



**St. Paul's Hospital Millennium Medical College**

**School of Public Health**

**Prevalence of Higher Body Mass Index and its Associated Factors among  
Type 2 Diabetes Mellitus Patients attending follow up clinic at St. Paul's  
Hospital Millennium Medical College in, Addis Ababa.**

**By Sara Birhanu (BSc)**

**Addis Ababa, Ethiopia**

**August, 2022**



**St. Paul's Hospital Millennium Medical College**

**School of public health**

**Prevalence of Higher Body Mass Index and its Associated Factors among Type 2 Diabetes Mellitus Patients attending follow up clinic at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, 2022.**

**By Sara Birhanu (BSc)**

**Advisors: Dr Takele Menna (Associate Professor of Public Health)**

**Mrs. Fatimetu Mohammed, MPH**

**A Thesis submitted to the School of Public Health, St. Paul's Hospital Millennium Medical College in Partial Fulfillments of the Requirements for the Degree of Master of Public Health in Nutrition**

**Addis Ababa, Ethiopia**

**August, 2022**

## **ACKNOWLEDGEMENTS**

I am very grateful to my advisors Dr Takele Menna and Mrs. Fatimetu Mohammed for their valuable advice and guidance throughout the whole stages of this thesis work and also St. Paul's Hospital Millennium Medical College, School of public health for offering the chance to conduct this thesis. Additionally, I acknowledge data collectors and supervisors for their great commitment and study participants. Finally my special thanks go to the administration staff of St Paul's Hospital Millennium Medical College for their friendly support that helped for the success of this study.

# TABLE OF CONTENTS

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| ACKNOWLEDGEMENTS .....                                                             | i  |
| TABLE OF CONTENTS .....                                                            | ii |
| LISTS OF TABLES .....                                                              | iv |
| LIST OF FIGURES .....                                                              | v  |
| LIST OF ACRONYMS AND ABBREVIATIONS .....                                           | vi |
| 1. INTRODUCTION.....                                                               | 1  |
| 1.1. Background .....                                                              | 1  |
| 1.2. statement of the problem.....                                                 | 2  |
| 1.3. Rationale or Significance of the study.....                                   | 4  |
| 2. Literature Review .....                                                         | 6  |
| 2.1. Prevalence of Higher Body Mass Index .....                                    | 6  |
| 2.2. Factors associated with higher body mass index among type 2 DM Patients ..... | 8  |
| 2.2.1. Socio demographic factors associated with higher body mass index .....      | 8  |
| 2.2.2. Behavioral factors associated with high body mass index.....                | 9  |
| 2.2.3. Knowledge of high body mass index.....                                      | 9  |
| 2.2.4. Clinical factors associated with high body mass index .....                 | 10 |
| 2.2.5. Institution/service-related factors.....                                    | 10 |
| 2.3. Conceptual frame work .....                                                   | 12 |
| 3. Objectives of the Study .....                                                   | 13 |
| 3.1. General Objective .....                                                       | 13 |
| 3.2. Specific Objectives .....                                                     | 13 |
| 4. Materials and Method .....                                                      | 14 |
| 4.1. Study setting and Period.....                                                 | 14 |
| 4.2. Study Design .....                                                            | 15 |
| 4.3. Population.....                                                               | 15 |
| 4.3.1. Source population .....                                                     | 15 |
| 4.3.2. Study population .....                                                      | 15 |
| Eligibility criteria .....                                                         | 15 |
| 4.3.3. Inclusion criteria .....                                                    | 15 |
| 4.4. Study Variables .....                                                         | 15 |
| 4.4.1. Dependent variables.....                                                    | 15 |
| 4.4.2. Independent variables.....                                                  | 15 |
| 4.5. Measurement and Data Collection Method .....                                  | 16 |

|        |                                                          |    |
|--------|----------------------------------------------------------|----|
| 4.5.1. | Sample size determination.....                           | 16 |
| 4.5.2. | Sampling technique.....                                  | 17 |
| 4.5.3. | Data collection procedures .....                         | 17 |
| 4.6.   | Data Quality Assurance.....                              | 19 |
| 4.7.   | Operational Definitions .....                            | 20 |
| 4.8.   | Data Analysis and Interpretation .....                   | 21 |
| 4.9.   | Ethical Consideration .....                              | 22 |
| 5.     | RESULT.....                                              | 23 |
| 6.     | DISCUSSION .....                                         | 34 |
| 7.     | CONCLUSION .....                                         | 38 |
| 8.     | RECOMMENDATIONS.....                                     | 39 |
| 9.     | References.....                                          | 41 |
| 10.    | Annexes .....                                            | 44 |
|        | Annex i. Participant’s information sheet .....           | 44 |
|        | Annex ii. Informed consent .....                         | 45 |
|        | Annex iii: Data collection form of English version ..... | 46 |
|        | Aneex v: Amharic version of consent form .....           | 55 |
|        | Annex vi: Amharic version of questionnaire.....          | 56 |
| 11.    | STATEMENT OF THE AUTHOR.....                             | 64 |

## LISTS OF TABLES

|                                                                                                                                                                                                                                                        |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Table 1:</b> Socio demographic characteristics of type 2 DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).....                                                          | 24 |
| <b>Table 2:</b> Knowledge of Type 2 DM Patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College towards higher body mass index , Addis Ababa Ethiopia, 2022.(n=410 ).....                                                 | 25 |
| <b>Table3:</b> Dietary practice of type 2 DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022. (n=410).....                                                                           | 26 |
| <b>Table4:</b> Clinical factors associated with high body mass index among type 2 DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).....                                    | 28 |
| <b>Table5:</b> Distribution of high body mass index by socio demographic factors among type two DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).....                      | 30 |
| <b>Table 6:</b> Bivariable and multivariable analysis of factors associated with high body mass index Among type two DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410)..... | 32 |

## LIST OF FIGURES

Figure 1 Conceptual frame work for the study to assess the prevalence of higher body mass index and its associated factors among type 2 diabetes patients inSt. Paul’s Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2022.....12

**Figure 2:** Body mass index category of type two diabetes mellitus patients attending follow-up clinic at St. Paul’s Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).....29

## LIST OF ACRONYMS AND ABBREVIATIONS

|               |                                                         |
|---------------|---------------------------------------------------------|
| <b>BMI</b>    | Body Mass Index                                         |
| <b>CHD</b>    | Coronary Heart Disease                                  |
| <b>CDC</b>    | Center for Disease Control and Prevention               |
| <b>CESSDS</b> | Center for Epidemiologic Studies Short Depression Scale |
| <b>CSA</b>    | Central Statistical Agency                              |
| <b>DM</b>     | Diabetes Mellitus                                       |
| <b>DHS</b>    | Demographic Health Survey                               |
| <b>IDF</b>    | International Diabetes Federation                       |
| <b>LEADER</b> | Liraglutide Effect and Action in Diabetes               |
| <b>OPD</b>    | Outpatient Department                                   |
| <b>SNNPR</b>  | Southern Nations Nationalities Region                   |
| <b>SPHMMC</b> | St. paul's hospital millennium medical college          |
| <b>SPSS</b>   | Statistical Package for Social Sciences                 |
| <b>STEPS</b>  | Step Wise Surveillance                                  |
| <b>WC</b>     | Waist Circumference                                     |
| <b>WHO</b>    | World Health Organization                               |
| <b>WHR</b>    | Waist-To-Hip Ratio                                      |

## ABSTRACT

**Background:** High body mass index in type 2 diabetes mellitus patients has been known to cause adverse impacts in the treatment and prevention of its likely complications. According to the World Health Organization, the number of patients with Type 2 diabetics in Ethiopia was estimated as 800,000 in 2000 and projected to be about 1.8 million by the year 2030.

**Objective:** To assess the prevalence of High body mass index and its associated factors among patients with type 2 diabetes mellitus attending the follow up clinics at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, 2022.

**Methods:** A hospital based cross sectional study was conducted from May 21, 2022 up to June 21, 2022 among type 2 diabetes mellitus patients who are attending diabetic clinic at St. Paul's Hospital Millennium Medical College. Systematic random sampling technique was used. Structured questionnaire and anthropometric measures were employed to collect the data. Binary and Multivariable logistic regression analysis models were used to determine the relationship of each independent variable with the dependent variable. Statistical significance was determined at the  $p\text{-value} < 0.05$ . Strength of association was described by adjusted odds ratio.

**Result:** Among the total 410 study participants, the prevalence of high body mass index was 64.9 % (95%CI: 58.9, 69.5). As the findings of this study revealed factors which were significantly associated with high body mass index were female gender (AOR: 2.788, 95%CI: 1.620, 4.798), those who attended higher education (AOR: 6.396, CI: 2.177, 18.788), those who sometimes uses walking on foot for transportation (AOR: 5.367, CI: 2.409, 11.959) and central obesity (AOR: .024, CI: .010, .058).

**Conclusion:** The prevalence of high body mass index was found to be very high among type 2 diabetes mellitus patients in the study area. Thus, an effective management of high body mass index aimed at bringing towards normal body weight through organized programs including nutrition and physical activity education and training can have significant role in preventing the associated further complications in diabetic patients.

**Key words:** High body mass index, Type 2 diabetes mellitus, Factors associated, Ethiopia

# 1. INTRODUCTION

## 1.1. Background

High body mass index is defined as a body mass index (BMI) of 25.0 kg/m<sup>2</sup> or above, represent progressive buildup of adipose tissue to levels that damage the physical and psychosocial health and well-being of an individual (1).

Globally over the past decade it has been known that the prevalence of type 2 diabetes is increasing alarmingly and exacerbated by the global rise in the prevalence of high body mass index. It is predicted that there will be at least 350 million people in the world with type 2 diabetes by the year 2030, unless appropriate measures taken(2). Worldwide, the proportion of adults with a BMI of 25 kg/m<sup>2</sup> or greater increased between 1980 and 2013 from 28.8 to 36.9% in males, and from 29.8 to 38.0% in females(3).

More than 2.6 million adults in Ethiopia are living with type 2 diabetes mellitus (T2DM). Ethiopia is the leading country in Africa in terms of the absolute number of individuals diagnosed with each type of diabetes(4). WHO estimates the number of Type 2 diabetics in Ethiopia to be approximately 800,000 in 2000 and projected that it would increase to approximately 1.8 million by the year 2030(5).

The development of Higher Body mass index is dependent on an imbalance between energy intake and energy expenditure during prolonged time. Although influenced by genetics, the current obesity epidemic appears to be driven principally by behavioral and environmental factors. Lifestyle factors, including high-energy diets and lack of physical activity, are the greatest contributors to the energy imbalance that causes obesity. Body mass index is the most commonly used indicator of obesity today (6-8).

Diabetes patients with high body mass index had a twofold greater relative risk of mortality than normal-weight patients (9). Patients having high body mass index also develops insulin resistance and metabolic syndrome whose other components besides hyperglycemic are hypertension, dyslipidemia, pro-inflammatory and pro-thrombotic state(10). Moreover, the presence of High body mass index among type 2 diabetes patients increases the risk of mortality from cardiovascular disease (11).

Higher Body Mass Index is an important modifiable risk factor for diabetes. Reducing the Prevalence of Higher Body Mass Index will lead to an improvement in the medical performance of diabetic patients (12). On type 2 DM patients, an increase in BMI results in severe obesity and associated complications than on healthy person. There is a seven times more risk of diabetes related health risks in individuals who weigh too much compared to those with normal weight (13).

A combination of diet and exercise has been proven more effective in regulating blood sugar more than diabetic medications do. The determinant factors for increased Prevalence of higher body mass index among type 2 DM were residence area, alcohol consumption, low level physical activities, duration of DM, central obesity and dietary intake. Using Waist circumference (WC) in conjunction with BMI would be useful for better diagnosis and early detection of type 2 DM patients with High body mass index(14, 15).

A few studies indicate that up to half of type 2 diabetes patients are affected by higher body mass index, with magnitude varying according to age and setting; 85% in Tanzania(16)and 27.4%–83% in Nigeria(16).

## **1.2. statement of the problem**

Now an epidemic, and arguably the most preventable cause of mortality and morbidity second to cigarette smoking is High body mass index. (17)Globally, over 300 million and 1.1 billion cases of adult obesity and overweight respectively are reported annually(18).The National demographic health survey (DHS) survey conducted in 2016 report showed that in the urban areas of Ethiopia 21% of women and 12% of men; and in Addis Ababa city 30% of women and 20% of men, were either overweight or obese(19).

Study conducted in Hosanna, south Ethiopia shows that the Prevalence of higher body mass index was very high. This study showed that 35.9% of the type 2 DM patients were having High body mass index. Of whom 31.5% were overweight and 4.4% were obese(14). Similar study conducted in Mekelle shows that Prevalence of High body mass index among type 2 diabetes is 40.8(20).

Higher body mass index have been associated with profound health consequences including hypertension, hyperglycemia, dyslipidemia, coronary artery disease, cardiovascular diseases,

cerebrovascular diseases, osteoarthritis, gallbladder diseases, respiratory tract diseases as well as psychological and emotional distress(8, 21). Higher body mass index has further been linked with poor control of blood pressure, cholesterol and blood glucose levels among individuals with type 2 diabetes(22). High body mass index in high cardiovascular risk patients with Type 2 DM is related to the major cardio metabolic risk factors. Furthermore, treatment intensity, like insulin, statins or oral antihypertensive drugs, is higher in those with high body mass index; while Blood Pressure and lipid control in these patients are remarkably suboptimal(23). It does interfere with not only effective treatment of hyperglycemia, but also hypertension and dyslipidemia cardiovascular disease, cerebrovascular disease, hyperlipidemia and increased incidence of arthritis of the hands and knees, gallbladder disease, and sleep apnea(24). High body mass index independently increased the risk of Coronary heart disease in patients with type 2 diabetes. The Coronary heart disease risk was higher with increasing BMI than with stable or decreasing BMI(25).

Prescriptions spending for community-dwelling Medicare beneficiaries found that annual drug spending was significantly higher for Medicare beneficiaries with high body mass index compared to normal-weight beneficiaries. Individuals with high body mass index also had higher utilization rates of selected medications for diabetes, hypertension, ischemic heart, cardiac failure, hyperlipidemia, and osteoarthritis(26).

In presence of much evidence that reversal of obesity generally is difficult and long-term success rates are low, strategies to reduce obesity are essential and potentially more simpler than obesity treatment regimens for controlling the current obesity epidemic(8).

A combination of diet and exercise has been proven more effective in regulating blood sugar more than diabetic medications do(15). Weight loss among patients with type 2 diabetes has shown to provide beneficial impacts in treatment and control of metabolic parameters. (27) It is furthermore associated with a pronounced low cardiovascular risks among patients with type 2 diabetes(28).

The determinant factors for increased Prevalence of Higher body mass index among type 2 DM were residence area, alcohol consumption, low level physical activities, duration of DM and dietary intake(14).

Despite this devastating trend and the recognition of the emerging problem of chronic diseases as a national public health concerns in the recently launched Health Sector Transformation Plan of Ethiopia little efforts are being made to address High body mass index (29).

In previously conducted studies nutritional knowledge of the respondent to higher body mass index was not considered (20, 30). The studies conducted were not included institutional factors such as lack of exercise prescription and clinical factors like treatment categories. This study will focus on these as an associated factor for High body mass index on type 2 DM patients.

Therefore, this study aims to assess the Prevalence of Higher Body Mass Index and its associated factors among type 2 DM patients who are following treatments in St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia.

### **1.3. Rationale or Significance of the study**

Higher body mass index is on the rise globally, not only in the general population but also in patients of type 2 diabetes mellitus. Being obese is themselves risk factors for diabetes mellitus, cardiovascular and other diseases(31).

Higher body mass index can potentiate and intensify the complication of diabetes and are the causes that make the treatments of diabetes unsuccessful. Such that they can result in increased duration of hospitalization and increase associated cost as an individual and as a society in whole. Assessing the Prevalence of higher body mass index can be the means to measure weather the treatments and health education given is successful or not(32).

As one of sub-Saharan African country, Ethiopia is facing burdens of both communicable and non-communicable disease. So as one part of non-communicable disease, it is essential to assess the prevalence and associated factors of higher body mass index in type 2 diabetes mellitus. As of my knowledge there is limited study conducted in our country to assess the Prevalence of higher body mass index in type 2 DM patients and its associated factors. In addition this study will focus on treatment categories as associated factors of higher body mass index on type 2 DM patients.

Therefore this study aims to assess the prevalence of higher body mass index in type 2 DM patients and its associated factors on patients who are following treatments in St. Paul's Hospital Millennium Medical College Addis Ababa, Ethiopia.

Identifying factors associated with higher body mass index will be helpful to educate and thereby control the progress of high body mass index in patients with type 2 diabetes, which can reduce the risks of high body mass index related comorbidities and mortalities in type 2 diabetes.

The findings of this study will be helpful to educate patients to improve their life style and hence enhance the improvement in the diabetes management. It will help to understand the factors associated with high body mass index so as to create appropriate investigation and treatment guidelines for hospital. Another significance of this study for health professional is it will provide an evidence based data for diabetic care and education. Furthermore, the finding may serve as a base line data for policy makers and researchers.

## **2. Literature Review**

### **2.1. Prevalence of Higher Body Mass Index**

Non-communicable diseases commonly associated with higher body mass index like type II DM, cardiovascular diseases, cancers and hypertension are gradually replacing infectious diseases as a main source of morbidity in African countries(33). Population surveys conducted in various areas of sub Saharan Africa shows that prevalence of high body mass index is increasing with in the general population(34).

Approximately 84.5% of hospitalized type 2 diabetes patients were having higher body mass index ( $BMI \geq 25 \text{ kg/m}^2$ ). More percentage of females (61.3%) were obese ( $BMI \geq 30 \text{ kg/m}^2$ ) compared to males (54.6%). Obese patients with type 2 diabetes were younger, have poor glycemic control, exhibited hypertension, and had worse lipid profiles compared to type 2 diabetes patients with  $BMI < 30 \text{ kg/m}^2$ . Approximately 84.5% of the hospitalized type 2 diabetes patients identified in this study were overweight or obese ( $BMI \geq 25 \text{ kg/m}^2$ ), suggesting the need for effective weight loss intervention in this population(35).

Research conducted with in the Swedish National Diabetes Register was to review the associations of higher body mass index with CVD in type 2 diabetes showed that higher body mass index independently increased the chance of cardiovascular heart disease and cardiovascular disease in patients with type 2 diabetes. The cardiovascular heart disease risk was higher with increasing BMI than with stable or decreasing BMI during the study(25).

The LEADER (liraglutide effect and action in diabetes evaluation of CV outcome results) trial, which is aimed to assess the cardiovascular safety of liraglutide in patients with T2DM. According to LEADER findings, in this population of patients with T2DM, the prevalence of higher body mass index is very high (90.3). Only 9.1 % of the patients were of normal weight(23).

According to the study conducted in Ghana the prevalence of higher body mass index is increased among diabetic patients. Being a female was significantly related to increased risk of obesity. Taking of snacks in between meals, eating meals late at night, physical inactivity, excessive fast food intake, and beverage intake were common causes of obesity among diabetic

patients. Physical exercise and dietary measures to regulate body weight are lacking despite the will to achieve appropriate body weight(32).

The study including data of 446 type 2 DM patients attending a diabetes clinic of a university teaching hospital in Southern India result shows that there's increased prevalence higher body mass index in that clinical population of diabetes, suggest that structured weight reduction should be an integral decision of attainment of glycemic targets. The percentage of diabetics with general obesity was 48.9% while 68.1% had central obesity. The results show in 59.9% females had raised BMI compared to 40.9% in males. Similarly, 86.6% of females had a waist circumference above the cut off value as compared to 54.7% males(26).

Study conducted to measure the prevalence of higher body mass index among type 2 diabetic patients attending diabetes clinics in northern Tanzania showed high magnitude (85.0%) of high body mass index among type 2 diabetic patients who were attending care clinics in these setting. Of them, 44.9% were overweight and 40.1% were obese and the prevalence of higher body mass index were marginally significantly varies inconsistent with their occupation and age of participants(22).

The systematic review that was aimed to assess prevalence of hypertension and obesity in patients with type 2 diabetes mellitus captured data from observational studies from 36 countries around the world, demonstrated that the high prevalence of obesity in type 2 DM as a worldwide issue. Of the studies evaluating obesity prevalence in patients with T2DM, over one-quarter of the 32 rates according to BMI were above 50%, whereas over four-fifths of the rates estimated by waist circumference were above 50%. The high prevalence of central obesity (high waist circumference) in most regions was observed than those recommended by the International Diabetes Federation (IDF)(36).

Study conducted in Ethiopia ,Addis Ababa showed that 46.4% of the diabetic patients were overweight or obese(37). The study conducted to assess prevalence of overweight and its associated factors among type 2 diabetes mellitus patients at Mekelle public hospitals, showed that the prevalence of overweight among type 2 DM patients using BMI as a measure was 40.8% and by using waist circumference as a measure 53.2% of the study subjects had central obesity(20). And also study conducted in Jimma, southwest Ethiopia shows that the prevalence of higher body mass index among type 2 DM patients is very high(36.2%)(38). Similarly, the

study conducted in Hosanna, south Ethiopia shows that the prevalence of higher body mass index was very high. This study showed that 35.9% of the T2DM patients were having higher body mass index. Of whom 31.5% were overweight and 4.4% were obese(14).

## **2.2. Factors associated with higher body mass index among type 2 DM Patients**

### **2.2.1. Socio demographic factors associated with higher body mass index**

The prevalence of higher body mass index was significantly different according to occupation and age of participants. Slightly vast majority of patients who were employed were having high body mass index as compared to those who were unemployed. The prevalence of higher body mass index was highest in patients aged 41–60 years and those  $\leq 40$  years comparing to those older than 60 years. Patient's  $\leq 40$  years had 70% higher odds of having high body mass index compared to those older than 60 years. Those aged 41–60 years, had twofold increase in odds of having high body mass index compared to those who were older than 60 years(22).

A retrospective study conducted in Uganda to determine prevalence of higher body mass index and associated factors with higher body mass index among patients with type 2 diabetes mellitus showed that the factors found to be associated with high body mass index among type 2 DM patients were female gender, age, and Socioeconomic status(39).

In Tanzania study aimed to assess the prevalence of higher body mass index among type 2 diabetic patients showed factors like gender and residence are associated with magnitude of higher body mass index. High prevalence of higher body mass index were observed in female participants as Longitudinally, evidence suggests that marriage predicts weight gain in both men and women, whereas marital termination (through divorce or widowed) predicts weight loss compared to their male's counterparts i.e. 92.2% vs. 69.9%(40).

Slightly vast majority of patients who were employed (91.4%) and self-employed (88.9%) were having high body mass index as compared to those who were unemployed (79.3%). Data shows being employed or self-employed had twofold increase in odds of having high body mass index in this setting(22). Being from urban residence had 3.4 times the odds of having high body mass index compared to their counterparts(20).

### **2.2.2. Behavioral factors associated with high body mass index**

In a study conducted in Iran, increased prevalence of higher body mass index in females was attributed to differences in level of physical activity. The majority of subjects in particular women had none or low levels of physical activity(41).

According to the study conducted in Ghana, taking of snacks in meals, eating meals late at night, physical inactivity, excessive fast-food intake, and alcoholic beverage intake were associated with increased prevalence of higher body mass index. Four hundred and ten (410) representing 75.5% of the participants were not physically active. Only 133 (24.5%) do regular exercise. The common type of exercise among the participants was walking(57.1%) followed by jogging (42.9%).Twenty-five percent (25.0%) of participants with history of alcohol intake were obese using the BMI, WC, and WHR whereas 75.0% were obese using WHtR(32).

In crosssectional study conducted in Uganda, those who reported to rarely consuming fruits and vegetables were less likely to have high body mass index than those who had regular intake of fruits and vegetables(39).

Study conducted in Mekelle, Tigray showed alcohol consumption, physical activities, central obesity and dietary intake were the determinant factors for overweight among type 2 diabetes mellitus patients(20).

The study conducted at Nigist Eleni Memorial Hospital, Hadiya Zone, Southern Ethiopia, being a diabetic patient for 3 years or more and poor dietary practices were significantly associated with high body mass index of the type 2 DM Patients(14).Current cigarette smoking were positively associated with high body mass index among the study participants(42).

### **2.2.3. Knowledge of high body mass index**

According to the crosssectional study conducted in Ghana, Using WHR as an indicator, 19.7% of participants with adequate knowledge, 29.1% with inadequate knowledge, and 45.5% with no knowledge of high body mass index were obese ( $p = 0.0101$ ) while 22.5% of participants with adequate knowledge, 39.3% with inadequate knowledge, and 72.2% with no knowledge of high body mass index were obese ( $p < 0.0001$ )(32).

Study aimed for assessment of the level and associated factors with knowledge and practice of Diabetes Mellitus among Diabetic Patients attending at Felege Hiwot Hospital, Northwest -

Ethiopia shows less than 10 % of study participants knew weight reduction as life style modification for prevention of diabetes related complications(43).

#### **2.2.4. Clinical factors associated with high body mass index**

According to retrospective study conducted in United States of America (USA) the comorbidity burden tended to increase in older age groups and was higher in men than women. The most common condition in patients with T2DM included hypertension(44).

Previous reports from the National Diabetes Register in Sweden have shown that obese patients with type 2 diabetes have higher frequencies of hypertension, dyslipidemia and micro albuminuria, which are well-known cardiovascular risk factors(25).

Clinical factors found to be associated with high body mass index reported co-morbid chronic disease were hypertension and CVD. Regarding treatment categories patients treated with insulin only compared to 57.6% of those treated with tablets only were obese(39). Among the factors which were significantly associated with obesity on type 2 DM patients is duration of DM(25).

The cross-sectional study conducted in Uganda shows that, patients who were on dual therapy were more than 2.2 times more likely to have high body mass index. Patients who had neuropathy complications were 1.4 times more likely to have high body mass index. Diabetic patients who also had hypertension were more than 1.7 times more likely to have high body mass index(39).

Study conducted in Mekelle, Tigray showed that the odds of overweight among participants who stayed with type 2 DM for 3–6 years was 2.8 times higher compared to those who stayed less than 3 years(20).

The study conducted at Nigist Eleni Memorial Hospital, Hadiya Zone, Southern Ethiopia, being a diabetic patient for 3 years or more and poor dietary practices were significantly associated with the obesity of the type 2 DM Patients(14).

#### **2.2.5. Institution/service-related factors**

According to the study conducted at Nigist Eleni Memorial Hospital, Hadiya Zone, Southern Ethiopia, 8.8% individuals didn't have nutritional education from any sources Despite attending

diabetic care clinic, there is limited self-management education offered by the health care workers this might contribute to the observed high magnitude of higher body mass index in this study population in that setting(45).

Regarding prescription of regular exercise, the study conducted found that only 37(18.4%) of the respondents reported as they were practicing physical exercise regularly but out of total respondents, 73(36.3%) reported that they never engaged in physical exercise as the result of lack of clear instructions(46).

### 2.3. Conceptual frame work

This conceptual frame work was developed from Determinants of obesity and associated population attributes, South Africa: Empirical Evidence from a National Panel Survey, 2008-2012(47). And other reviewed literatures (30, 39, 45, 48, 49). The diagram shows the relationship between high body mass index and socio demographic, behavioral, institution related and clinical factors among type 2 DM patients.

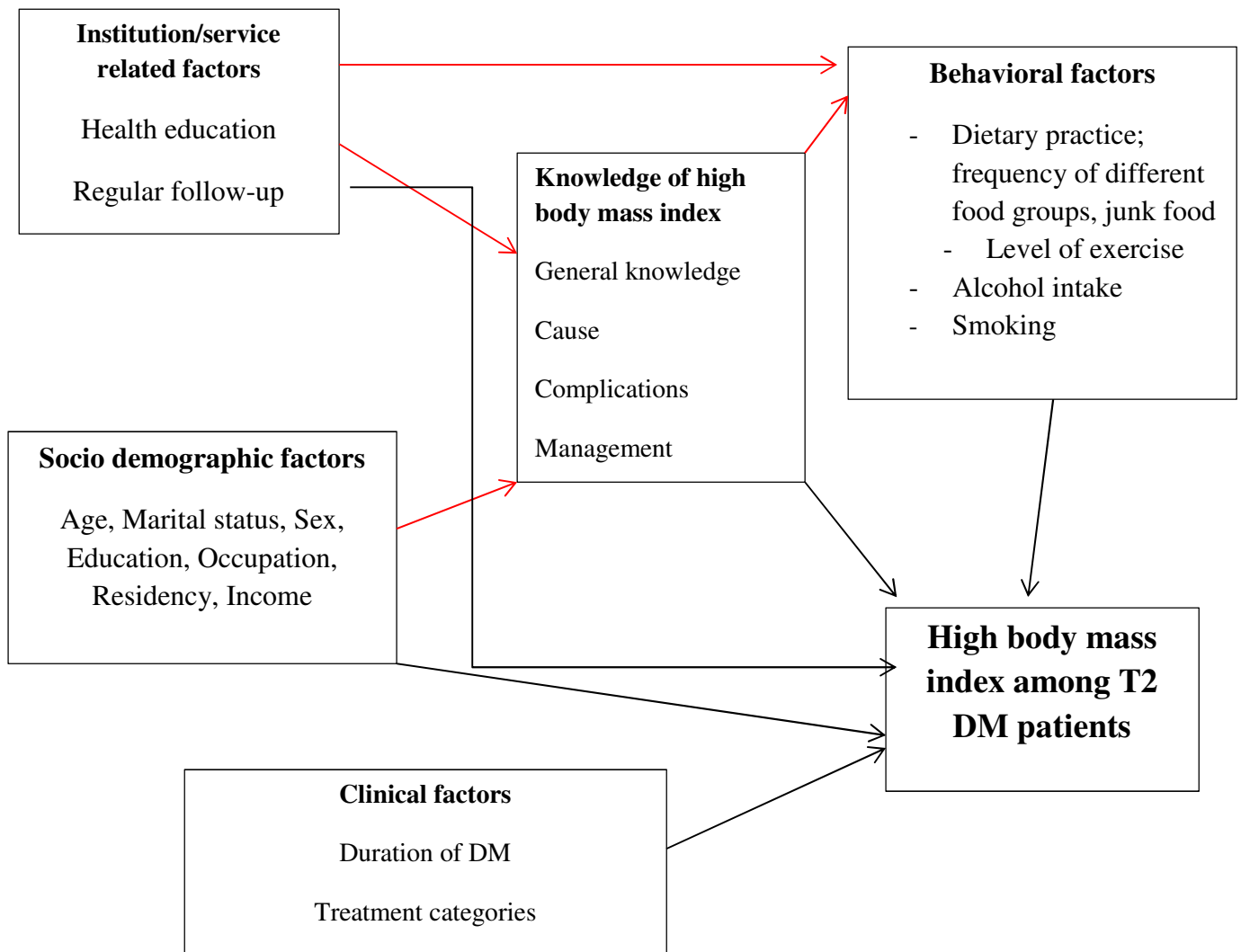


**Figure 1.** Conceptual frame work for the study on prevalence of high body mass index and its Associated factors among type 2 diabetes in St. Paul’s Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.

### **3. Objectives of the Study**

#### **3.1. General Objective**

To assess the prevalence of higher body mass index and its associated factors among patients with type 2 diabetes mellitus attending follow up clinic at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, from May 21, 2022 up to June 21, 2022.

#### **3.2. Specific Objectives**

- To assess the prevalence of higher body mass index among type 2 diabetic patients  
Attending follow up clinic at SPHMMC Addis Ababa Ethiopia;
- To identify factors associated with higher body mass index among type 2 diabetic patients  
Attending follow up clinic at SPHMMC Addis Ababa Ethiopia

## **4. Materials and Method**

### **4.1. Study setting and Period**

St Paul's Hospital Millennium Medical College /SPHMMC/is found in Addis Ababa, the capital city of Ethiopia. It is governed by a board under the Federal Ministry of Health. St Paul's Hospital Millennium Medical College is in the process of building its capacity quickly in a short period of growing from 3 to 250 faculty members in the last six years, and expanding teaching facilities. The college has currently over 3736 clinical, academic, administrative and support staffs those provide medical specialty service to patients who are referred from all over the country, teaching medicine and nursing students and doing basic and applied researches. While the inpatient capacity is more than 700 beds, the college sees an average of 1200 emergency and outpatient cases daily. Annual average of 200,000 patients and a catchment population more than 5 million, approximately 75% of patients receive medical service free of charge.

The study was conducted from May 21, 2022 up to June 21, 2022 during the routine working hours of the hospital.

## **4.2. Study Design**

A hospital based cross sectional study design was conducted

## **4.3. Population**

### **4.3.1. Source population**

All type 2 DM patients visiting SPHMMC

### **4.3.2. Study population**

All type 2 diabetes patients having follow-up in St. Paul's Hospital Millennium Medical College Addis Ababa, Ethiopia, during data collection period.

### **Eligibility criteria**

#### **4.3.3. Inclusion criteria**

All type 2 diabetes mellitus patients who have follow up visit in the study area were included.

#### **4.3.4. Exclusion Criteria**

Those critically ill, pregnant and have ascites were excluded.

## **4.4. Study Variables**

### **4.4.1. Dependent variables**

Body Mass Index among T2 DM Patients (normal vs high)

### **4.4.2. Independent variables**

**Socio-demographic factors:** Age, Sex, Marital Status, Religion, Ethnicity, Educational status, Income level, Residency, occupation

**Behavioral factors:** Physical activity, dietary intake, smoking, alcohol consumption

**Clinical factors:** Disease duration, Treatment categories

**Institution/service-related factors:** Nutrition education, regular visit, exercise prescription

**Knowledge of high body mass index:** General knowledge, Cause, Complications and Management

## 4.5.Measurement and Data Collection Method

### 4.5.1. Sample size determination

Sample size is determined using single population proportion sample size calculation formula by considering the following assumptions: On the basis of a previous study, considering the outcome variable as the prevalence of higher body mass index, the proportion of higher body mass index T2DM patients with inactive level of exercise at Jimma hospital, Southwest Ethiopia, was 50.6%.(38), 95% confidence level and a margin of error 5% .The final sample size by adding 10 percent of nonresponse rate is 422.

The following formula was used to work out the sample size.

**For the first objective**

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

Where; n=Desired sample size.

$Z\alpha/2$ = Critical value= (1.96)

P= Prevalence of condition being studied. In this case proportion of having higher body mass index T2DM patients with in-active level physical activity at Jimma hospital, Southwest Ethiopia, was 50.6%.(38)

d= precision (marginal error) =0.05

$$n = (1.96)^2 0.506(0.494) / (0.05)^2$$

$$n = 384$$

The nonresponse rate (10%) was considered and the final sample size is 422

**Therefore,  $n = 38(10\% \text{ of } 384) + 384 = 422$**

#### **4.5.2. Sampling technique**

SPHMMC was selected by simple random sampling technique by using lottery method from public hospitals giving general services.

The monthly Average number of type two diabetes mellitus patients at follow-up clinics in St. Paul's Hospital Millennium Medical College from the patient appointment registration book is around 850.

Systematic random sampling technique was applied to select the study participants.

For St. Paul's Hospital Millennium Medical College systematic random sampling interval (K) is determined as;  $K = 850/422 = 2$ , the first patient was taken by lottery method and the next was proceeded as every 2<sup>nd</sup> patient.

#### **4.5.3. Data collection procedures**

Data collection methods including face-to-face interviews with questionnaires and anthropometric measurements were taken by the trained research assistants. Three supervisors were participated and also Three Bsc nurses were trained for data collection and participated in the face-to-face interviews with type 2 diabetic patients. Questions on socio-demographic, clinical and diagnostic characteristics, duration of DM and treatment options were asked during the face-to-face interviews.

Following WHO recommendation, blood pressure was measured with the subject in a seating position after waiting in a quiet room for at least five minutes with legs uncrossed. Depending on the size of the subject's right upper arm, one of two mercury sphygmomanometers with different size cuffs were used to take three readings for blood pressure, measured to the nearest 2mmHg, at intervals of one minute each. An average of three readings were used for the analysis, in compliance with WHO recommendation of taking a minimum of two recordings of both the systolic and diastolic pressures, to minimize measurement errors(50).

**Anthropometric measures:** Weight and height, measurements were taken. Heights of subjects were measured to the nearest 0.1centimetres, using a standard stadiometer with subjects standing in the upright position and without shoes on their feet. To ensure that an upright position was

maintained, each subject was told to stand tall, looking straight forward, while the data collector positioned the head, so that the temporo-mandibular joint is at level with the eye and both heels on the ground, before taking the height measurement.

To measure the weight, subjects were first taken off heavy outer jackets, overalls, scarves or heavy items in their pockets, and stand with both feet close together on a bathroom scale. Weight is recorded to the nearest kilogram. Next the waist and hip girth were measured with the use of a flexible, inelastic tape, calibrated in centimeters. Waist girth is measured at the mid-way circumference between the lowermost rib margin and the iliac crest at the end of normal expiration, while the hip girth is measured at the level of widest circumference of the hip over the greater trochanter. Both measurements were taken three times and the average of the three readings was also taken for the calculation of the body mass index, and further analysis. Body mass index was calculated for each subject, as the value of the weight (kg), divided by the square of the height (m<sup>2</sup>) or  $Wt/ht^2$ (50).

Circumferences were evaluated by using a stretch-resistant 1-cm-wide measuring tape that provides a constant measurement. Circumference measurements were taken while the subject is in the standing position and breathing normally. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. for taking both waist and hip circumference measurements.

The categories for smoking status include current smoker (defined as smoking at least one cigarette within the past month), never smoker and former smoker (defined as having quit smoking more than one month prior to the study). Data on current alcohol consumption was considered as: never drinkers, excessive drinkers ( $\geq 3$  units/day for men and  $\geq 2$  units/day for women) or moderate drinkers ( $\leq 2$  units/day for men and  $\leq 1$  unit/day for women)(42).

Dietary practice was assessed using the conceptualized form of perceived dietary adherence questionnaire for people with Type2 Diabetes. Out of the nine items in the questionnaire, six items were used because of accessibility of the products. The score for each item ranged from 0 to 7, with the maximum value ranging from 0 to 42. Participants who consume the mentioned food he/she listed the frequency of days in week, those who don't take any of them marked zero

and those who took food items throughout the week marked 7. The Participants that scored above the mean value were considered as having “good” dietary practice and those scored below the mean value were labeled as “poor” dietary practice(51).

Knowledge questionnaire were developed from previous research to assess knowledge of type 2 diabetes mellitus patients about high body mass index (52).

Physical activity questions were asked by validated physical activity questionnaire(53).

Tools for data collection of alcohol consumption, smoking/tobacco use and physical activity were adapted from previous study(54).

#### **4.6.Data Quality Assurance**

The collected data was reviewed and checked for completeness before data entry. Any error if found during expert evaluation and pretest ,which was conducted among 42 type 2 diabetes mellitus patients at Yekatit 12 hospital DM follow up clinic ,were corrected and modification was made into the final version of the data collection format. To maintain consistency of the tool the questionnaire was first translated from English to Amharic then back to English. Training was given to data collectors and supervisors for two days before actual data collection. Data quality was controlled by designing the proper data collection materials, through continues supervision. All completed data collection forms were examined for completeness and consistency during data management, storage, cleaning and analysis. Weight measurement scale was checked before measurement. pretest was done on 10 % of sample size on similar patients following in Yekatit 12 hospital which is different from the study area. Depending on the result of the pretest, correction and modification was made on the questionnaire before applied on the study population.

#### 4.7. Operational Definitions

**Overweight:** BMI of 25 up to 29.9 kg/m<sup>2</sup>

**Obese;** BMI  $\geq 30$  kg/m<sup>2</sup>

**Higher body mass index;** BMI equal or above 25kg/m<sup>2</sup>

**Low level of physical exercise:** individual activity less than 150 min per week was considered as low level of physical activities (55).

**Adequate level of physical exercise;** individual activity above 150 min per week was considered as adequate level of physical activities (55).

**Mild activity:** Mostly Sitting or Standing with only a short walking distance

**Moderate activity:** Activities that require the same physical effort as walking long distance or backyard gardening

**Heavy activity:** Activities that require the same effort as lifting heavyweights or heavy construction work

**Heavy Alcohol Consumption** - Refers to the average consumption of more than 3 standard alcoholic drinks per day for men or >2 alcoholic drinks for women. A standard alcoholic drink is the equivalent of one glass/can/bottle (330ml) of regular beer (with 3% ethanol), one glass (100ml) of wine (10% ethanol) or one glass or measure (40ml) of distilled spirit, each of which adds up to about 10g of ethanol per drink (42, 54).

**Moderate /low consumption;** moderate drinkers ( $\leq 2$  units/day for men and  $\leq 1$  unit/day for women)(42)(54).

**Never drinkers:** Those who have never drank alcohol before.

**Current smoker:** defined as smoking at least one cigarette within the past month(42).

**Never smoker and former smoker:** defined as having quit smoking more than one month prior to the study(42).

**Adequate knowledge of overweight/obesity:** Participants were said to have “adequate” knowledge of overweight/obesity if they responded to at least three correct answers each about causes, complication, management of obesity, and method of weight measurement out of 4, 3, 4 and 3 choices respectively(52).

**Inadequate knowledge of overweight/obesity:** “inadequate” knowledge if they responded to at most one correct answer each to causes, complications, management of overweight/obesity, and method of weight measurement out of 4, 3, 4 and 3 choices respectively (52).

**No knowledge (do not know) of overweight/obesity:** if they did not know anything about causes, complication, management of obesity, and method of weight measurement (52).

**Good dietary practice;** out of six food items used, score for each item ranged from 0 to 7, with the maximum value ranging from 0 to 42. The Participants that scored above the mean value were considered as having good dietary practice and those scored below the mean value were labeled as **poor dietary practice**

#### **4.8.Data Analysis and Interpretation**

The collected data was entered and cleaned as well analyzed using an Epi info computer software version 7 and Statistical package for social sciences (SPSS) computer software version 20.0 respectively.

Descriptive statistics were performed to identify the distribution of socio-demographic characteristics of the study participants.

After that, descriptive statistics such as frequencies, percentages, means, standard deviations, and crosstabs were used to summarize data. Model fitness was checked using Hosmer-Lemeshow goodness-of-fit. Binary logistic regression was done to determine the relationship of each independent variable with the dependent variable; variables with p value below 0.2 were entered into a multivariable logistic regression analysis to determine the association between a set of independent variables with the dependent variable using a step wise backward method(56). A variable with p value less than 0.05 were considered as statistically significant. An Adjusted Odds ratio with their 95% confidence interval (CI) was used to show the strength of association. The result was presented using text, graphs and tables.

#### **4.9.Ethical Consideration**

Ethical clearance and approval to conduct the research was obtained from St. Paul's Hospital Millennium Medical College Institutional Review Board /IRB/. Official letter from school of public health was written to St. Paul's Hospital Millennium Medical College out-patient department. In addition, informed consent was obtained from each study participant to confirm their willingness for participation after explaining the objective of the study. Respondents were clearly told that they have the right to refuse or terminate at any time of the interview. Respondents were coded anonymously and confidentiality of information was maintained.

## **5. RESULT**

### **5.1. Socio Demographic Characteristics of the Study Participants**

From the total 422 participants, 410(97%) responded to the questionnaires. Out of 410 respondents 274(66.8%) were females. The age range of the patients was from 24 to 91 years and mean age was 53.70 (SD±12.91). Among all the participants 268(65.4%) were Orthodox Christian religion followers and 155(37.8%) were from Amhara ethnicity; 379(92.4%) were from urban area; 158(38.5%) attended primary education and 208 (50.7%) were house wives. In addition, 179(43.7%) of participants had monthly income ranging from 1000 to 5000, and 177(43.2%) had monthly income below one thousand birr. (Table1).

**Table 1:** Socio demographic characteristics of type 2 DM patients attending follow-up clinic at St. Paul’s Hospital’s Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410)

| Characteristics |                     | Frequency | Percent |
|-----------------|---------------------|-----------|---------|
| Age group(yrs.) | <=40                | 80        | 19.5    |
|                 | 41 to 64            | 241       | 58.8    |
|                 | >64                 | 89        | 21.7    |
| Sex             | Male                | 136       | 33.2    |
|                 | Female              | 274       | 66.8    |
| Residence       | Rural               | 31        | 7.6     |
|                 | Urban               | 379       | 92.4    |
| Marital status  | single              | 42        | 10.2    |
|                 | married             | 270       | 65.9    |
|                 | divorced            | 42        | 10.2    |
|                 | widowed             | 56        | 13.7    |
| Religion        | Orthodox            | 268       | 65.4    |
|                 | Muslim              | 91        | 22.2    |
|                 | Protestant          | 48        | 11.7    |
|                 | Others              | 3         | .7      |
| Ethnicity       | Oromo               | 144       | 35.1    |
|                 | Amhara              | 155       | 37.8    |
|                 | Guraggie            | 75        | 18.3    |
|                 | Tigray and others   | 36        | 8.8     |
| Education       | no formal education | 94        | 22.9    |
|                 | primary education   | 158       | 38.5    |
|                 | secondary education | 70        | 17.1    |
|                 | higher education    | 88        | 21.5    |
| Occupation      | House wife          | 208       | 50.7    |
|                 | Self employed       | 78        | 19.0    |
|                 | Others              | 48        | 11.7    |
|                 | Government employed | 34        | 8.3     |
|                 | NGO employed        | 23        | 5.6     |
|                 | Farmer              | 19        | 4.6     |
| Income          | <1000               | 177       | 43.2    |
|                 | 1000 to 5000        | 179       | 43.7    |
|                 | 5001 to 10000       | 33        | 8.0     |
|                 | >10000              | 21        | 5.1     |

[“Others for ethnicity => Gamo and Silte] [“Others for Occupation => pensioner, student, merchant and tailor]

## 5.2. Knowledge of Type 2 DM Patients towards higher body mass index

From all 410 respondents 195(47.6%) have inadequate level of general knowledge about the meaning of high body mass index, ideal body weight and method of weight measurement, while 124(30.2%) have no knowledge and the remaining 91(22.2%) have adequate level of general knowledge about the meaning of high body mass index, ideal body weight and method of weight measurement. More than half of respondents 287(70%) have inadequate knowledge about causes of high body mass index, 90(22%) of respondents did not know about causes of high body mass index, while remaining 33(8%) have adequate knowledge about causes of high body mass index. Out of 410 participants 329(80.2%) have inadequate knowledge about complications of high body mass index, while 80(19.5%) did not know about complications of high body mass index. From all 410 respondents 326(79.5%) have inadequate knowledge about management of high body mass index, while 47(11.5%) of respondents did not know about management and remaining 37(9%) have adequate knowledge about management of high body mass index. (Table2).

**Table 2:** Knowledge of Type 2 DM Patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College towards higher body mass index , Addis Ababa Ethiopia, 2022.(n=410 )

| Variables         |             | Frequency | Percent |
|-------------------|-------------|-----------|---------|
| General knowledge | adequate    | 91        | 22.2    |
|                   | Inadequate  | 195       | 47.6    |
|                   | Do not know | 124       | 30.2    |
| Causes            | adequate    | 33        | 8.0     |
|                   | Inadequate  | 287       | 70.0    |
|                   | Do not know | 90        | 22.0    |
| Complications     | adequate    | 1         | 0.2     |
|                   | Inadequate  | 329       | 80.2    |
|                   | Do not know | 80        | 19.5    |
| Management        | adequate    | 37        | 9.0     |
|                   | Inadequate  | 326       | 79.5    |
|                   | Do not know | 47        | 11.5    |

### 5.3. Dietary practice of type 2 diabetes

Based on six item questions, the minimum and maximum scores were 0 and 20 respectively with the mean dietary practice of  $7.10 \pm 4.033$ . Accordingly, those whose score of six food items taken in seven days is below the mean were 244(59.5%) have poor dietary practice and 166 (40.5%) have scored above the mean have good dietary practice. Proportions that reported of consumption of the six food groups was displayed in table 3.

**Table3:** Dietary practice of type 2 DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022. (n=410)

|                                                                                                                                 | Response in number of days per week   |                                      |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------|
| Dietary practice of type 2 diabetic patients                                                                                    | <b>3 days or less:<br/>No<br/>(%)</b> | <b>4days or more:<br/>No<br/>(%)</b> |
| Healthful eating plan such based on Ethiopian Food Guide for diabetics or according to health professional advise               | 293<br>(71.5%)                        | 117<br>(28.5%)                       |
| Fruit and vegetable                                                                                                             | 354<br>(86.3%)                        | 56<br>(13.7%)                        |
| Carbohydrate containing foods with a low Glycemic Index? (Example: dried beans, lentils, barley, pasta, low fat dairy products) | 409<br>(99.7 %)                       | 1<br>(0.3%)                          |
| Foods high in sugar such as Cakes, cookies, desserts, candies, etc.                                                             | 408<br>(99.5%)                        | 2<br>(0.5%)                          |
| Foods of freely or with minimal restrictions for diabetics                                                                      | 362<br>(88.3%)                        | 48<br>(11.7%)                        |
| Foods high in fat (example: fatty meat, fried foods or deep fried foods)                                                        | 401<br>(97.8%)                        | 9<br>(2.2%)                          |

#### **5.4. Physical activity level of type two diabetes mellitus patients**

Out of all 410 respondents, majority 382(93.2%) never engage in vigorous physical activities; 343(83.7%) participate in moderate activities; 404(98.5%) engage in mild physical exercise. In addition, 176(42.9%) were having low level physical activities, 130(31.7%) had sedentary life style and remaining 104(25.4%) were having adequate level of physical activities. Out of 410 participants 231(56.3%) spend eight and more hours at work during a typical day. Regarding the transportation method during this typical day 249(60.7%) use private car or taxi sometimes; 292(71.2%) use public transport sometimes; 403(98.3%) never used motor bike or bicycle as transportation method and 176(42.9%) sometimes use walking on foot as transportation.

#### **5.5. Alcohol consumption and smoking status of type 2 DM patients**

From all 410 respondents 310 (75.6%) never drank alcohol, 83(20.2%) were moderate drinkers and remaining 17(4.1%) were heavy drinkers; regarding the frequency of consumption, 51 (12.4%) drink less than three days monthly, 28 (6.8%) drink 1-4 days per week, 21 (5.1%) drink  $\geq 5$  days per week. Concerning smoking 396 (96.6%) of respondents were never smoker and 14 (3.4%) were former smoker.

#### **5.6. Institution/service related characteristics of respondents**

Regarding health education about high body mass index, 384 (93.7%) of respondents didn't received nutrition education, while remaining 26 (6.3%) of respondents received health education regarding high body mass index. On the other hand almost all of the respondents 409(99.8%) had regular check-up. From the total of 410 respondents 397(96.8%) did not received exercise prescription.

#### **5.7. Clinical factors associated with high body mass index**

From all 410 respondents 175 (42.7%) have more than three to ten years of diabetes Follow-up and 98(23.9%) have more than 10 to 20 years of diabetes follow-up, 88(21.5%) have one to three years of diabetes follow-up, 25(6.1%) have less than one years of diabetes follow-up and remaining 24(5.9%) have more than twenty years of diabetes follow-up. (Table4). Majority of subjects, 181 (44.1%) used oral hypoglycemic agent, 121(29.5%) used insulin only to control blood sugar level, while 105 (25.6%) used tablet/oral and insulin as hypoglycemic drugs and 3(0.7%) used exercise and nutrition only to control blood sugar level. (Table4).

**Table4:** Clinical factors associated with high body mass index among type 2 DM patients attending follow-up clinic at St. Paul’s Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410)

| Variables            |                                | Frequency | Percentage |
|----------------------|--------------------------------|-----------|------------|
| Duration of DM       | <1 year                        | 25        | 6.1        |
|                      | 1 to 3                         | 88        | 21.5       |
|                      | >3 to 10                       | 175       | 42.7       |
|                      | >10 to 20                      | 98        | 23.9       |
|                      | >20                            | 24        | 5.9        |
| Treatment categories | oral only                      | 181       | 44.1       |
|                      | insulin only                   | 121       | 29.5       |
|                      | oral and insulin               | 105       | 25.6       |
|                      | only dietary plan and exercise | 3         | .7         |

## 5.2.prevalence of high body mass index among type two DM patients

From all 410 respondents 8(2%), 136(33.2%), 168(41.0%) and 98(23.9%) were underweight, Normal weight, overweight and obese respectively. The prevalence of high body mass index was 64.9%. (Figure1). The mean and standard deviation of BMI in this study were 26.94 and 5.520 Respectively. Whereas using WC as a measure 243 (59.3%) of participants were having central obesity with mean and standard deviation of WC 96.9 and 12.77 respectively.

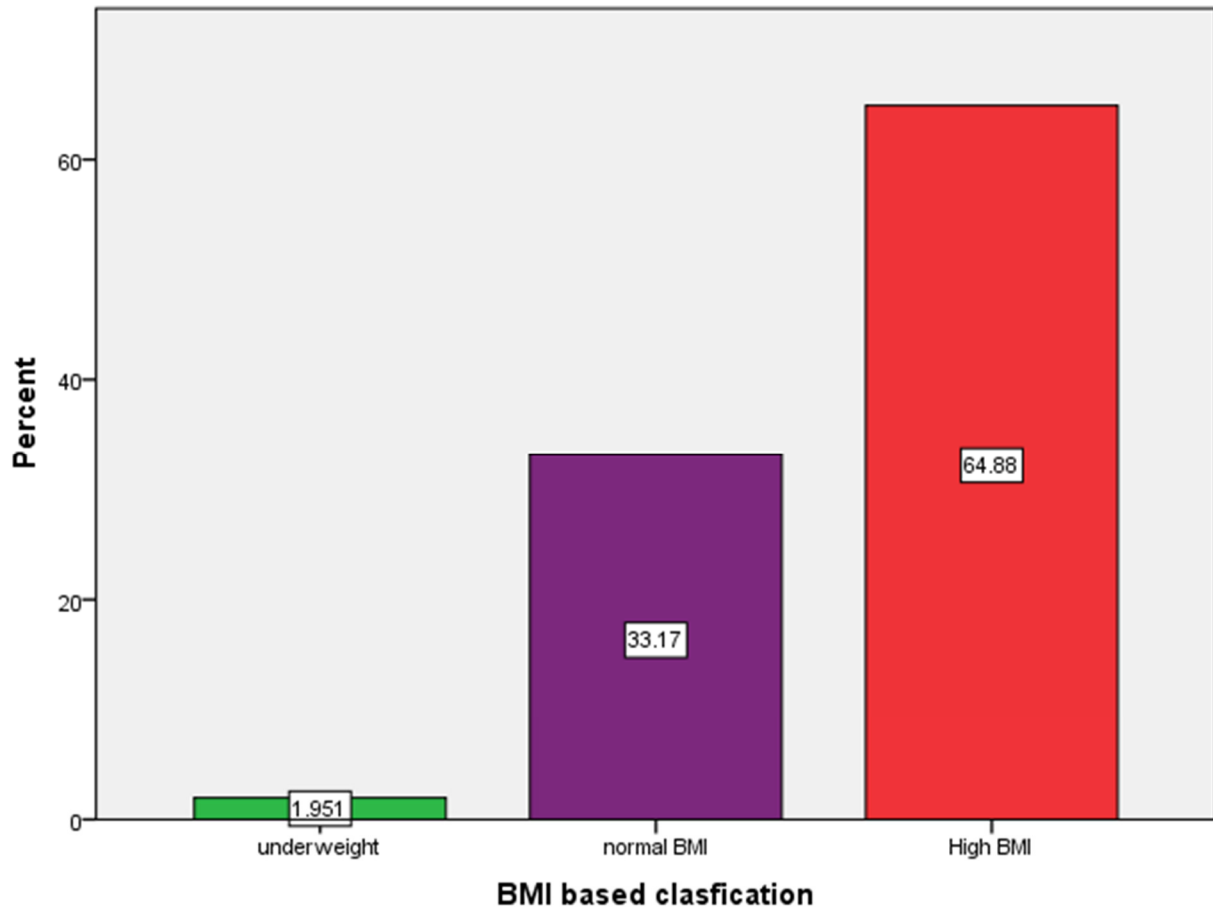


**Figure 2:** Body mass index category of type two diabetes mellitus patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).

From a total of 274(66.8%) Female respondents, 192(72.2%) had high body mass index and 74(27.8%) male respondents had high body mass index. according to the distribution shown above most females than males had High body mass index. The distribution of high body mass index by socio demographic characteristics is depicted in Table 5.

**Table5:** Distribution of high body mass index by socio demographic factors among type two DM patients attending follow-up clinic at St. Paul’s Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).

|                        |                     | HIGHER BODY MASS INDEX |            |
|------------------------|---------------------|------------------------|------------|
| VARIABLES              | LABELS              | YES                    | NO         |
| Sex                    | Male                | 74(27.8%)              | 62(43%)    |
|                        | Female              | 192(72.2%)             | 82(57%)    |
| Age                    | <=40                | 50(19%)                | 30(20.8%)  |
|                        | 41 to 64            | 165(62%)               | 76(52.8%)  |
|                        | >64                 | 51(19%)                | 38(26.4%)  |
| Residence              | Urban               | 253(95%)               | 126(87.5%) |
|                        | Rural               | 13(5%)                 | 18(12.5%)  |
| Marital status         | Single              | 21(7.9%)               | 21(14.6%)  |
|                        | Married             | 188(70.7%)             | 82(56.9%)  |
|                        | Divorced            | 25(9.4%)               | 17(11.8%)  |
|                        | Widowed             | 32(12%)                | 24(16.7%)  |
| Level of Education     | No formal education | 49(18.4%)              | 45(31.2%)  |
|                        | Primary education   | 115(43.2%)             | 43(29.9%)  |
|                        | Secondary education | 43(16.2%)              | 27(18.8%)  |
|                        | Higher education    | 59 (22.2%)             | 29(20.1%)  |
| Occupation             | House wife          | 151(57%)               | 57(39.3%)  |
|                        | Self employed       | 47(18%)                | 31(21.4%)  |
|                        | Others              | 22(8%)                 | 26(18%)    |
|                        | Government employed | 21(7.9%)               | 13(9%)     |
|                        | NGO employed        | 17(6.4%)               | 6(4%)      |
|                        | Farmer              | 7(2.6%)                | 12 (8.3%)  |
| Religion               | Orthodox            | 185(69.5%)             | 83(57.6%)  |
|                        | Muslim              | 58(21.8%)              | 33(22.9%)  |
|                        | Protestant          | 22(8.3%)               | 26(18.1%)  |
|                        | Catholic and others | 1(0.4%)                | 2 (1.4%)   |
| Ethnicity              | Oromo               | 81(30.5%)              | 63(43.8%)  |
|                        | Amhara              | 112(42.1%)             | 43(29.9%)  |
|                        | Guraggie            | 49(18.4%)              | 26(18%)    |
|                        | Tigray and others   | 24(9%)                 | 12(8.3%)   |
| Monthly Income in birr | 1000 to 5000        | 105(39.5%)             | 74(51.4%)  |
|                        | 5001 to 10000       | 24(9%)                 | 9(6.3%)    |
|                        | >10000              | 15(5.6%)               | 6(4.2%)    |
|                        | <1000               | 122 (45.9%)            | 55(38.2%)  |

## **5.2. Bivariable and multivariable logistic regression analysis of factors associated with high BMI**

All independent variables have been considered for the bivariable logistic regression analyses.

All independent variables that showed p-value less than 0.2 in bivariable analyses were considered as candidate variables for the multivariable analysis. In bivariable analysis sex, place of residency, ethnicity, marital status, religion, level of education, occupation, monthly income, level of general knowledge about high body mass index, level of knowledge about causes of high body mass index, frequency of alcohol consumption, exercise level, duration of DM, central obesity and method of transportation were significantly associated with high body mass index.

Finally multivariable analysis was conducted and sex, educational level of respondents, those who uses private car or taxi and walking on foot as transportation method and central obesity of the respondents were statistically significant factors associated with high body mass index among type 2 DM. The odds of having high body mass index were 2.8 times higher in females than males (AOR: 2.788, CI: 1.620, 4.798). The odds of having high body mass index were 6 times higher in those participants who completed higher education than those without formal education (AOR: 6.396, CI: 2.177, 18.788). The odds of having high body mass index increases 5 times among those who sometimes walking on foot for transportation than those who usually uses walking on foot (AOR: 5.367, CI: 2.409, 11.959). Being not centrally obese decreases the odds of high body mass index by 98% as compared to those participants who were centrally obese (AOR: .024, CI: .010, .058). All significant variables with their adjusted odd ratio were described in table 6. No significant associations were evident for the other variable including marital status, level general knowledge about high body mass index and level of knowledge about causes of high body mass index. (Table6).

**Table 6:** Bivariable and multivariable analysis of factors associated with high body mass index Among type two DM patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa Ethiopia, 2022.(n=410).

| Variables                                               |                     | High body mass index |    | COR( 95% CI)         | AOR (95% CI)            | P Value              |
|---------------------------------------------------------|---------------------|----------------------|----|----------------------|-------------------------|----------------------|
|                                                         |                     | Yes                  | No |                      |                         |                      |
| Sex                                                     | Male                | 74                   | 62 | 1                    | 1                       | .002                 |
|                                                         | Female              | 192                  | 82 | 1.962(1.282,3.001)*  | 2.788 (1.620, 4.798)**  |                      |
| Educational level                                       | no formal education | 49                   | 45 | 1                    | 1                       | .000<br>.835<br>.001 |
|                                                         | primary education   | 115                  | 43 | 2.456(1.438, 4.195)* | 4.329(1.945, 9.635)**   |                      |
|                                                         | secondary education | 43                   | 27 | 1.463(.780, 2.743 )  | 1.101(.445, 2.722)      |                      |
|                                                         | higher education    | 59                   | 29 | 1.868(1.024, 3.408)* | 6.396(2.177, 18.788)**  |                      |
| Method of transportation<br>(Walking on foot)           | always              | 45                   | 45 | 1                    | 1                       | .002<br>.000<br>.057 |
|                                                         | usually/often       | 77                   | 40 | 1.925(1.097, 3.379)* | 3.330(1.537, 7.215)**   |                      |
|                                                         | sometimes           | 126                  | 50 | 2.520(1.487, 4.270)* | 5.367(2.409, 11.959) ** |                      |
|                                                         | never               | 18                   | 9  | 2.000(.813, 4.922)*  | 2.903(.970, 8.686)      |                      |
| Marital status                                          | single              | 21                   | 21 | 1                    | 1                       | .561<br>.264<br>.191 |
|                                                         | married             | 188                  | 82 | 2.293(1.187, 4.428)* | 1.307(.530, 3.223)      |                      |
|                                                         | divorced            | 25                   | 17 | 1.471(.620, 3.487)   | .496(.145, 1.697)       |                      |
|                                                         | widowed             | 32                   | 24 | 1.333(.597, 2.978)   | .462(.145, 1.472)       |                      |
| Method of transportation<br>(using private taxi or car) | always              | 20                   | 12 | 1                    | 1                       | .153                 |
|                                                         | usually/often       | 75                   | 25 | 1.800(.772,4.198)*   | 2.360(.726, 7.671)      |                      |

|                                  |             |     |     |                    |                     |      |
|----------------------------------|-------------|-----|-----|--------------------|---------------------|------|
|                                  | sometimes   | 162 | 87  | 1.117(.522,2.393)  | 1.698(.579, 4.976)  | .335 |
|                                  | never       | 9   | 20  | .270(.093, .782)*  | .150(.034, .659 )** | .012 |
| Central obesity                  | Yes         | 209 | 34  | 1                  | 1                   |      |
|                                  | No          | 57  | 110 | .084(.052, .137)*  | .024(.010, .058 )** | .000 |
| General knowledge about high BMI |             |     |     |                    |                     |      |
|                                  | Adequate    | 62  | 29  | 1                  | 1                   |      |
|                                  | Inadequate  | 135 | 60  | 1.052(.616, 1.798) | 1.426(.633, 3.211)  | .392 |
|                                  | Do not know | 69  | 55  | .587(.333, 1.033)* | .385(.138, 1.076)   | .069 |
| Knowledge on Causes of High BMI  |             |     |     |                    |                     |      |
|                                  | Adequate    | 24  | 9   | 1                  | 1                   |      |
|                                  | Inadequate  | 189 | 98  | .723(.324, 1.616)  | .547(.192, 1.561)   | .259 |
|                                  | Do not know | 53  | 37  | .537(.224, 1.287)* | 1.541(.419, 5.671)  | .515 |

☞ (“\*” Significant at  $p < 0.2$ , “\*\*” Significant at  $p < 0.05$ )

COR Crude Odd Ratio, AOR Adjusted Odd Ratio, CI confidence interval, 1-reference.

## 6. DISCUSSION

This study assessed the prevalence and associated factors of high body mass index among type two diabetes mellitus patients attending follow-up clinic at St. Paul Hospital Millennium Medical College, Addis Ababa.

According to this study, the overall prevalence of high body mass index among the study participants was 64.9 % (CI: 58.9, 69.5). Of which 41% and 23.9% were overweight and obese, respectively. The findings of this study showed that the prevalence of Type 2 diabetic patients with high body mass index in the study area is higher when compared with the findings of previous similar studies conducted in Addis Ababa, 46.4% (37), in Hosanna, 35.9% (14), in Mekelle, 40.8% (20) and in Jimma, 36.2% (38). This could be explained by the continuous change in the life style factors of the society and limited education offered by the health care workers in this setup. Nevertheless, the prevalence of Type 2 diabetic patients with high body mass index in this study is lower when compared with the findings of similar studies conducted in Tanzania (85%) (22) And in Nigeria (83%) (16). this could be explained by the likely differences in the life style, socioeconomic status and cultural factors of different countries.

### 6.1.Factors Associated With High Body Mass Index

In this study the factors which were significantly associated with high body mass index in multivariable logistic regression analysis were being female, those who attended primary and higher education, being centrally obese and those who usually or sometimes use walking on foot as transportation method. These results are in line with previous studies both prospective and retrospective which were conducted in both general population and facility-based among patients with type 2 diabetes (3, 6-8, 14,15,20).

Based on the adjusted odds ratio, it was found that women had 2.8 (95% CI: 1.620, 4.798) times increased odds of having high body mass index as compared to men. Similarly, being female was significantly associated with high body mass index, in a retrospective study conducted in Uganda to determine the prevalence of overweight and obesity and associated factors among patients with type 2 diabetes mellitus. This study showed that the factor found to be associated with overweight and obesity among type 2 DM patients was female gender (39). A possible reason for this difference might be physiological changes, genetic makeup, unhealthy eating behaviors and individual lifestyles among women. However, there might be other possible explanations for this

difference. In another study conducted in Tanzania, high prevalence of higher body mass index was observed in female participants as longitudinally (40).

There was a statistically significant association between high body mass index and physical activities. The odds of having high body mass index was 5 times higher among those who sometimes uses walking on foot for transportation than those who usually uses walking on foot, and this finding is in line with previous studies conducted in Mekelle and Hosanna, Ethiopia(14, 20). Similarly, this finding is in line with a study done in Ghana where physical activity was significantly associated with overweight (32). The reason might be that physical activity increases an individual's energy expenditure, which can help them stay in energy balance and such that physical activity decreases fat around the waist and total body fat, slowing increment of high body mass index. On the other hand low level of physical activity promotes buildup of fat in an individual's body and thus it might result in high body mass index.

In this study marital status had no significant association with high body mass index. While study conducted in Tanzania which was aimed to assess the prevalence of high body mass index among type 2 diabetic patients showed marriage was significantly associated with magnitude of high body mass index. Marriage predicts weight gain in both men and women, whereas marital termination (through divorce or widowhood) predicts weight loss compared to their male's counterparts i.e. 92.2% vs. 69.9% (40). This might be due to socio demographic difference in our setup women engage in more daily life activities.

In this study income level is not found to be associated with high body mass index but the odds of having high body mass index were higher among those with higher income level when compared to their counterparts on previous study conducted in jimma (38). Similarly, on retrospective study conducted in Uganda where factors found to be associated with high body mass index among type 2 DM patients is socioeconomic status (39). This relationship is probably due to participants with higher income level usually adopt western life style, which frequently leads to more intake of high fat and high caloric diet have a higher risk of expose to energy-dense foods and a sedentary way of life.

Other socio-demographic characteristics like occupation, place of residency and religion were not significantly associated with high body mass index. In previously conducted study conducted in South Africa showed that the most significant determinant of obesity was unemployment (42).

Similarly, study conducted in northern Tanzania shows being employed or self-employed had twofold increase in odds of having high body mass index in this setting (22). This could be explained by socioeconomic difference and life style difference of the populations. And also in previous study conducted in Mekelle, the odds of high body mass index were lower among patients live in rural area compared to their counterparts (20). The possible reason might be due to participants who live in urban area live a sedentary way of life and do less exercise and use vehicles for transportation.

In current study, duration of diabetes; treatment category; regular follow-up; knowledge about high body mass index; health education and exercise prescriptions for diabetes were not significantly associated with high body mass index. While in previous studies among the factors which were significantly associated with obesity on type 2 DM patients is duration of DM (14,20,25).The crossectional study conducted in Uganda showed that, patients who were on dual therapy were more than 2.2 times more likely to be overweight and obese (39). Since the other variables were significant in these populations, the above mentioned knowledge, clinical and institution/service related variables were adjusted as confounders in multivariable logistic regression.

### **Limitations of the study**

- There may be a recall bias in answering questions related to dietary practices, time spent for doing physical activity and sitting on a typical day.
- A single health facility based nature of the study that considered only patients under follow-up might limit the generalizability of the findings for all type 2 diabetic populations in Ethiopia. However, some findings of this study concur well with other previous studies.
- Its cross-sectional design has inherited disadvantage in ascertaining the temporal relationship between exposure and outcome.

## **7. CONCLUSION**

In conclusion, compared to the earlier studies, the prevalence of high body mass index in this study was found to be high among type 2 diabetes mellitus patients attending follow-up clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa.

Being female, those who attended primary and higher education, being centrally obese, those who usually or sometimes uses walking on foot and those who usually uses private car/taxi as transportation method were statistically significant factors associated with high body mass index among type 2 DM. Therefore, all stakeholders who are involved in the management of diabetes should be aware of this situation and should take appropriate interventions to tackle this problem.

## **8. RECOMMENDATIONS**

Based on this study finding the following recommendations have been forwarded to each respective body.

### **To Federal Ministry of Health**

Minister of health should appropriately balance health professionals and client's ratio in outpatient department in order to enhance physical activity and nutrition education for patients.

Public awareness through mass media about the prevalence of the problem and associated complications can have significant role in creating awareness.

### **To St. Paul's Hospital Millennium Medical College in Addis Ababa**

Effective management of high body mass index aimed at bringing towards normal body weight through organized programs including physical activity and nutrition education and training can have significant role in preventing the associated further complications in diabetic patients.

Public health awareness especially hospital-based awareness on healthy lifestyle and nutrition is essential in early management of diabetes.

This increased prevalence of high body mass index among type 2 diabetic patients in the present study over most of other similar studies necessitates greater efforts from responsible bodies to find possible solutions.

This finding is useful for the planning of health and nutrition programs as well as intervention strategies to combat high body mass index among type 2 DM patients, thereby reduce or prevent further insulin resistance and complications.

### **To health professionals**

Health service providers should encourage patient education programs about the importance of physical activity for the control of obesity among type two diabetic patients.

Health service providers should screen body mass index and record it in follow-up charts.

**To future researchers**

Further study is needed to assess the outcome of type 2 diabetes in presence of high body mass index.

Researcher should have to investigate perceived barriers to regular physical activity among type 2 DM patients.

## 9. References

1. Naser KA, Gruber A, Thomson GA. The emerging pandemic of obesity and diabetes: are we doing enough to prevent a disaster? *International journal of clinical practice*. 2006;60(9):1093-7.
2. Forouhi NG, Wareham NJ. Epidemiology of diabetes. *Medicine*. 2010;38(11):602-6.
3. Ng M FT, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: Global Burden of Disease Study 2013. 2014;766-81.
4. Hailu FB, Moen A, Hjortdahl P. Diabetes self-management education (DSME)–Effect on knowledge, self-care behavior, and self-efficacy among type 2 diabetes patients in Ethiopia: A controlled clinical trial. *Diabetes, metabolic syndrome and obesity: targets and therapy*. 2019;12:2489.
5. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE. Global estimates of diabetes prevalence for 2013 and projections for 2035. *Diabetes research and clinical practice*. 2014;103(2):137-49.
6. Control CfD, Prevention. <http://www.cdc.gov/obesity/adult/defining.html>.
7. Goran MI, Treuth MS. Energy expenditure, physical activity, and obesity in children. *Pediatric Clinics of North America*. 2001;48(4):931-53.
8. Racette SB, Deusinger SS, Deusinger RH. Obesity: overview of prevalence, etiology, and treatment. *Physical therapy*. 2003;83(3):276-88.
9. Gao F, Wang ZJ, Shen H, Yang SW, Nie B, Zhou YJ. Impact of obesity on mortality in patients with diabetes: Meta-analysis of 20 studies including 250,016 patients. *Journal of diabetes investigation*. 2018;9(1):44-54.
10. Grundy SM, Brewer Jr HB, Cleeman Jr SC, Lenfant C. Definition of metabolic syndrome: report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. *Circulation*. 2004;109(3):433-8.
11. Czernichow S, Kengne A-P, Huxley RR, Batty GD, De Galan B, Grobbee D, et al. Comparison of waist-to-hip ratio and other obesity indices as predictors of cardiovascular disease risk in people with type-2 diabetes: a prospective cohort study from ADVANCE. *European Journal of Preventive Cardiology*. 2011;18(2):312-9.
12. Miyazawa I, Kadota A, Miura K, Okamoto M, Nakamura T, Ikai T, et al. Twelve-year trends of increasing overweight and obesity in patients with diabetes: the Shiga Diabetes Clinical Survey. *Endocrine journal*. 2018;65(5):527-36.
13. Sigal RJ, Alberga AS, Goldfield GS, Prud'homme D, Hadjiyannakis S, Gougeon R, et al. Effects of aerobic training, resistance training, or both on percentage body fat and cardiometabolic risk markers in obese adolescents: the healthy eating aerobic and resistance training in youth randomized clinical trial. *JAMA pediatrics*. 2014;168(11):1006-14.
14. Lambebo A, Egata G, Mangistie B, Irenso AA. Overweight and Obesity among Type 2 Diabetic Patients at Nigist Elleni Memorial Hospital, Hosanna Town, Southern Ethiopia. *East African Journal of Health and Biomedical Sciences*. 2018;2(1):18-25.
15. Bassam A, Rasool H. Clinical Pharmacy Discipline, School of Pharmaceutical Sciences, University of Sains Malaysia. *Chromat Separation Techniq*. 2013.
16. Damian DJ, Kimaro K, Mselle G, Kaaya R, Lyaruu I. Prevalence of overweight and obesity among type 2 diabetic patients attending diabetes clinics in northern Tanzania. *BMC research notes*. 2017;10(1):1-6.
17. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. Annual deaths attributable to obesity in the United States. *Jama*. 1999;282(16):1530-8.
18. Organization WH. Obesity: preventing and managing the global epidemic. 2000.
19. Demographic CE. Health Survey-2011. Central Statistical Agency Addis Ababa. Ethiopia ICF International Calverton, Maryland, USA. 2012. 2016.

20. Kiros KG, Abyu GY, Belay DS, Goyteom MH, Welegebriel TK. Magnitude of overweight and associated factors among type 2 diabetes mellitus patients at Mekelle public hospitals, Tigray, Ethiopia: a cross-sectional study. *BMC research notes*. 2019;12(1):762.
21. Lyznicki JM, Young DC, Riggs JA, Davis RM. Obesity: assessment and management in primary care. *American family physician*. 2001;63(11):2185.
22. Damian DJ, Kimaro K, Mselle G, Kaaya R, Lyaruu I. Prevalence of overweight and obesity among type 2 diabetic patients attending diabetes clinics in northern Tanzania. *BMC research notes*. 2017;10(1):515.
23. Masmiquel L, Leiter L, Vidal J, Bain S, Petrie J, Franek E, et al. LEADER 5: prevalence and cardiometabolic impact of obesity in cardiovascular high-risk patients with type 2 diabetes mellitus: baseline global data from the LEADER trial. *Cardiovascular diabetology*. 2016;15(1):29.
24. Grundy SM, Benjamin IJ, Burke GL, Chait A, Eckel RH, Howard BV, et al. Diabetes and cardiovascular disease: a statement for healthcare professionals from the American Heart Association. *Circulation*. 1999;100(10):1134-46.
25. Eeg-Olofsson K, Cederholm J, Nilsson P, Zethelius B, Nunez L, Gudbjörnsdóttir S, et al. Risk of cardiovascular disease and mortality in overweight and obese patients with type 2 diabetes: an observational study in 13,087 patients. *Diabetologia*. 2009;52(1):65-73.
26. Stuart B, Lloyd J, Zhao L, Kamal-Bahl S. Obesity, disease burden, and prescription spending by community-dwelling Medicare beneficiaries. *Current Medical Research and Opinion*. 2008;24(8):2377-87.
27. Henry R, Wallace P, Olefsky J. Effects of weight loss on mechanisms of hyperglycemia in obese non-insulin-dependent diabetes mellitus. *Diabetes*. 1986;35(9):990-8.
28. Kao YH, Chang HH, Lee MJ, Chen CL. Tea, obesity, and diabetes. *Molecular nutrition & food research*. 2006;50(2):188-210.
29. Ethiopia F. Health sector transformation plan I. Addis Ababa. 2015.
30. Kiros KG, Abyu GY, Belay DS, Goyteom MH, Welegebriel TK. Magnitude of overweight and associated factors among type 2 diabetes mellitus patients at Mekelle public hospitals, Tigray, Ethiopia: a cross-sectional study. *BMC research notes*. 2019;12(1):1-6.
31. Alberti KGMM, Zimmet P, Shaw J. International Diabetes Federation: a consensus on Type 2 diabetes prevention. *Diabetic Medicine*. 2007;24(5):451-63.
32. Obirikorang Y, Obirikorang C, Odame Anto E, Acheampong E, Dzah N, Akosah CN, et al. Knowledge and lifestyle-associated prevalence of obesity among newly diagnosed type II diabetes mellitus patients attending diabetic clinic at Komfo Anokye Teaching Hospital, Kumasi, Ghana: a hospital-based cross-sectional study. *Journal of diabetes research*. 2016;2016.
33. Mathers CD LD. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med*. Nov 2006;3(11):e442.
34. Abubakari AR LW, Agyemang C, Jones M, Kirk A, Bhopal RS. Prevalence and time trends in obesity among adult West African populations: a meta-analysis. *Obes Rev*. 2008;9(4):297-311.
35. Blumentals WA, Hwu P, Kobayashi N, Ogura E. Obesity in hospitalized type 2 diabetes patients: A descriptive study. *Medical science monitor: international medical journal of experimental and clinical research*. 2013;19:359.
36. Colosia AD, Palencia R, Khan S. Prevalence of hypertension and obesity in patients with type 2 diabetes mellitus in observational studies: a systematic literature review. *Diabetes, metabolic syndrome and obesity: targets and therapy*. 2013;6:327.
37. Worku A, Abebe SM, Wassie MM. Dietary practice and associated factors among type 2 diabetic patients: a cross sectional hospital based study, Addis Ababa, Ethiopia. *SpringerPlus*. 2015;4(1):1-8.
38. Abdissa D, Dukessa A, Babusha A. Prevalence and associated factors of overweight/obesity among type2 diabetic outpatients: Hospital-based, cross-sectional study , Southwest Ethiopia. *Heliyon* 7 (2021) e06339

39. Tino S, Mayanja BN, Mubiru MC, Eling E, Ddumba E, Kaleebu P, et al. Prevalence and factors associated with overweight and obesity among patients with type 2 diabetes mellitus in Uganda—a descriptive retrospective study. *BMJ open*. 2020;10(11):e039258.
40. Damian DJ, Kimaro K, Mselle G, Kaaya R, Lyaruu I. Prevalence of overweight and obesity among type 2 diabetic patients attending diabetes clinics in northern Tanzania. *BMC research notes*. 2017;10(1):515.
41. Hajian-Tilaki K, Heidari B. Prevalence of obesity, central obesity and the associated factors in urban population aged 20–70 years, in the north of Iran: a population-based study and regression approach. *Obesity reviews*. 2007;8(1):3-10.
42. Adeniyi OV, Longo-Mbenza B, Ter Goon D. Female sex, poverty and globalization as determinants of obesity among rural South African type 2 diabetics: a cross-sectional study. *BMC public health*. 2015;15(1):298.
43. Feleke SA, Alemayehu CM, Adane HT, Onigbinde A, Akindoyi O, Faremi F. Assessment of the level and associated factors with knowledge and practice of diabetes mellitus among diabetic patients attending at FelegeHiwot hospital, Northwest Ethiopia. *Clin Med Res*. 2013;2(6):110.
44. Iglay K, Hannachi H, Joseph Howie P, Xu J, Li X, Engel SS, et al. Prevalence and co-prevalence of comorbidities among patients with type 2 diabetes mellitus. *Current medical research and opinion*. 2016;32(7):1243-52.
45. Dereje N, Earsido A, Temam L, Abebe A. Prevalence and associated factors of diabetes mellitus in Hosanna Town, Southern Ethiopia. *Annals of global health*. 2020;86(1).
46. Koyra HC, Doda BE. Physical exercise and factors affecting among adult diabetic patients at Wolaita Soddo University teaching referral hospital, Southern Ethiopia. *International Journal of Physical Education, Sports and Health*. 2017;4(5):82-6.
47. Sartorius B, Veerman LJ, Manyema M, Chola L, Hofman K. Determinants of obesity and associated population attributability, South Africa: Empirical evidence from a national panel survey, 2008-2012. *PloS one*. 2015;10(6):e0130218.
48. Adeniyi OV, Longo-Mbenza B, Ter Goon D. Female sex, poverty and globalization as determinants of obesity among rural South African type 2 diabetics: a cross-sectional study. *BMC public health*. 2015;15(1):1-8.
49. Daousi C, Casson I, Gill G, MacFarlane I, Wilding J, Pinkney J. Prevalence of obesity in type 2 diabetes in secondary care: association with cardiovascular risk factors. *Postgraduate medical journal*. 2006;82(966):280-4.
50. Organization WH. Summary: surveillance of risk factors for noncommunicable diseases: the WHO STEPwise approach. World Health Organization, 2001.
51. Asaad G, Sadegian M, Lau R, Xu Y, Soria-Contreras DC, Bell RC, et al. The reliability and validity of the perceived dietary adherence questionnaire for people with type 2 diabetes. *Nutrients*. 2015;7(7):5484-96.
52. Obirikorang Y, Obirikorang C, Odame Anto E, Acheampong E, Dzah N, Akosah CN, et al. Knowledge and Lifestyle-Associated Prevalence of Obesity among Newly Diagnosed Type II Diabetes Mellitus Patients Attending Diabetic Clinic at Komfo Anokye Teaching Hospital, Kumasi, Ghana: A Hospital-Based Cross-Sectional Study. *Journal of Diabetes Research*. 2016;2016:9759241.
53. Forde C. Scoring the international physical activity questionnaire (IPAQ). University of Dublin. 2018.
54. Uhomoibhi PE. Prevalence, and determinants, of diabetes mellitus and impaired fasting glucose among workers at the spare parts share company, Akaki. 2003.
55. Pei X, Liu L, Imam MU, Lu M, Chen Y, Sun P, et al. Neck circumference may be a valuable tool for screening individuals with obesity: findings from a young Chinese population and a meta-analysis. *BMC public health*. 2018;18(1):529.
56. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. *Source code for biology and medicine*. 2008;3(1):1-8.

## 10. Annexes

### Annex i. Participant's information sheet

Greeting: Good morning/afternoon

My name is \_\_\_\_\_ I am working on behalf of research conducted by Sara Birhanu student of st. paul's hospital millenium medical college, school of public health in nutrition. I would like to ask few questions which take around 7 minutes. Your genuine responses that you are going to give are very important to identify problems related to higher body mass index and design programs. You are selected purposefully to be participant of this study if you give me consent after you have understood the following information sheet:

**Title of the study:** prevalence of High body mass index among Type 2 Diabetes Patients at st. paul's hospital millenium medical college, Ethiopia 2022

**Back ground of the study:** Higher body mass index defined as BMI  $25.0 \text{ kg/m}^2$  or above, represent progressive buildup of adipose tissue to levels that damage the physical and psychosocial health and well-being of an individual.

**Objective of the study:** To identify the prevalence of high body mass index in Type 2 DM patients at st. paul's hospital millenium medical college, addis ababa, Ethiopia 2022.

**Benefit of the study:** you will not gain any direct benefit, yet if you have higher body mass index during examination, opportunities for management will be arranged and you will be followed. If you don't have higher body mass index you recommended for strict followups.

**Risk of the study:** The study has no any risk for the participants and interview will be private to make safe participants from any fear.

**Rights of participants:** Participating and non participation in the study is the full rights of participants and you can ask any question which is not clear for you. You do not have to answer any questions that you do not want to answer and you may end this interview at any time you want to.

**Confidentiality:** Any information forwarded will be kept private and her/his name will not be specified.

## Annex ii. Informed consent

I have read this form or it has been read to me in the language I comprehend and understand all conditions stated above. Are you willing to participate in this study?

1.No (Say Thank you)

2. Yes ☐ participant's signature .....

Continue your interview

I certify that the nature and purpose, the potential benefits and possible risks associated with participating in this study have been explained to the volunteer.

\_\_\_\_\_

Signature of interviewer

Date

Result of interview: 1. Completed

2. Respondent not available

3. Refused.

4. Partially completed

Checked by supervisor, name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

### **Annex iii: Data collection form of English version**

#### **Part 1:- Socio-demographic Information**

| S.NO | QUESTION           | RESPONSE CATEGORY                                                      | Skip to |
|------|--------------------|------------------------------------------------------------------------|---------|
| 1.   | Age                | -----                                                                  |         |
| 2.   | Sex                | 1 Male<br>2 Female                                                     |         |
| 3.   | Place of residency | 1 urban<br>2 rural                                                     |         |
| 4.   | Marital status     | 1. Single<br>2. Married<br>3. Divorced<br>4. Widowed<br>5. Other _____ |         |
| 5.   | Religion           | 1 Orthodox<br>2. Muslim<br>3. protestant<br>4. catholic<br>5. other_   |         |
| 6.   | Ethnicity          | 1. Oromo<br>2. Amhara<br>3. Gurage<br>4. Tigray                        |         |

## 5.Others

- |     |                                   |                                                                                                                                                     |                       |
|-----|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 7.  | Did you attended formal education | 1.Yes<br>2.No                                                                                                                                       | If yes go to q. no. 8 |
| 8.  | Educational level                 | 1. Unable to read and write<br>2. read and write<br>3. Primary<br>4. Secondary<br>5. Diploma<br>6. Degree and Above                                 |                       |
| 9.  | Occupation                        | 1. Government employee<br>2. Nongovernmental employee<br>3. Self employed<br>4. Farmer<br>5. Student<br>6.. Merchant<br>7. Other ( <b>specify</b> ) |                       |
| 10. | Income                            | Enter_____                                                                                                                                          | birr per month        |

## Part 2. Behavioral and personal practices

| Knowledge of Higher body mass index |                              | Code(choice)                                                                                                                                                                                                         |
|-------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11.                                 | <b>General knowledge</b>     | <ul style="list-style-type: none"><li>1.Understanding the meaning of high body mass index</li><li>2.Ideal body weight</li><li>3.Method of weight measurement</li></ul>                                               |
| 12.                                 | <b>Causes</b>                | <b>Causes of high body mass index</b> <ul style="list-style-type: none"><li>1.Poor diet</li><li>2.Physical inactivity</li><li>3.Insufficient sleep/stress</li><li>4.Family history of high body mass index</li></ul> |
| 13.                                 | <b>Complications</b>         | <ul style="list-style-type: none"><li>1.Hypertension</li><li>2.Stroke</li><li>3.Cancer</li></ul>                                                                                                                     |
| 14.                                 | <b>knowledge about mgmt.</b> | <ul style="list-style-type: none"><li>1.Dietary modification</li><li>2.Physical activity</li><li>3.Regular health checkup/medication</li><li>4.Other life style(alcohol, smoking, and sedentary activity)</li></ul>  |

| <b>Dietary practice of type 2 diabetic patients</b> |                                                                                                                                                                  | <b>Response in number of days</b> |   |   |   |   |   |   |   |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---|---|---|---|---|---|---|
|                                                     | Items                                                                                                                                                            | 0                                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15.                                                 | How many days in weak do you eat healthful eating plan such based on Ethiopian Food Guide for diabetics?                                                         |                                   |   |   |   |   |   |   |   |
| 16.                                                 | How many days in weak do you eat fruit and vegetable Servings?                                                                                                   |                                   |   |   |   |   |   |   |   |
| 17.                                                 | How many days in weak do you eat carbohydrate-containing foods with a low Glycemic Index? (Example: dried beans, lentils, barley, pasta, low fat dairy products) |                                   |   |   |   |   |   |   |   |
| 18.                                                 | How many days in weak do you eat foods high in sugar, such as Cakes, cookies, desserts, candies, etc.?                                                           |                                   |   |   |   |   |   |   |   |
| 19.                                                 | How many days in weak do you eat foods of freely or with minimal restrictions for diabetics?                                                                     |                                   |   |   |   |   |   |   |   |
| 20.                                                 | How many days in weak do you eat foods high in fat (such as high fat dairy Products, fatty meat, fried foods or deep fried foods)?                               |                                   |   |   |   |   |   |   |   |

## CONCERNING ALCOHOL CONSUMPTION

## CODE

21. Have you ever taken any type of alcoholic drink?  
(Beer, wine, spirit, 'tella', 'tej' etc.)
1. Yes
  2. Yes, but not in the past 12 months
  3. No, I have never  
⇒Skip to Qn.22
22. In the past one month, how frequently have you taken at least one alcoholic **drink**? \*
- \*This refers to one 'standard drink'
- (see below)
1. 5 or more days a week
  2. 1-4 days a week
  3. Less than three days this month
  4. Less than every month
23. When you drink alcohol, what is your average Consumption at a sitting?
- (number of drinks)

## QUESTIONS RELATED TO SMOKING/TOBACCO USE

## code

24. Have you ever smoked on a regular basis?
1. Yes, daily
  2. Yes, but not daily
  3. No, never daily
25. Do you currently smoke any tobacco product  
Such as cigarettes, cigars, or pipes?
1. Yes
  2. No ⇒Skip to Qn
26. On the average, how many of the following listed items do you smoke each day?
1. -----no of factory-produced cigarettes per day
  2. -----no of hand-rolled (local) cigarettes per day
  3. -----no of local pipes ('Gaya') full of tobacco

- per day
4. -----no of cigars  
per day
- 88.Other -----  
--(specify type ,and no per  
day) e.g. 'shisha'
27. Do you currently use smokeless tobacco product such as snuff, chewing tobacco, etc.?
1. Yes, daily
2. Yes, sometimes
3. No, not at all

### A. CONCERNING PHYSICAL ACTIVITY

### CODE

28. Firstly, how many hours do you typically spend at work each day? -----no of  
hours
29. During these hours, how frequently do you practice the following? (**Fill 1-4 from the response choices in the space provided**)
1. Always
2. Usually/Often
3. Sometimes
4. Never
- A. Mostly Sitting or Standing with only a short walking distance -----  
- (mild exercise)
- B. Activities that require the same physical effort as  
walking long distance or backyard gardening -----  
(moderate exercise)
- C. Activities that require the same effort as lifting heavy weights or  
heavy construction work ----- (heavy exercise)
30. How often do you use the following transportation methods on a typical day?)
1. Always
2. Usually/Often
3. Sometimes
4. Never
- A. Private car or taxi -----
- B. Public transport such as city bus, factory bus, minibuss
- C. Motorbike or bicycle -----
- D. Walking (on foot) -----
31. Outside the working hours or transportation time, how often do you practice the following activities?
1. Always
2. Usually/Often

(Fill 1-4 from the choices in the space provided)

A. Mostly Sitting or Standing with only a little walking ----

B. Activities that require the same effort as walking long distance, or backyard gardening, or climbing upstairs -----

C. Activities that require the same effort as lifting heavy weight or strenuous exercise -----

3. Sometimes

4. Never

If answer to Qn 31 is always (1) or often

(2), specify the time spent on these activities.

-----hours

OR

-----mins

#### **Part IV-clinical condition**

##### **Clinical condition**

code

**32.** How long has it been since you diagnosed with DM?

##### **Diabetic tratments**

**33.** Which drug regimen you are following currently for your diabetes?

Oral anti diabetic medication only

Insulin only

Insulin and oral anti diabetic medication

Only following dietary plan as recommended

Exercise

| PHYSICAL MEASUREMENTS |        |         | CODE |
|-----------------------|--------|---------|------|
| 34.                   | Weight | .....kg |      |
| 35.                   | Height | .....cm |      |
| 36.                   | BMI    | .....   |      |
| 37.                   | WC     | .....cm |      |
| 38.                   | HC     | .....cm |      |
| 39.                   | WHR    |         |      |

| HEALTH INSTITUTION/SERVICE RELATED |                                                                       |                 | CODE |
|------------------------------------|-----------------------------------------------------------------------|-----------------|------|
| 40.                                | Did you get health education regarding Overweight/obesity prevention? | A. Yes<br>B. No |      |
| 41.                                | Do you attend regular followup                                        | A. Yes<br>B. No |      |
| 42.                                | Did you get exercise prescription                                     | A. Yes<br>B. No |      |

**Annex iv: Amharic version of information sheet**

**የአማርኛ መረጃ መሰብሰቢያ መሳሪያ**

በ ክዱስ ፓውሎስ ሆስፒታል የስኳር ህክምና ክሊኒክ በተመላላሽ ህክምና የሁለተኛው አይነት የስኳር ህመምተኞችን ከመተን በላይ ውፍረትና ተያያዥ ጉዳዮችን ለማጥናት የተዘጋጀ መጠይቅ

ሀ. የተሳታፊዎች የጥናቱ መረጃ መግለጫ

ሰላምታ፡ እንደምንዋልሽ/ክ ወይም እንደምን አደርሽ/ክ

ስሜ .....ይባላል። በ ክዱስ ፓውሎስ ሆስፒታል ምልኒያም መዲካል ኮሌጅ የ2ተኛ ደረጃ ትምህርት መስመራት ላይ ሳራ ብርሃኑ በምታካሂደው ጥናት ላይ የመረጃ ሰብሳቢ ነኝ። ከመጠን በላይ ውፍረትን የሚያመጣው ምክንያቶች አስመልክቶ እስከ 7 ደቂቃ የሚወስድ ጥያቄዎችን ልጠይቀዎ እወዳለሁ የእርሶም መልስ ከመጠን በላይ ውፍረትን የሚያመጣው ምክንያቶች ለመለየት እና መፍትሄ አቅጣጫዎችን ለማስቀመጥ እንደሚያግዝ አምናለሁ። እርሶም የተመረጡት በሌላ ምክንያት ሳይሆን በአጋጣሚ እንደሆነ ልነግርዎት እወዳለሁ። ጥናቱን አስመልክቶ አንዳንድ ነገር ግልፅ ለማድረግ ያህል፡-

**የጥናቱ ርዕስ፡-** በክዱስ ፓውሎስ ሆስፒታል የስኳር ህክምና ክሊኒክ በተመላላሽ ህክምና የሁለተኛው አይነት የስኳር ህመምተኞችን ከመተን በላይ ውፍረትና ተያያዥ ጉዳዮችን ለማጥናት የተዘጋጀ መጠይቅ።

**የጥናቱ አላማ፡-** በ ክዱስ ፓውሎስ ሆስፒታል የስኳር ህክምና ክሊኒክ በተመላላሽ ህክምና የሁለተኛው አይነት የስኳር ህመምተኞችን ከመተን በላይ ውፍረትና ተያያዥ ጉዳዮችን መመርመር ነው።

**የጥናቱ ጥቅም፡-** ምንም እንኳን በጥናቱ ላይ የሚሳተፉ ሰዎች በቀጥታ የሚያገኙት ጥቅም ባይኖርም ከጥናቱ የሚገኘው መረጃ በ ክዱስ ፓውሎስ ሆስፒታል የስኳር ህክምና ክሊኒክ በተመላላሽ ህክምና የሁለተኛው አይነት የስኳር ህመምተኞችን ከመተን በላይ ውፍረትን የሚያመጡ ችግሮችን ለመቅረፍ ከማስቻል በላይ በሀገር ደረጃ የራሱ አስተዋጽኦ እንደሚኖረው ይታመናል።

**የጥናቱ ስጋት፡-** በጥናቱ ላይ መሳተፍ ለተሳታፊዎች ምንም የሚያመጣው ችግር የሌለ እና የሚሰጡት መረጃ ሚስጥራዊነቱ የተጠበቀ ነው።

**የተሳታፊዎች መብት፡-** በጥናቱ ላይ መሳተፍም አለመሳተፍም ሙሉ መብት ያላቸው ሲሆን ተሳታፊዎችም በማንኛውም ጊዜ እራሳቸውን ከጥናቱ ማግለል ይችላሉ፤ ከዚህም በተጨማሪ በጥናቱ ላይ ምንም አይነት ጥያቄዎች ካሏቸው የበለጠ እንዲብራራላቸው መጠየቅ ይችላሉ።

**የጥናቱ ሚስጥራዊነት፡-** ማንኛውም መረጃ ሚስጥራዊነቱ የተጠበቀ ሲሆን በመጠይቁ ላይ የተሳታፊዎችን ስም መግለፅም አስፈላጊ አይደለም። ከማንነትዎ ጋር በቀጥታ ተያያዥነት ያላቸው መረጃዎች በሙሉ በዋና ተመራማሪው ሚስጥራዊ በሆነ የመረጃ ጥንቅር ዘዴ ከተቀየሩ በኋላ ብቻ ምርምር ሂደቱ የሚውል ይሆናል።

## **Aneex v: Amharic version of consent form**

ለ. የስምምነት ቅጽ

ከላይ ያነበብኩልዎትን መረጃ በሚገባ ከተረዱት በጥናቱ ላይ ለመሳትፍ ፈቀደኛ ነዎት ?

1) አይደለሁም (አመሰግናለሁ)

2) አዎ (ቃለመጠይቁ ይቀጥላል)

ጥናቱን የሚያካሄደው ተማሪ፡- ሳራ ብርሃኑ

የተጠያቂው ፊርማ ..... ቀን.....

ቃለመጠይቁ የተካሄደበት ቀን.....

የቃለመጠይቁ ዉጤት

1) የተፈጸመ

2) መልስ ሰጭ የለም

3) መልስ ሰጭው ፍቃደኛ ያልሆነበት

4) በከፊል የተሞላ

ያረጋገጠው ተቆጣጣሪ ስም ..... ፊርማ ..... ቀን .....

# Annex vi: Amharic version of questionnaire

## ማህበራዊ መረጃዎችን በተመለከተ የተዘጋጀ ቃለመጠይቅ

| ቁ  | ጥያቄ          | የኮድክፍፍል                                                       |
|----|--------------|---------------------------------------------------------------|
| 1. | ዕድሜ          | -----ዓመት                                                      |
| 2. | ጾታ           | 1. ሴት<br>2. ወንድ                                               |
| 3. | የመኖሪያ ቦታ     | 1. ከተማ<br>2. ገጠር                                              |
| 4. | የጋብቻ ሁኔታ?    | 1. ያገባ<br>2. ያላገባ<br>3. በሞትየተለዩ<br>4. ፈት<br>5. ሌላካለይግለጹ ..... |
| 5. | ብሄረዎት ምንድነው? | አማራ<br>አሮሞ<br>ጉራገ<br>ትግረ<br>ሌላ.....                           |

6. የስራህ/ሽ/ ሁኔታ

1. የመንግስትሰራተኛ
2. የመንግስታዊያልሆነቅጥር
3. የግልስራ
4. አርሶአደር
5. ተማሪ
6. ሌላካለይግለጹ .....

7. ሃይማኖት

1. ኦርቶዶክስ
2. ሙስሊም .....
3. ፕሮቴስታንት
4. ካቶሊክ
5. ሌላካለይግለጹ

8. መደበኛትምህርትተምረዋል

1. አዎ
2. አይ

መልስዎአዎከሆነአዎከሆነዎደቀጣዩ

9. የትምህርትደረጃ

1. ማንበብናመፃፍየማይችል/ትችል
2. ማንበብናመፃፍየሚችል/ትችል
3. 1ኛደረጃ
4. 2ተኛደረጃ
5. ዲፕሎማ
6. ድግሪእናከዚያበላይ

10. የወርሃዊገቢ

\_\_\_\_\_ብር

**ከመጠን በላይ ውፍረት እውቀትን የሚመለከት ጥያቄ**

**ኮድ**

11. አጠቃላይእውቀት

ከመጠንበላይውፍረትትርጉምማወቅ

ትክክለኛየሰውነትክብደትከመጠንበላይ

የክብደትመለኪያዘዴ

12. ከመጠንበላይውፋረትመንስኤዎች ደካማአመጋገብ  
አካላዊእንቅስቃሴ-አልባነት  
በቂእንቅልፍ /  
ጭንቀትከመጠንበላይክብደትያለውየቤተሰብታሪክ  
/ ከመጠንበላይውፋረት
13. ተያያዥቸግሮች የደምግፊት  
ስትሮክ  
ካንሰር
14. ስለመከላከልናመቆጣጠርእውቀት የአመጋገብማሻሻያ  
አካላዊእንቅስቃሴ  
መደበኛየጤናምርመራ / መድሃኒት  
ሌላየሕይወትዘይቤ (አልኮሆል፣  
ማጨስእናእንቅስቃሴየማያደርግእንቅስቃሴ)

# የሁለተኛው ስኬር ዓይነት ህመምተኞች የአመጋገብ ልምምድ

በሳምንት ውስጥስንትግዘ

ጥያቄ

0 1 2 3 4 5 6 7

በሳምንትውስጥስንትቀናት

የስኬርህመምተኞችንበኢትዮጵያየምግብመመሪያላይበመመርኮዝእንደዚህባለው  
ጤናማየአመጋገብእቅድይመገባሉ

በሳምንትውስጥስንትቀናት

የፍራፍሬ እና የአትክልት አቅርቦቶች ይመጣሉ

በሳምንት ውስጥ ስንት ቀናት

ካርቦን ድፍት የያዙ ምግቦች በዝቅተኛ ግላይኬሚካል መረጃ ጠቋሚ መሰረት ይመጣሉ

እንደ ኬኮች፣ ኩኪዎች፣ ጣፋጮች፣ ከረሜላዎች፣

ወዘተ ያሉ በስኳር የበዛባቸው ምግቦች በሳምንት ውስጥ ስንት ቀናት ይመጣሉ?

በሳምንት ውስጥ ስንት ቀናት በነፃ ወይም ለስኳር ህመም ተኞች አነስተኛ ገደቦችን የሚበሉ ምግቦችን ይመጣሉ?

በሳምንት ውስጥ ስንት ቀናት ከፍተኛ ቅባት ያላቸው ምግቦችን ይመጣሉ  
(እንደ ከፍተኛ ቅባት ያላቸው የወተት ተዋጽኦዎች፣ ጮማሥ ጋ፣ የተጠበሱ ምግቦች)?

## አልኮል ተዛማጅ ጥያቄዎች

ኮ  
ድ

- ማንኛውንም ዓይነት አልኮል ወስደህታውቃለህ? (ቢራ፣ ወይን፣ <ቴላ> ፣ 1. አዎ  
<ቴጅ> ወዘተ) 2. አዎ፣ ግን ላለፉት 12 ወራት አይደለም  
3. አይ፣ በጭራሽ ከሆነ ወደ Qn.22 ዝለል
- ባለፈው አንድ ወር ውስጥ ቢያንስ አንድ የአልኮል መጠጥምን ይህልጊዜ ወስደህ? 1. በሳምንት 5  
ዋል? \* Refers ይህ የሚያመለክተው አንድ <መደበኛ መጠጥ> ነው። ወይም ከዚያ በላይ ቀናት 2  
(ከዚህ በታች ይመልከቱ) 2. በሳምንት ከ1-4 ቀናት  
3.

በዚህ ወር ከሶስት ቀናት በታች

4. ከወር በታች

፡ አልኮል ሲጠጡ በአንድ ቁጭብ ለውሃ ማካደፍ ጆታዎን ያህል ነው?

----- (የመጠጥብ ዘዴ)

### ስጋ ራሳችሁን በተመለከተ

24. በመደበኛነት አጭሶ ይውቃሉ?

1. አዎ፣ በየቀኑ
2. . አዎ፣ ግን በየቀኑ አይደለም
3. . አይበጭራሽ

25. በአሁኑ ጊዜ እንደ ሲጋራ፣

ሲጋራ ወይም ቧን ቧን ለማናቸውን ምን ምን ምርቶች ያጫሳሉ?

1. አዎ
2. የለም Q ወደ 26 ዝለል

26. በአማካኝ በየቀኑ ከሚከተሉት የተዘረዘሩ ዕቃዎች ውስጥ ስንት ያጫሳሉ?

1. -----  
ከፋብ ሪከፖርት መረት ሲጋራ
2. -----  
በየቀኑ በእጅ የሚሸከረከር  
(አካባቢያዊ) ሲጋራ
3. -----  
የትምባሆ ሞልቶ አካባቢ  
ው ('gaya')  
4. -----  
በየቀኑ ሲጋራዎች አይኖሩም  
ሌላ -----  
-- (ዓይነት ይጥቀሱ፣  
እና በቀን አይገኙም)  
ለምሳሌ 'sisha '

27. በአሁኑ ጊዜ ጭስ አልባ የትምባሆ ምርት እንደ ማጣጫ፣

1. አዎ፣ በየቀኑ

የትምባሆማኘክወዘተይጠቀማሉ?

2. አዎ፣አንዳንድጊዜ

3. አይበጭራሽ

የአካላዊእንቅስቃሴ

ከ  
ድ

28. በመጀመሪያ፣በመደበኛነትበየቀኑበስንትሰዓትያጠፋሉ?

----- የሰዓቶችአይ

29. በእነዚህሰዓታትውስጥየሚከተሉትንምንያህልተደጋጋሚልምምድያ

1. ሁልጊዜ

ደርጋሉ? (በውስጥካለውየምላሽምርጫዎች

1-4

2. ብዙውንጊዜ / ብዙጊዜ

ይመሉበታተሰጥቷል)

3. አንዳንድጊዜ

ሀ / በአብዛኛውመቀመጥወይምመቆምበአጭሩበእግርብቻርቀት -----

4. በጭራሽ

-- (መለስተኛየአካልብቃትእንቅስቃሴ)

ለ.

ተመሳሳይአካላዊጥረትየሚጠይቁእንቅስቃሴዎችረጅምርቀትወይምየጓ

ሮአትክልትመጓዝ ----- (መካከለኛየአካልብቃትእንቅስቃሴ) ሐ /

እንደከባድማንሳትተመሳሳይጥረትየሚጠይቁተግባራትክብደትወይምከ

ባድየግንባታሥራ ----- (ከባድመልመጃ)

30. በተለመደውቀንየሚከተሉትንየትራንስፖርትዘዴዎችምንያህልጊዜ

1. ሁልጊዜ 2. ብዙውንጊዜ / ብዙጊዜ

ይጠቀማሉ?) ሀ. የግልመኪናወይምታክሲ -----

3. አንዳንድጊዜ 4. በጭራሽ

ቢየህዝብማመላለሻእንደየከተማአውቶቡስ፣የፋብሪካአውቶቡስ፣

ሚኒባስሲሞተርብስክሌትወይምብስክሌት ----- መበእግር

(በእግር)

31. ከስራሰዓቱወይምከትራንስፖርትሰዓቱውጭ፣

1. ሁልጊዜ

የሚከተሉትንተግባራትምንያህልጊዜይለማመዳሉ?

2. ብዙውንጊዜ / ብዙጊዜ

(በተጠቀሰውቦታውስጥካሉምርጫዎች 1-4 ይመሉ)

3. አንዳንድጊዜ

ሀ / በአብዛኛውመቀመጥወይምመቆምበትንሽመራመድብቻነው ---- ለ.

4. በጭራሽ

ረጅምበእግርመጓዝተመሳሳይጥረትየሚጠይቁእንቅስቃሴዎችርቀት፣

ወይምየጓሮአትክልትመንከባከብ፣ወይምወደላይመውጣት ----- ሐ /

እንደከባድማንሳትተመሳሳይጥረትየሚጠይቁትግባራትክብደትወይምከ  
ባድየአካልብቃትእንቅስቃሴ -----

ለቁጥር 28 መልስሁልጊዜ (1)  
ወይምብዙጊዜከሆነ (2) ፣  
በእነዚህእንቅስቃሴዎችላይያጠፋው  
ንጊዜይግለጹ። -----  
ሰዓታትወይም ----- ደቂቃዎች

### ህክምናነክሁኔታ

32. የስኳርህመምተኛከሆኑምንያህልጊዜሆኖት -----

33. ለስኳርህመምከሚሰጡመድሀኒቶችመካከልየትኛዎቹንበተከታታይ  
ይደወሰዳሉ፤

የሚዋጡትንብቻ-----1

ኢንሱሊንንብቻ-----2

የሚዋጡትንእናኢንሱሊን-----

3

አመጋገብእናእንቅስቃሴበማከናወንብቻ-----4

ሌላ (ይገለፅ)\_\_\_\_\_5

34. የሰውነትክብደት \_\_\_\_\_ ኪ.ግ

35. ቁመት \_\_\_\_\_ ሜትር

36. የክብደትእናቁመትምጣኔ \_\_\_\_\_ ኪ.ግ / ሜትር<sup>2</sup>

37. የወገብዙሪያ \_\_\_\_\_

38. ህፕተርያ \_\_\_\_\_

39. ወገብዳለፊሾ-----

-----

**የጤናተቋም / ከአገልግሎትጋርተያያዥነትያላቸውምክንያቶች**

40. ከመጠንበላይውፋረትንለመከላከልየጤናትምህርትተምረዋል?      A.አዎ-----1  
B አይ-----2
41. መደበኛ ክትትል ያደርጋሉ      A.አዎ-----1  
B አይ-----2
42. የ ሰውነት እንቅስቃሴ በ ሃኪም ይታዘዛል      A.አዎ-----1  
B አይ-----2

## **11.STATEMENT OF THE AUTHOR**

I, the undersigned declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Public Health in public health nutrition. I also declare that it has never been presented in this or any other university and that all resources and materials used in the thesis have been duly acknowledged.

Student Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date of submission: \_\_\_\_\_

### **Approval of advisors**

**This thesis has been submitted for examination with my approval.**

Primary advisor Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date of submission: \_\_\_\_\_

Name of Co-advisor: \_\_\_\_\_

Signature: \_\_\_\_\_

Date of submission: \_\_\_\_\_