

	Metabolic syndrome		**COR (95% CI)**	**Adjusted OR* (95%CI)**	**P-Value**
	Yes	**No**			
Fast-food consumption					
Not Frequent	119(22.1%)	419(77.9%)	1	1	
Frequent	27(43.5%)	35(56.5%)	2.749 (1.600, 4.723)	1.606 (0.237, 10.889)	0.627

* Adjusted for age, Sex, education, marital status, smoking, alcohol consumption, chat chewing, physical activity, household income, family history of hypertension and family history of DM

6. Discussion

Fast food, characterized by quick preparation and high content of fat, sugar, salt, and calories (1, 2), has seen a rise in consumption due to its convenience, affordability, and palatability. This trend is further exacerbated by urbanization and increasingly busy lifestyles (79). The prevalence of frequent fast-food consumption in this study was 10.4%, and the prevalence of metabolic syndrome (MetS) was 24.3%.

The prevalence of Metabolic syndrome aligns with global estimates ranging from 20–25% among adults (21). However, the Health and Nutrition Examination Survey conducted in the United States reported a significantly higher prevalence of 41.8%. This discrepancy may be attributed to sociodemographic differences between developed and developing nations, including variations in lifestyle and dietary habits (49).

A systematic review and meta-analysis of studies across Africa reported a pooled MetS prevalence of 32.4%, with a higher prevalence (33.1%) among adults aged >18 years (45). This finding differs from our study as well as from another meta-analysis of sub-Saharan African studies, which estimated a significantly lower pooled prevalence of 17.1%. The discrepancy may be attributed to regional economic disparities, as the southern African region and upper-middle-income economies exhibited the highest burden of MetS. Variations in the study populations' socioeconomic factors likely contribute to these differences (51).

Several studies conducted across Ethiopia report metabolic syndrome (MetS) prevalence rates comparable to our findings. A cross-sectional study in Southern Ethiopia documented a MetS prevalence of 18.5% (52). Another study in northern Ethiopia also reported a rate of 21.8% (53). Similarly, a study in Addis Ababa found an overall prevalence of 20.3%. The findings are consistent across different regions of Ethiopia and suggest relatively uniform MetS distribution patterns nationwide (16).

Existing literature links frequent fast-food consumption to adverse health outcomes, primarily due to its high content of unhealthy fats (trans and saturated) and refined sugars, which contribute to metabolic disorders.

Studies have also established a clear association between regular fast-food intake and weight gain, poor dietary habits, and disruptions in metabolic processes (15).

However, our findings do not align with these established trends. We did not observe a statistically significant association between fast-food consumption and Metabolic Syndrome (MetS). While our initial unadjusted analysis suggested that frequent fast-food consumers had 2.75 times higher odds of MetS, this association lost significance after adjusting for confounders. One potential explanation for the divergence could be variations in the nutritional profiles or consumption patterns among different fast-food types in the study population compared to those in the broader literature. Furthermore, differences in portion sizes and individual dietary habits (e.g., how fast food is integrated into an overall diet) could also play a significant role. For instance, one study conducted in the USA found a significant association. In the study, the following variables were adjusted: dietary intake of total energy (kcal/day), saturated fatty acids (% kcal), unsaturated fatty acids (% kcal), trans-fatty acids (g/day), fiber (g/1000 kcal), and daily servings of fruits, non-starchy vegetables, whole grains, refined grains, and soft drinks, which are not considered in this study except for soft drinks(87). In addition to this the study's power (66.8%) was below the conventional 80% threshold, which may limit the detection of smaller effects. Future research with larger samples could validate these findings.

7. Strengths and Limitations of the Study

7.1. Strengths

The study used a multistage cluster sampling technique to select participants from various sub-cities in Addis Ababa, increasing the representativeness of the sample and improving the generalizability of the findings to the broader population. Additionally, key health indicators such as blood pressure, lipid profiles, and anthropometric measurements were assessed using objective clinical methods rather than self-reported data, thereby minimizing recall bias and increasing the reliability of the results.

7.2. Limitations

This study has some limitations that should be considered during the interpretation of the findings. The cross-sectional design restricts the ability to establish causal relationships between fast food consumption and health outcomes.In this study only frequency of fast-food consumption was assessed using self-reported food frequency questionnaires (FFQs). Although sample size was adequate based on sample size calculation ,it had limited statistical power to show significant association between fast food consumption and metbolic syndrom. And also the study was subject to subject to recall and social desirability biases. Additionally, unmeasured confounding factors, such as genetic predisposition, may have influenced the observed results but were not accounted for in the analysis. These limitations highlight the need for cautious interpretation and suggest directions for future research with more methodologies.

8. Conclusion and Recommendations

8.1 Conclusion

The study provides key insights into metabolic syndrome and fast-food consumption frequency among adults in Addis Ababa. Women had higher rates of overweight, obesity, and elevated waist circumference compared to men, highlighting gender disparities in metabolic risk. While fast-food intake was low (10.4% consumed it once daily or more), sugar-sweetened beverages were the most commonly consumed fast-food items. Metabolic syndrome (MetS) affected 24.3% of participants, with low HDL cholesterol being the most prevalent risk factor. Although frequent fast-food consumption initially appeared linked to MetS, the association weakened after adjustment, suggesting other factors may be more influential.

The findings underscore Ethiopia's growing burden of metabolic disorders, particularly among women. Despite limitations like cross-sectional design and self-reported dietary data, the study calls for targeted interventions to address obesity, poor lipid profiles, and physical inactivity to limit the burden of NCDs. Future research should use longitudinal designs and biomarker-based assessments for deeper insights.

8.2 Recommendations

1. **For the Ministry of Health and the Regional Health Bureau**

- They should strengthen nutritional counseling and education to advocate a healthy diet, especially for high-risk groups.

2. **For Researchers**

- To conduct longitudinal cohort studies to establish causality between fast food and MetS.
- To include rural populations to compare urban vs. rural dietary patterns and differences in metabolic syndrome.

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Annex I: SECONDARY DATA COLLECTION QUESTIONNAIRE

Title of the study: Frequency Fast-food consumption and its association with metabolic syndrome among adults in Addis Ababa, Ethiopia.

Researcher /organization: Kalkidan Wondatir

Purpose of study : This study aims to assess the frequency of fast food consumption and its association with MetS in the adult population of Addis Ababa, contributing to a deeper understanding of the dietary habits influencing public health.

Section 1: source information

1. Source type

- **Government**
- Academic, journal/paper
- Data base (e.g., World Bank, UN, WHO)
- Corporate/Institutional records
- Other

2. Title of source

Association between normal-weight obesity and cardio metabolic risk factors among adults in Addis Ababa, Ethiopia.

Association of fruit and vegetable intake with predicted 10-year cardiovascular disease risk among hypertensive patients in Addis Ababa, Ethiopia: a cross-sectional study.

Evaluating the performance of a novel anthropometric index: weight adjusted for waist-to-height ratio (W-WHR) – for predicting cardio metabolic risk among adults in Addis Ababa .

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3. Author/publisher:Samson Gebremedhin (MPH,PHD)

4. Year of publication

January 2023

28August2023

January 12, 2024

5. URL/Link

https://doi.org/10.21203/rs.3.rs-2479785/v1

doi: 10.1136/bmjopen-2023-075893.

doi: 10.1136/bmjopen-2023-077646

6. Accessibility

- **Publicly available**
- Restricted access
- Requires permission

Section2: Data description

7. Period covered:

From May to June 2021

8. Geographical coverage

- Global
- National (country)
- Regional
- **Local**

9. Data Type

- **Quantitative**
- **Yes**

- Qualitative
- Mixed

Section 3: Reliability assessment

10. Methodology used in original data collection

- **standardized**
- Non- standardized
- Not specified

11. Known biases/limitations

- **known**
- Unknown

Section 4: Intended use

12. How will you use this data?

- **Comparative analysis**
- Trend analysis
- Supporting primary research
- Other

13. Modification required before use?

- Yes
- **No**

Section 5: key variables/parameters used from this source

14. Socio demographic information: respondent's information

No	Question	Choice
1	Age	_____ (99)for unknown
2	Sex	1.Male 2.Female
3	Marital status	1.Single 2.Married 3.Divorced 4.Widowed
4	Education status	1.No formal education 2.Primary 3.Secondary 4.Higher education
5	Occupation	1.Not working 2.Household or domestic 3.Unskilled manual 4.Skilled manual 5.Drriver 6.Petty trade 7.Trade 8.Sales 9.Professional /Technical/Managerial 10.Student 11.Other _____
6	Religion	1.Orthodox Christian 2.Muslim

		3.Protestants 4.Others
7	Household monthly income	———
8	Household individual monthly income	———

15. Lifestyle related factors

1.	Do you Ever smoke a cigarette?	1.Yes 2.No
2.	Do you currently smoke?	1.Yes 2.No
3.	Do you Smoking cigarette daily?	1.Yes 2.No
4.	Did you smoke within the past 30 days?	1.Yes 2.No
5.	Passive smoking in the past 30 days	1.Yes 2.No
6.	Do you Consumed any alcohol such as beer, wine, spirits, Tella, Tej or other local alcohols in the past 12 months ?	1.Yes ,if yes go to Q8 2.No
7.	During the past 12 months, how frequently have you had at least one standard alcoholic drink? alcohol?	1."Daily." 2."5-6days per week." 3."3-4 days per week." 4. "1-2days per week" 5.".1-3 days per week." 6. "Less than one month."
8.	Have you consumed any alcohol within the past 30 days?	1.Yes 2.No
9.	Ever chewed a chat?	1.Yes

		2.No
10.	Do you Currently chewing chat?	1.Yes 2.No
11.	Level of total physical activity	1.High 2.Moderate 3.Low
12.	Have you the problem of excessive sleepiness?	1.Yes 2.No
13.	Having the problem of excessive sleepiness	1.Yes 2.No
14.	Sleep quality over the last 1 month	1.very good 2.good 3.average 4.poor 5.very poor
15.	Do you have family history of hypertension?	1.Yes 2.No
16.	Do you have family history of diabetes?	1.Yes 2.No

16. Fast food consumption frequency questionnaire

S. No	Food item	Frequency
1.	Sugar-sweetened beverages/energy drinks	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month

		10. Never or < once/ month
2.	Chocolate or sweet spreads	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
3.	store-bought ice cream	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
4.	Fruit juice(preserved)	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week

		6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
5.	deep-fried foods(e.g. French fries, chicken fries)	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
6.	Burgers or sandwiches	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
7.	Store –bought Pizza	1. Everyday 2. 2-3/day 3. 4 or more/day

		4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
8.	Chips	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
9.	Store –bought Pastries or sweet bread	1. Everyday 2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month
10.	Cookies or biscuits	1. Everyday

		2. 2-3/day 3. 4 or more/day 4. Once/ week 5. Twice/ week 6. 3-4/ week 7. 5-6/ week 8. 1/month 9. 2-3/ month 10. Never or < once/ month

17. Anthropometric measurement and metabolic syndrome profile of participant

S.No	Variable	Response Category
1.	Systolic_B/P average	
2.	Diastolic_B/P average	
3.	Elevated Blood pressure	1. 1.Yes 2. 2.No
4.	Elevated Blood sugar	1. 1.Yes 2. 2.No
5.	LDL categorized	1. Normal 2. Elevated
6.	Triglycerides categorized	1. Normal 2. Elevated
7.	HDL categorized	1. Borderline or desirable 2. At risk
8.	Cholesterol categorized	1. Normal 2. Elevated
9.	Waist to hip ratio -- categorized	1. Normal (<0.90 cm (M); <0.85 cm (W))

		2. Substantially increased (0.90 cm (M); 0.85 cm (W))
10.	BMI -- categorized	1. Underweight (< 18.5) 2. Normal (18.5 – 24.9) 3. Overweight (25.0 – 29.9) 4. Obese (>= 30)
11.	Waist circumference categorized	1.Normal (Male < 94 cm and Female < 80 cm) 2.Increased risk (Male 94-102 cm and Female 80-88 cm) 3.Greatly increased risk (Male > 102 cm and Female > 88 cm)

Annex II:የሁለተኛ ደረጃ መረጃ መሰብሰቢያ መጠይቅ

የጥናቱ ርዕስ: ፈጣን ምግብ ድግግሞሽ ፍጆታ እና ከሜታቦሊክ ሲንድሮም ጋር ያለው ግንኙነት በአዲስ አበባ፣ ኢትዮጵያ ውስጥ በአዋቂዎች መካከል

ተመራማሪ/ድርጅት :ቃልኪዳን ወንዳትር

የመረጃ አሰባሰብ ዓላማ:ይህ ጥናት የፈጣን ምግብ አጠቃቀምን ድግግሞሽ እና ከሜታቦሊክ ሲንድሮም ጋር ያለው ግንኙነት ጋር በአዲስ አበባ ጎልማሳ ህዝብ ውስጥ ያለውን ግንኙነት ለመገምገም ያለመ ሲሆን ይህም በህብረተሰብ ጤና ላይ ተጽእኖ ስላላቸው የአመጋገብ ልምዶች ጠለቅ ያለ ግንዛቤ እንዲኖር አስተዋጽኦ ያደርጋል።

ክፍል 1፡ የምንጭ መረጃ

1.ምንጭ አይነት

- ***መንግስት***
- **ትምህርታዊ፣ ጆርናል/ወረቀት**
- **ዳታ ቤዝ (ለምሳሌ፡ የዓለም ባንክ፣ UN፣ WHO)**
- **የድርጅት/ተቋማዊ መዛግብት**
- **ሌላ**

2.**የምንፈጩ ርዕስ**

በአዲስ አበባ፣ ኢትዮጵያ ውስጥ በአዋቂዎች መካከል በመደበኛ-ክብደት ውፍረት እና የካርዲዮ ሜታቦሊዝም አደጋዎች መካከል ያለው ግንኙነት።

የአትክልትና ፍራፍሬ ቅበላ ማህበር ከ 10 ዓመት የሚቆይ የልብና የደም ቧንቧ በሽታ ተጋላጭነት በአዲስ አበባ ፣ ኢትዮጵያ ውስጥ የደም ግፊት ህመምተኞች አደጋ ተጋላጭነት - ክፍል-ተኮር ጥናት።

የልብ ወለድ አንትሮፖሜትሪክ መረጃ ጠቋሚ አፈጻጸምን መገምገም፡ ክብደት ከወገብ እስከ ቁመት ሬሾ (W-WHR) የተስተካከለ - በአዲስ አበባ ውስጥ በአዋቂዎች ላይ የካርዲዮ ሜታቦሊዝም ስጋትን ለመተንበይ።

3.ደራሲ/አሳታሚ:ዶር.ሳምሶን ገብረመድን

4.የህትመት ዓመት

ጥር 2023

ነሐሴ 28 ቀን 2023

ጥር 12 ቀን 202 3

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6.ተደራሽነት

- በይፋ የሚገኝ
- የተገደበ መዳረሻ
- ፈቃድ ያስፈልገዋል

ክፍል 2፡ የውሂብ መግለጫ

7.የተሸፈነው ጊዜ፡-

ከግንቦት እስከ ሰኔ 2021

8. ጂኦግራፊያዊ ሽፋን

- ዓለም አቀፍ

- ሀገር አቀፍ (ሀገር)
- ክልላዊ
- **አካባቢያዊ**

9. የውሂብ አይነት

- **ቁጥራዊ**
- ጥራት ያለው
- ድብልቅ

ክፍል 3፡ የአስተማማኝነት ግምገማ

10.በመጀመሪያው የመረጃ አሰባሰብ ላይ ጥቅም ላይ የዋለው ዘዴ

- **መደበኛ**
- መደበኛ ያልሆነ
- ያልተገለጸ

11.የታወቁ አድልዎዎች/ገደቦች

- **አዎ**
- አይ
- አይታወቅም

ክፍል 4፡ የታቀደ አጠቃቀም

12.ይህንን ውሂብ እንዴት ይጠቀማሉ?

- **የንጽጽር ትንተና**
- የአዝማሚያ ትንተና
- ዋና ምርምርን መደገፍ
- ሌላ

13.ከመጠቀምዎ በፊት ማሻሻያ ያስፈልጋል?

- አዎ
- **አይ**

ክፍል 5፡ ከዚህ ምንጭ የተገኙ ቁልፍ ተለዋዋጮች/መለኪያዎች

14. ማህበራዊ የስነ-ህዝብ መረጃ፡ ምላሽ ሰጪው መረጃ

ተ.ቁ	ጥያቄ	ምርጫ
1	ዕድሜ	———— (99) ለማይታወቅ
2	ጾታ	1.ወንድ 2.ሴት
3	የጋብቻ ሁኔታ	1. ያላገባ 2. ያገባ 3. የተፋታ 4. የሞተባት
4	የትምህርት ሁኔታ	1. መደበኛ ትምህርት የሌለው 2. የመጀመሪያ ደረጃ 3. ሁለተኛ ደረጃ 4. ከፍተኛ ትምህርት
5	ሥራ	1. የማይሰራ 2. የቤት ውስጥ ወይም የቤት ውስጥ 3. ያልተማረ የጉልበት ሥራ 4. የተማረ የጉልበት ሥራ 5. ሹፌር 6. ጥቃቅን ንግድ 7. ንግድ 8. ሽያጭ 9. ሙያዊ /ቴክኒካል/አስተዳዳሪ 10. ተማሪ 11. ሌላ
6	ሃይማኖት	1. ኦርቶዶክስ ክርስቲያን 2. ሙስሊም 3. ፕሮቴስታንቶች 4. ሌሎች

7	የቤተሰብ ወርሃዊ ገቢ	_____
8	የቤተሰብ ግለሰብ ወርሃዊ ገቢ	_____

15.የአኗኗር ዘይቤ

9	ሲጋራ አጨስ ያውቃሉ?	1. አዎ 2. አይ
10	በአሁኑ ጊዜ ያጨሳሉ?	1. አዎ 2. አይ
11	በየቀኑ ሲጋራ ያጨሳሉ?	1. አዎ 2. አይ
12	ባለፉት 30 ቀናት ውስጥ ሲጋራ አጨሰዋል?	1. አዎ 2. አይ
13	ባለፉት 12 ወራት ውስጥ እንደ ቢራ፣ ወይን፣ መጠጥ፣ ጠላ፣ ጠጅ ወይም ሌሎች የአካባቢ አልኮልች ያሉ አልኮል ጠጥተው ያውቃሉ?	1. አዎ፣ አዎ ከሆነ ወደ Q8 ይሂዱ 2. አይ
14	ባለፉት 12 ወራት ውስጥ ቢያንስ አንድ መደበኛ የአልኮል መጠጥ ምን ያህል ጊዜ ወስደዋል? አልኮል?	1. "በየቀኑ።" 2. "በሳምንት 5-6 ቀናት።" 3. "በሳምንት 3-4 ቀናት።" 4. "በሳምንት 1-2 ቀናት" 5. ".በሳምንት 1-3 ቀናት።" 6. "በወር ከአንድ ጊዜ ያነሰ።"
15	ባለፉት 30 ቀናት ውስጥ አልኮል ጠጥተው ያውቃሉ?	1. አዎ 2. አይ

16	ጫት ቅመው ያውቃሉ/ቅመሽ ያውቃሉ?	1. አዎ 2. አይ
17	በአሁኑ ሰዓት ጫት ይቅማሉ/ይቅሙ ኖሯል?	1. አዎ 2. አይ
18	የአካል ብቃት እንቅስቃሴዎን ደረጃ እንዴት ይገመግማሉ?	1. ከፍተኛ 2. መካከለኛ 3. ዝቅተኛ
19	ከመጠን ያለፈ እንቅልፍ የመተኛት ችግር አለብዎት?	1. አዎ 2. አይ
20	የደም ግፊት በሽታ የቤተሰብ ታሪክ አለዎት?	1. አዎ 2. አይ
21	የስኳር በሽታ የቤተሰብ ታሪክ አለዎት?	1. አዎ 2. አይ
22	ባለፈው አንድ ወር ውስጥ የእንቅልፍዎን ጥራት እንዴት ይገልጹታል?	1. በጣም ጥሩ 2. ጥሩ 3. አማካይ 4. ደካማ 5. በጣም ደካማ

16. ፈጣን የምግብ ፍጆታ ድግግሞሽ መጠይቅ

ተ.ቁ	የምግብ አይነት	ድግግሞሽ
1	በስኳር የበለፀጉ መጠጦች/የኃይል መጠጦች	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት

		7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
2	ቸኮሌት ወይም ጣፋጭ ስርጭቶች	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
3	በሱቅ የተገዛ አይስክሬም	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
4	የፍራፍሬ ጭማቂ (የተጠበቀ)	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ

		5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
5	ጥልቅ የተጠበሱ ምግቦች (ለምሳሌ የፈረንሳይ ጥብስ፣ የዶሮ ጥብስ)	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
6	በርገር ወይም ሳንድዊች	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞድራሽ ወይም < በወር አንድ ጊዜ
7	በሱቅ የተገዛ ፒዛ	1. በየቀኑ 2. 2-3/ቀን

		3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞራሽ ወይም < በወር አንድ ጊዜ
8	ቺፕስ	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞራሽ ወይም < በወር አንድ ጊዜ
9	በሱቅ የተገዛ መጋገሪያ ወይም ጣፋጭ ዳቦ	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞራሽ ወይም < በወር አንድ ጊዜ

10	ኩኪዎች ወይም ብስኩቶች	1. በየቀኑ 2. 2-3/ቀን 3. 4 ወይም ከዚያ በላይ/ቀን 4. በሳምንት አንድ ጊዜ 5. በሳምንት ሁለት ጊዜ 6. 3-4/ሳምንት 7. 5-6/ሳምንት 8. 1/ወር 9. 2-3/ወር 10. በሞራሽ ወይም < በወር አንድ ጊዜ

17.የአንትሮፖሜትሪክ መለኪያ እና የተሳታፊዎች ሜታቦሊክ ሲንድሮም መገለጫ

1	ሲስቶሊክ(mmHg)	
2	ዲያስቶሊክ(mmHg	
3	ከፍ ያለ የደም ግፊት	1. አዎ 2. አይ
4	ከፍ ያለ የደም ስኳር	1. አዎ 2.አይ
5	አሰናዳዊ ኮሌስትሮል (መጥፎ ኮሌስትሮል)ደረጃ	1.መደበኛ 2. ከፍተኛ
6	(የደም ስኳር እና ስብ)ደረጃ	1.መደበኛ 2. ከፍተኛ
7	ጥሩ ኮሌስትሮልደረጃ	1.መካከለኛ ደረጃ 2.አደጋ ላይ
8	ኮሌስትሮልደረጃ	1.መደበኛ

		2. ከፍተኛ
9	የወገብ ዙርያ	1.መደበኛ (ወንድ < 94 cm , ሴት< 80 cm) 2.የአደጋ ከፍ ያለ ደረጃ (ወንድ 94-102 cm ,ሴት 80-88 cm) 3.እጅግ ከፍተኛ የአደጋ ደረጃ (ወንድ > 102 cm, ሴት > 88 cm)
10	አካል መመዘኛ መጠን(ቢ.ኤም.አይ) ደረጃ	1.ከታች ክብደት (ከ18.5 በታች) 2.መደበኛ (18.5 — 24.9) 3.ተጨማሪ ክብደት (25.0 — 29.9) 4.ከፍተኛ ክብደት (30 እና ከዚያ በላይ)
11	ወገብ እና ዳሌ ጥምርታ	1.መደበኛ (<0.90 cm (ወንድ); <0.85 cm (ሴት)) 2.በጣም ከፍተኛ(<0.90 cm (ወንድ); <0.85 cm (ሴት))

Annex III: Ethical Clearance

ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES (IRB)
አዲስ አበባ ዩኒቨርሲቲ ጤናሳይንስ ኮሌጅ
Institutional Review Board

ANNEX 3
Form AAUMF 03-008

IRB's Decision

Meeting No: 11/2020 Meeting Date: November 25,2020
Protocol number: 109/20/SPH

Protocol Title: Non-communicable diseases in Addis Ababa, Ethiopia: Epidemiology, economic burden and multisectoral response	
Principal Investigator:	**Dr. Samson Gebremedhin**
Institute:	College of Health Sciences, AAU
Elements Reviewed (AAUMF 01-008)	☑ Attached ☐ Not attached
Review of Revised Application ☐ Yes ☐ No	Date of Previous review:
Decision of the meeting:	☑Approved ☐Approved with Recommendation ☐Resubmission ☐ Disapproved

I. Elements approved-
1. Protocol Version No: 3
2. Protocol Version Date:
3. Informed consent Version No. 3
4. Informed Consent Version Date:

II. Obligations of the PI-
1. Should comply with the standard international & national scientific and ethical guidelines
2. All amendments and changes made to protocol and consent form needs IRB approval
3. The PI should report SAE within 10 days of the event
4. End of the study, including manuscripts and thesis works should be reported to the IRB
5. The PI should report non-compliance and unanticipated events

III. TO NERC ☐

Institution Review Board (IRB) Approval: Period from: March 16, 2021 to March 15, 2022
Follow up report expected in
3 Months ___ 6 months ___ 9 months ✓ one year ___

Chairperson, IRB
Dr. Adamu Addissie
Signature
Date: March 16,2021

አዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
City Government of Addis Ababa Health Bureau

Ref.N.o. [illegible]
Date 01/12/13

TO:

- Gulelle Sub-city Health Office
- Bole Sub-city Health Office
- Yeka Sub-city Health Office
- Lideta Sub-city Health Office
- Arada Sub-city Health Office
- Akaki Kality Sub-city Health Office
- Addis Ketema Sub-city Health Office
- Kirkos Sub-city Health Office
- Nifas Silk Lafto Sub-city Health Office
- Kolfe Keranio Sub-city Health Office

Subject: Request to access Facilities to conduct approved research

This letter is to support **Samson Gebremedhin (PhD)** of "**Non-communicable diseases in Addis Ababa, Ethiopia: Epidemiology, economic burden and multisectoral response** "The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, and the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required. Therefore we request the facility and staffs to provide support to the principal investigator.

With Regards

Ethical Clearance Committee

Cc

- **Samson Gebremedhin (PhD)**
- **To Ethical Clearance Committee**

Annex IV: Approval form

ASSURANCE OF PRINCIPAL INVESTIGATOR

(USE THE FOLLOWING IN ONE PAGE)

I, the undersigned agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide timely progress report to my advisors and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely to my advisors and all stakeholders involved in the study including any source of funding for this research.

Name of the student: Kalkidan Wondatir

Date: 25/11/2023

Signature: _____

Approval of the primary Advisor

Name of the primary advisor: Dr.Gudina Egata

Date: _____

Signature: _____

Annex V: Curriculum Vitae (CV)

1. Personal Information

- Name: Kalkidan Wondatir
- Sex: Female
- Age: 25
- Date of birth: April 21, 1990 E.C
- Place of birth: Filakit, N/Wollo, Ethiopia.
- Profession: **BSc. in Human Nutrition**
- Marital Status: Married
- Nationality: Ethiopian
- **Phone Number**: +251-976-08--14-61
- **Email**: kalkidanwondatir19@gmail.com

2. Language

Language	Speaking	Reading	Writing	Listening
Amharic	Excellent	Excellent	Excellent	Excellent
English	Very good	Excellent	Very good	Very good

3. Educational Background

September 2010 – January 2014 E.C: Attending a degree program at koteba metropolitan University Bachelor of Science (BSC) in human nutrition with GPA 3.97.

September 2006 - June 2007 E.C: at Filakit secondary school.

September 2008 -June 2009 E.C: at Filakit preparatory school.

October 2022-until now –am attending my post graduate class in MPH, nutrition, in Addis Ababa University.

4. Education Qualification

- Field of study: **BSc. in Human nutrition**
- Cumulative grade point: **3.97.**

5. Computer Skill

Basic computer skills: - excellent at Microsoft office (word, excel, power point)

6. Work Experience

I was working as Graduate assistance II for 10 month at Menilick II medical and health science collage (From Nov 9,2014- , Aug,30,2014EC).

7. Hobbies:

- ✓ Reading books.
- ✓ Listening to music.
- ✓ Watching moves.

8. References

Amanual Nana: M.Sc., Lecturer and department head of Human nutrition in Menilick II medical and health science collage.

Cell phone: +251-916-667-775

Primary Advisor

SHORT CURRICULUM VITAE

1. Identification: Gudina Egata (Associate Professor, PhD)

Citizen: Ethiopian

Institution: Department of Nutrition& Dietetics, School of Public Health, College of Health Sciences, Addis Ababa University, Ethiopia

Address: Mobile (+251) 911-64-13-62

E-mail fenetg@gmail.com or gudina.egata@aau.edu.et

2. Educational Qualification

- 2014: PhD in Public Health , Haramaya University and Addis Continental Institute of Public Health PhD Joint Program PhD Dissertation Topic: Acute Child Malnutrition in Eastern Ethiopia: Magnitude, seasonal variation and predictors
- 2003-2005: Master's Degree in Public Health, Department of Community Heath, Addis Ababa University, Addis Ababa, Ethiopia Master's Thesis Title: Level of knowledge of Reproductive Health and sexual behavior among adolescents in Nekemte town, 2005
- 1989-2001: BSc degree in Public Health, Department of Community Health Program, Jimma University, Jimma, Ethiopia. Research Title: Determinants of Expanded Program on Immunization (EPI) coverage in Yebu town, Jimma zone, 2001.
- 1987-1989: Diploma in Comprehensive Nursing with distinction, Gondar College of Medical Sciences, Gondar, Ethiopia.

3. Professional Experience and Positions Held

- Head, Department of Nutrition & Dietetics , School of Public Health ,College of Health Sciences ,Addis Ababa University since October 2021.
- Associate Professor and Researcher, School of Public Health, Department of Nutrition& Dietetics , Addis Ababa University since August 2019

- Lecturer and Associate Professor, School of Public Health, Haramaya University, Ethiopia and Associate Director, Post-graduate program coordinator- Nov 2017 – Aug 2019
- Lecturer and Assistant professor of public Health, College of Health and Medical Sciences, Haramaya University, and Associate Director, Post-graduate program coordinator-Dec 2013 – Nov 2017
- Lecturer, HIV and AIDS Pre-service Training Focal Person, Faculty of Health Sciences, Secretary of Academic Commission of Faculty of Health Sciences, Haramaya University-Dec 2005 – Jan 2014 Graduate Assistant II and Assistant lecturer-College of Health and Medical Sciences, Haramaya University Sep 2001 – Dec 2005.
- Nekemte School of Nursing, Eastern Wollega Zonal Health Bureau Instructor-Dec 1996 – Aug 1998.
- District Health Manager, Planning, organizing, monitoring and evaluating Woreda's health activities Eastern Wollega Zonal Health Bureau Aug 1996 – Nov 1996
- Staff nurse, Maternal & Child Health (MCH) Coordinator, Treatment and care of patients, Coordinating MCH activities, Eastern Wollega Zonal Health Bureau - Mar. 1989 – Sep. 1989.

4. Project experience

- From December 2022 to present Consultancy work with Frontier for world Food program(WFP) serving as Principal Investigator (PI) of "Developing Social and Behavioral Change Communication (SBCC) Strategy for WFP Ethiopia Strategic Plan " which is in its final phase (project closure phase).
- From July 2023 to present consultancy work with Frontier for UNICEF and UNFPA serving as Principal Investigator (PI) of "Strengthening Federal and Regional Levels Monitoring, Evaluation and Learning (MEL) system for the prevention of harmful practices and violence against children (VAC) in Ethiopia."
- Leadership, Management and Governance (LMG) practices and associated factors among Primary Health Care Managers in Selected areas of Eastern Ethiopia- 2017

- 2018 by international Institute for Primary Health Care – Ethiopia as Principal investigator(PI)

- Consultancy work for John Snow International (JSI) Ethiopia in collaboration with Addis Continental Institute of Public Health. An Analysis of the Core Functions, Issues and Challenges of Human Resource Management (HRM) for Urban Health Extension Professionals (UHE-ps) as co-investigator, 2014.
- Mini Project used to identify predictors of acute child under nutrition in selected districts of eastern Haragehe zone, Eastern Ethiopia 2010/11 by Care Ethiopia as Principal Investigator (PI).
- Consultancy work for Ethiopian Catholic church as Team Leader for Capacity building training for health managers working in Ethiopian Catholic Health Facilities,2010/11

5. Publication of Articles:

More than 70 publications on the international peer reviewed journal as Author and Coauthor

6. Association's Memberships

- Ethiopian Public Health Associations (EPHA) since 2001 to present.
- Food and Nutrition Society (FONSE), Ethiopia since 2015.