MEKELLE UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE, BIOMEDICAL DIVISION

DEPARTMENT OF MEDICAL BIOCHEMISTRY AND MOLECULAR BIOLOGY

ASSESSMENT OF MAGNITUDE AND DETERMINANTS OF PREDIABETES AMONG ETHIOPIAN COMMERCIAL BANK WORKERS IN SHIRE ENDASLASI BRANCH TOWN TIGRAY, NORTH ETHIOPIA, 2023/2024: CROSS-SECTIONAL STUDY

By: KIBROM TAMENE BERHE (BSc, MSc. Candidate)

A THESIS SUBMITTED TO THE DEPARTMENT OF MEDICAL BIOCHEMISTRY, COLLEGE OF HEALTH SCIENCE, MEKELLE UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN CLINICAL BIOCHEMISTRY

MARCH, 2025
MEKELLE, ETHIOPIA

Mekelle University

College of Health Sciences

School of Medicine

Department of Medical Biochemistry and Molecular Biology

Advisor's Approval Sheet

This is to certify that the thesis entitled "**Assessment of Magnitude and Determinants of Prediabetes among Commercial Bank Workers in Shire Endaslasie Town, Tigray, North Ethiopia, 2023/2024**": **Cross-Sectional Study** is submitted in partial fulfilment of the requirements for the degree of MSc with specialization in "**Clinical Biochemistry**" to the Graduate Program of the College of Health Sciences of Mekelle University and has been carried out by Kbrom Tamene Berhe under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Department.

Name of Main advisor_____ Signature_____ Date_____

Name of Co-advisor_____ Signature_____ Date_____

Name of Co-advisor_____ Signature_____ Date_____

Mekelle University

College of Health Sciences

School of Medicine

Department of Medical Biochemistry and Molecular Biology

Examiners' Approval Sheet

We, the undersigned, members of the Board of Examiners of the final open defence by "**Kibrom Tamene Berhe**" have read and evaluated his thesis "**Assessment of Magnitude and Determinants of Prediabetes among Commercial Bank Workers in Shire Endaslasie Town, Tigray, North Ethiopia, 2023/2024": Cross-Sectional Study**" and evaluated the candidate. This is therefore to certify that the thesis has been accepted in partial fulfilment of the requirements for the Master's Degree in **Clinical Biochemistry.**

Name of Chairperson _____ Signature_____ Date_____

Name of Main advisor_____ Signature_____ Date_____

Name of Internal Examiner _____ Signature _____Date_____

Name of External Examiner_____ Signature_____ Date_____

Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the candidate's Department through the office of the Department Graduate Program Coordinator.

Thesis Approved by

Graduate Program Coordinator_____ Signature_____ Date_____

Declaration

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

Name:Kibrom Tamene

Signature: _____

Date: _____

This MSc thesis had been submitted for examination with my approval as thesis advisor.

Name: Dr. Desalegn Teklu (MSc, Asst Prof.)

Signature: _____

Date: _____

Mekelle University

College of Health Sciences

School of Medicine, Biomedical Division

Department of Medical Biochemistry and Molecular Biology

Thesis Research Submission Form

Principal Investigator	Kibrom Tamene Berhe (BSc. Public Health Officer)
Main Supervisor	Dr. Desalgn Teklu (MSc., Asst. Prof. of Medical Biochemistry)
Co- Supervisor	Dr. Hagos Amare (Phd, MSc.,Asst. Prof. of Medical Biochemistry) Mss. Merhawit Hailezgi (MSc., Asst. Prof. of Medical Biochemistry)
Title of Thesis Research	Magnitude and Determinants of Prediabetes among Commercial Bank Workers in Shire Endaslasie Town, Tigray, North Ethiopia, 2023/2024": Cross-Sectional Study
Duration of the Thesis Research	October, 2023 – December, 2024
Study Area	Shire Commercial bank of Ethiopia
Total Cost of the Project (Birr)	25,524.50
Address of Investigator	Email: tamenekibrom121@gmail.com Cell phone: +251932329914

ACKNOWLEDGMENTS

Above all, I magnify the Almighty God with my whole heart for all indescribable things he rendered to me.

I would like to express my deepest appreciation and gratitude to my advisor Dr. Desalegn Teklu and my co advisors Dr. Hagos Amare and Mss. Merhawit Hailezgi for their provision of reference materials, valuable suggestions and comments throughout the course of this work.

I am grateful to Aksum University for sponsoring my postgraduate study and Mekelle University for sponsoring my thesis research.

My acknowledgment also extends to the study participants, commercial bank workers of Shire district office employee and Suhl hospital staff for helping me in data collection.

Last but not least, I would like to express my appreciation and thanks to my family, friends, colleagues and staffs of Mekelle university department of medical biochemistry and molecular biology who, have contributed to my studies in one way or another

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATION AND ACRONYMS

ADF----------American Diabetes Federation

ADA- ----------American Diabetic Association

BMI- ----------Body Mass Index

DM----------Diabetes Mellitus

IDF---------- International Diabetes Federation

IGF----------Impaired Fasting Glucose

IGT----------Impaired Glucose Tolerance

IGH----------Impaired Glucose Homeostasis

NCD----------Non communicable diseases

SSA---------- Sub Saharan Africa

T2DM- ----------Type 2 diabetes mellitus

WHO---------- ---World Health Organization

WHR ----------Waist-to-hip ratio

WHtR----------Waist-to-height ratio

ABSTRACT

Background: Globally, the prevalence of prediabetes across various occupational groups and its relationship with an occupational factor is a topic of recent interest. Physical inactivity, long working hours, and workload stress were mentioned to play a big role in the development of prediabetes. Thus, bank workers who are always subjected to physical inactivity, long working hours, and workload stress are at risk of developing prediabetes.

Objectives: The aim of this study was to assess magnitude and determinant of prediabets among Commercial Bank of Ethiopian workers at Shire Endaslasie Branch between November 2023 and April 2024.

Methodology & Material: A cross-sectional study was conducted using a systematic random sampling technique. The study populations were all Commercial Bank of Ethiopia workers at Shire Endaslasie town who had worked at least one year and above as bank workers. The total sample size for the study was 111. The data were collected using a semi-structured questionnaire, physical examinations, and blood samples by using the WHO stepwise approach. Data were entered into SPSS version 20.0. The entered data were cleaned and analyzed. Frequency distributions, percentages, tables, and charts were used to show the results of univariate analysis. Cross-tabulation, chi-square tests, and 95% confidence intervals are used to present results of bivariate analysis. Multivariate logistic regression analyses were done to control for potential confounding variables

Result: Out of 111 eligible subjects, 105 (93.3%) commercial bank of Ethiopia workers participated in this study. Of the total subjects tested for fasting blood glucose level, the prevalence of impaired glucose (IFG) was 21.4% and 3.6% were undiagnosed diabetes. The history of alcohol intake (P = 0.041, AOR 14.6 (1.11-191.1)), having a history of physical inactivity (P = 0.014, AOR = 60 (2.29-159.3)), hypertension (P = 0.013, AOR = 1.694 (1.116-2.572)), and body mass index (P = 0.013, AOR = 1.694 (1.116-2.572)) were found to have statistical significance association with the prevalence of impaired fasting glucose among the study participants.

Conclusion: in this study nearly one in five commercial banks employees have prediabetes, in addition to this Unhealthy lifestyle such as heavy alcohol use , physical inactivity and related derangements like elevated BMI and hypertension had significant associations with prediabetes. Hence, education on lifestyle modification and provision of targeted care & support is imperative to reduce the risk.

Keyword: ***Risk factor, impaired fasting glucose, commercial bank workers, prediabetes***

1. INTRODUCTION

1.1. Back ground of the study

Prediabetes is a chronic, progressive condition that replaced the former name of borderline diabetes (1). The condition marks the state of health between normal glucose metabolism and type 2 diabetes mellitus (T2DM). The primary physiologic sign of prediabets is high blood glucose, whereas symptoms such as fatigue and increased appetite range from subtle to unnoticeable (2). Individuals with prediabets have insulin resistance at the receptor sites, an insulin secretory defect by the pancreas that causes metabolic abnormalities in carbohydrate, fat, and protein metabolism, and consequently impaired fasting glucose or impaired glucose tolerance. The World Health Organization (WHO) defines prediabets as fasting plasma glycemic levels that are higher than normal but lower than diabetes thresholds, that is, impaired fasting glucose (IFG) 6.1 mmol/l–6.9 mmol/l (110 mg/dl – <126 mg/dl) (3).

Prediabetes is associated with a cluster of metabolic conditions, including obesity, dyslipidemia, and hypertension. (2). It should not be viewed as a clinical entity in its own right but rather as an increased risk for diabetes and cardiovascular disease (4,5). Its effect can be manifested in terms of physiological, psychological, sociocultural, developmental, and spiritual dimensions. The physiological impacts of prediabetes are heart disease, stroke, blindness, kidney disease, and loss of limbs (5, 6,7). The psychological impact of depression is related to health-related quality of life (6, 8). The sociocultural variable can be influenced by an individual's loss of work productivity, as evidenced by increased absenteeism, inability to work due to disability, and lost wages. Prediabetes can affect the developmental variable by increasing mortality (5, 9).

Globally, the prevalence of IFG in 2021 was 6.2% and is projected to increase to 6.9% in 2045. Low and middle-income countries including most in the SSA region are assumed to record the largest relative growth (10). This unfortunate trend is a significant addition to the already heavy burden of infectious diseases ravaging its people, thereby taking a heavy toll on the scant human and financial resources available to the region (11). Increasing age, behavioral and lifestyle changes in relation to adopting westernization are among the major drivers.

In Ethiopia, it is difficult to find population-based data on the exact prevalence of prediabetes. However, according to the 2021 report of the International Diabetes Federation (IDF), the number of people aged 20–79 living with prediabetes in Ethiopia was estimated to be 6.7% based

on the IFG (10). Moreover, studies done on some selected population groups have witnessed such an increasing burden (4).

According to the Sedentary Behavior Research Network, the amount of physical activity has been decreasing among people in workplaces, resulting in the rise of the sedentary job. Further they defined sedentary work as any kind of job that requires most of the working time to be spent sitting with minimal or occasional walking or standing (7).

The job of most bank employees is sedentary in nature. These people spend almost all their working hours seated as they carry out their work. Besides, it involves high levels of stress. Evidence also tells that people with sedentary lifestyle and increased mental stress are at risk of developing prediabetes (12).

Substantiating this notion, a large number of bank employees were found to suffer from metabolic syndrome defined by high rates of prediabetes and overweight in Brazil (13). In relation to this, several studies have also indicated the importance of breaking long sitting hours with bouts of light- or moderate-intensity on correcting modifiable risk factors like waist circumference, BMI, plasma glucose, and triglyceride levels (14).

1.2. Statement of problem

Prediabetes is a toxic cardio metabolic state associated with increased risk for micro vascular complications like nephropathy, small fiber neuropathy, and diabetic retinopathy. Prediabetes is also associated with an increased risk of macro vascular diseases and cancer. Premature death and disability due to diabetes are also associated with a negative economic impact for countries, often called the 'indirect costs' of diabetes (15, 16/24).

Currently, prediabetes is increasing urgently like an epidemic in the world, with the highest burden in middle- and low-income countries as a result of behavioral and lifestyle changes. It is the foremost cause of premature morbidity and mortality deaths around the globe and can be present long before becoming clinically apparent. People with IFG are at high risk for developing diabetes, with up to 50% progressing to diabetes within 5 years, around 70% developing DM with time increase, and also at elevated risk of chronic kidney disease, cardiovascular disease, and death (16).

Globally, there is no comprehensive prevalence data on prediabetes. But IDF estimated the global prevalence of prediabetes based on IFG in 2021 to be 319 million and is expected to be 6.5% and 6.9% in 2030 and 2045, respectively (10). Prediabetes is a forerunner to type 2 diabetes (17). It is an intermediate stage of raised blood glucose between normal glucose tolerance and type 2 diabetes. Prediabetes is also associated with nephropathy, small fiber neuropathy, diabetic retinopathy, and an increased risk of macro vascular disease (6). People with prediabetes have a 5% to 15% greater risk of the progression of T2DM (18) and a stay of at least five years before the development of T2DM (17, 19).

In Africa the prevalence of prediabetes is increasing with age and change in lifestyle, which is associated with rapid urbanization and westernization (20). Many risk factors are both modifiable and non-modifiable.

Such as physical inactivity, low fiber diet (less consumption of fruit and vegetables), high glycemic load diet (high consumption of sugar), high intake of fat, job stress, alcohol drinking, obesity, high blood pressure, and age, sex, and family history are reported to be involved. Those risk factors are well-recognized precursors to the prediabetes incidence and the progression to T2DM (19, 21).

Currently, Ethiopia has around 3 million people living with prediabetes, and it is one of the four countries with the highest number of people living with diabetes in Africa (10). Moreover,

various institutional and community-based studies indicated an increasing prevalence of prediabetes (22). But the magnitude varies with the risk factors in a given target (23, 24). Not only is prediabetes, like diabetes mellitus, among other chronic non-communicable diseases, the leading cause of hospital admission in Ethiopia, it is also a cause of death, disability, hospital stays, and absenteeism from duty among bank workers and other office workers. However, there was a paucity of studies done on the magnitude of prediabetes among bank workers. Therefore, the purpose of this study is to assess the prevalence of prediabetes and identify its risk factors among commercial bank workers in Shire Endaslasie town , Tigray, Ethiopia.

1.3. Significance of the study

Prediabetes precedes the development of full-fledged type 2 diabetes mellitus. Hence, identifying prediabetes cases at this point will provide a window of opportunity for early targeting of modifiable risk factors, such as overweight or obese state, diet high in energy, job stress, and physical inactivity, so that the development of type 2 diabetes is prevented or delayed (15, 6).

Besides, recent evidence has shown that some long-term damage to the body, especially the heart and circulatory system, occurs during prediabetes. Therefore, identifying people with prediabetes early is very important to reverse or prevent the development of such complications.

The extent of the association between occupational factors and prediabetes is explored in our context. Hence, assessing the relationship between banking jobs and prediabetes in this study will generate substantive evidence that helps inform the design and implementation of health preventive measures by the employees, the employer, and policymakers at large.

Besides, the study will provide insight as to the magnitude of prediabetes in similar settings and may trigger policymakers to plan for conducting population-wide assessment

2. LITERATURE REVIEW

2.1. Prediabetes

Chronic metabolic conditions known as prediabets occur when blood glucose levels are over the upper limit of normal but below the cutoff point for a diabetes diagnosis (25). Crucially, different organizations use quite different diagnostic standards and nomenclature when referring to prediabets. Guidelines for prediabets screening based on evaluations of impaired glucose tolerance (IGT) and impaired fasting glucose (IFG) levels are provided by the World Health Organization (WHO) and the American Diabetes Association (ADA) (22). IFG, indicative of hepatic insulin resistance, is thought to be a more significant predictor of diabetes risk than the skeletal muscle insulin resistance described by IGT. The WHO's criteria were developed to reflect the relative likelihood of progression to overt T2DM rather than the overall prevalence (3, 22).

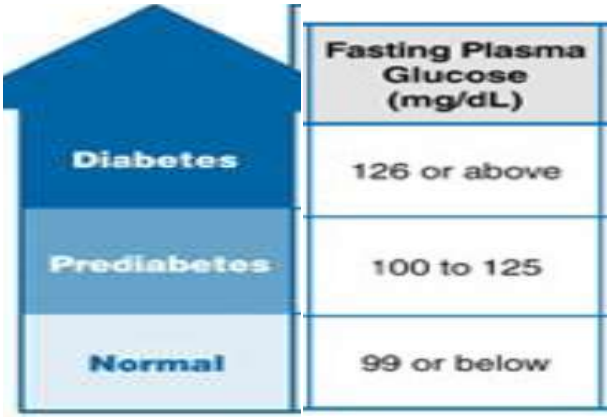


Figure 1: Progress of Fasting plasma glucose from normal to prediabetes and diabetes

2.2. Epidemiological distribution of Prediabetes

2.2.1 Global Situation

Prediabetes is a global epidemic that is affecting people today. This epidemic has been triggered by urbanization, which is linked to improved diets generally, and longer life spans, as well as social and economic developments. A sedentary lifestyle, smoking, excessive drinking, high blood pressure, obesity, being overweight, and having a higher body mass index are some risk factors that make it worse (26).

The International Diabetes Federation's data indicates that the prevalence of IGT is expected to increase from 7.5% of people worldwide in 2019 to 8.6% of adults worldwide in 2045. Of them, the majority (72.2%) live in low- and middle-income countries (27).

According to data from the International Diabetes Federation, the countries with the highest numbers of prediabetes patients with IGT in the 20–79 age group as of right now are China (54.5 million), the United States of America (37.4 million), and Indonesia (29.1 million) (27

2.2.2. Africa Situation

Africa currently has the third-highest prevalence of increasing diabetes among continents, with a magnitude of 10.1%. This percentage is expected to increase to 10.5% and 10.7% in 2030 and 2045, respectively, in the 20–79-year age range (28). Moreover, it is predicted that in the near future, Sub-Saharan Africa—the bulk of which are low- and middle-income countries will see the fastest rate of increase in the prevalence of pre- diabetes (29).

According to WHO standards the prevalence of prediabetes was reported 13.8% in Tanzania (30), other a cross-sectional study done among administrative staff in Southern Nigeria was 22.3% (31), while health workers in West Africa had a 19.4% (32). In Egypt, the prevalence reached 36% (10).

2.2.3. Ethiopian Condition

Ethiopia is predicted to rank among the top ten nations in the globe by the IDF 2019 forecast for 2045, with 14.7 million cases and an estimated prevalence of 11.6%–31.5%. Ethiopia is positioned next to Nigeria among African countries (27).

Prediabetes was previously considered an uncommon medical condition in Ethiopia; however, recent studies on its epidemiology indicate that it is becoming more prevalent. A few institution-based cross-sectional studies conducted within specific populations have revealed that the prevalence of prediabetes in Ethiopia ranges between 8% and 20%. This variability in prevalence rates can be attributed to a variety of demographic factors, lifestyle choices, and the methodologies employed in these studies. Significant contributors to the risk of developing prediabetes include age, family history of diabetes, and lifestyle behaviors such as physical inactivity and poor dietary habits (4, 22-24, 17-20, 32, 33).

2.3. Pathogenesis of prediabetes

Obesity and insulin resistance are two closely related conditions that highlight the complex and multifactorial pathogenesis of prediabetes. A transitional, median phase that spans a sequence from NGT to frank T2DM has been referred to as prediabetes (34).

The pathophysiology of prediabetes is primarily influenced by the first five of these factors, which together can be referred to as the "portentous pentad. These factors include increased lipolysis, impaired insulin secretion, increased glucagon secretion, and incretin deficiency or resistance. Only the first five of these, which collectively may be described as the “portentous pentad” (IR, increased lipolysis, increased glucagon secretion, impaired insulin secretion, and incretin deficiency or resistance), actually play a role in the pathogenesis of prediabetes (35, 36).

Insulin resistance (IR) appears to be the outcome of a multiplex interplay between strong genetic predisposition and environmental factors, including weight gain, physical inactivity, and aging (34). In general, IR points to the presence of a reduced peripheral tissue response to endogenously secreted insulin. Characteristically, it presents as both reduced insulin-mediated glucose uptake at the level of adipose and skeletal muscle tissue and impaired suppression of hepatic glucose output (37).

Impaired insulin secretion/beta-cell dysfunction: Although IR is a major pathogenic factor inducing progression from NGT to IGT to T2DM, deterioration in glycemic control does not occur unless the beta-cells fail to compensate for the IR. Ultimately, beta-cell failure is responsible for the progression of IGT to T2DM (38). Beta cells have the ability to up-regulate insulin secretion in response to IR. In a study on beta-cell responsiveness in Nigerian patients with Type 2 DM, the authors reported low fasting and postprandial beta-cell responsiveness in the patients. Their findings suggest that beta-cell dysfunction occurs early in the natural history of the disease in these patients (36, 38).

Increased lipolysis: the high levels of disruptive “bad” adipocytokines produced by these aberrant fat cells, at the expense of the good, insulin-sensitizing adipocytokines like adiponectin, induce inflammation, atherosclerosis, and IR. Indeed, current research has shown that a low adiponectin level is a strong predictor of prediabetes progression from NGT (39).

Incretin deficiency/resistance: The two main incretin hormones, glucagon-like peptide (GLP-1) and gastric inhibitory peptide (GIP), have both been shown to stimulate insulin secretion by pancreatic beta cells in normal individuals. Their secretion in the gut, however, only follows glucose ingestion, such that the higher the glucose level in the gut, the higher the incretin

hormone secreted, and vice versa. Individuals with prediabetes have reduced GLP-1 levels and a resistance to the stimulatory effects of GIP on insulin secretion (40). Incretin deficiency or resistance naturally results in elevated plasma glucose levels.

Increased glucagon secretion: Abnormally high levels of glucagon, produced by the pancreatic alpha cells, have been observed in subjects with prediabetes, and this has been shown to be responsible for the increased rates of hepatic glucose output, with resultant hyperglycemia (40).

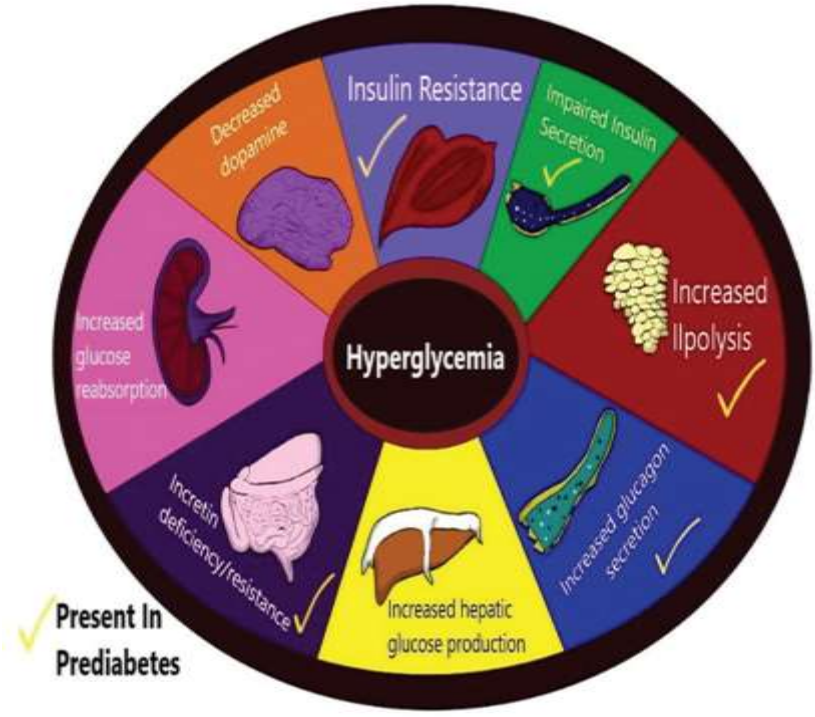


Figure 2: Pathophysiological defects of prediabetes and type 2 diabetes

2.4. Risk Factors of Prediabetes

2.4.1 Age: In many populations worldwide, the incidence of prediabetes is generally low before age 30 years but gradually increases during adult life and is highest in older populations. According to a population-based KORA study on IFG from Germany 2020, people aged 65–79 years are more susceptible to prediabetes (OR = 9.90; 95% CI: 7.84–12.50) for the oldest group than the youngest (<38 years) (26, 41). Also, a global study by the IDF in 2019 Almost half (48.1%) of adults aged 20–79 years with IGT are under the age of 50 years. This age group will continue to have the highest number of people with IGT in 2030 and 2045, rising to 204.1 million and 231.8 million, respectively. It is important to note that nearly one-third (28.3%) of all those who currently have IGT are in the 20–39 age group and are therefore likely to spend many years at risk of type 2 diabetes and adverse cardiovascular disease (CVD) outcomes (42).

Family history: An eminent family history of type 2 DM could be an established risk factor for prediabetes. Parents or close relations suffering from T2D increase the chances of developing this prediabetes. Studies have proven the connection of positive family history and prediabetes

Physical inactivity: Many epidemiological studies have found physical inactivity to be a strong risk factor for prediabetes (44-47, 50).

Obesity and overweight: values greater than 25 kg/m2 are overweight. People with a BMI over 30 kg/m2 are obese. Obesity has become a pandemic, and is attributed to easy access to high caloric, low-nutritional foods, a sedentary lifestyle or being physically inactive most days, low socioeconomics (48, 51-56,). Also tied to obesity is the fact that the distribution in the waist can indicate a higher risk for pre-diabetes. In addition to BMI, waist circumference can better predict the risk since BMI can be misleading for those that are athletic. Different previous studies showed varied prediction abilities of anthropometric measurements to predict prediabetes (58).
Data from the population-based KORA study on prediabetes in Germany indicated a prevalence of prediabetes parallel to the increased prevalence of BMI (59). The study conducted by Yuing G, Kang C, and Yiming M also reported that there is a strong positive relationship between BMI, WHtR, and the risk for prediabetes in Chinese adults. In this study, the risk of prediabetes increased with overweight and obesity increase (63, 65).

Alcohol consumption: In the majority of prospective study reports, after adjusting for other risk factors, alcohol consumption was independently associated with prediabetes; with a dose-response relationship, heavy drinkers have a higher risk of prediabetes than light or moderate

drinkers, but those who drank 1-2 times/month had a decreased risk of prediabetes. Alcohol consumption was found to be a risk factor for prediabetes in men, but not in women (60, 61)

Hypertension: Studies carried out in Nigeria and Ethiopia have found hypertension to be an independent risk factor for prediabetes; this association may be explained by a number of underlying mechanisms, such as the impact of long-term high blood pressure on vascular health, which may affect insulin sensitivity and glucose metabolism (34, 62).

2.4. Conceptual frame work of the Study

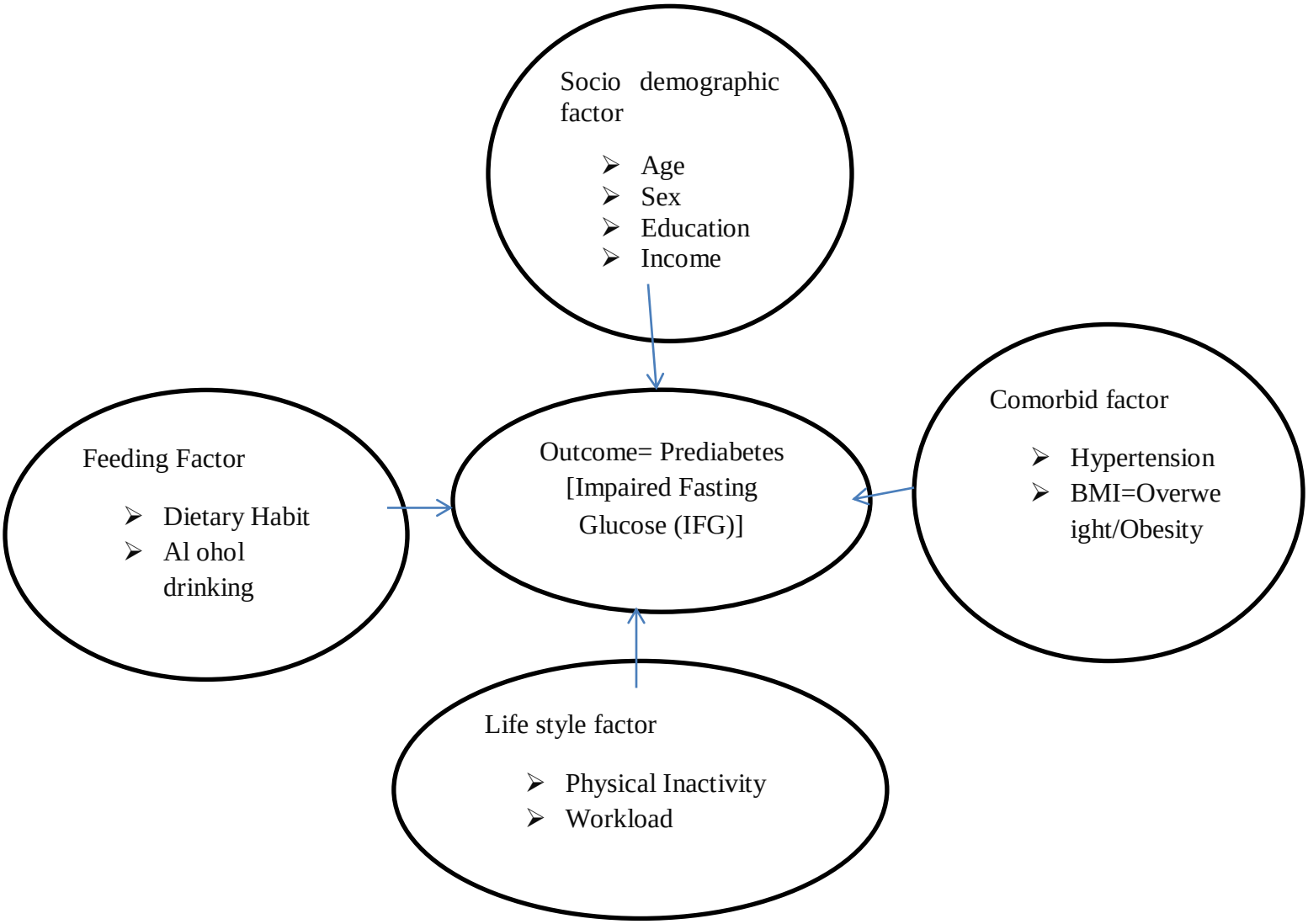


Figure 3: Conceptual frame work of framework of the study prediabetes

3. OBJECTIVES

3.1. General objectives

To determine the magnitude and determinants of prediabetes among bank workers of the Commercial Bank of Ethiopia (CBE) in Shire Endaslasie town, Tigray, North Ethiopia, from November 2023 to April 2024.

3.2 Specific Objectives

- ✓ To assess the prevalence of prediabetes among CBE Workers
- ✓ To Identify factors associated with prediabetes among CBE workers

4. METHODS

4.1. Study Area

The study was conducted on the Ethiopian commercial bank workers at Shire Endaslasie town, which is located in North Ethiopia. Shire Endaslasie is 1087 & 300 kilometers away from Addis Ababa and Mekelle respectively, and the estimated population of the town is 47,284. The city has one public general hospital and three health center which serve for more than 3 million people. The town has five CBE branches Mdre-genet, Suhul, Shire, Endaslasie and Main District with around 334 staff member and is expected to deliver service for more than one million people in and around the Town (63).

4.2. Study Design and period

Institutional based Cross-Sectional Study was conducted from November 2023 to April 2024.

4.3. Population

4.3.1 Source of the Population

All employees working for at least a year and above and currently working in any of the five CBE branches.

4.3. 2. Study Population

All selected staff member of Commercial Bank of Ethiopia in Shire Endaslasie Town.

4.3. 3.Study Subjects

Each study participant selected by using systematic random sampling.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All volunteers who were working for at least one year and above in any of the CBE at Shire town

4.4.2. Exclusion Criteria

All adults who had been fresh recruits and served less than 1 year working in Ethiopian Commercial bank of Ethiopia, pregnant women, known DM and critically ill were excluded from the study.

4.5. Sample size determination and sampling procedure

4.5.1 Sample size determination

Sample size was determined using single population proportion formula using P= 0.07(65), 95% confidence interval, 5% degree of precision the sample size was calculated as follows.

$$\mathbf{n= \frac{z^2 p\,(1-p)}{d^2}}$$

n = the sample size to be determined.

z = the z-value at the given confidence level=1.96

d = Absolute sampling error (margin of error) that can be tolerated=5%

P =Proportion of impaired fasting glucose= 0.07

$$n= \frac{(1.96)^2 *(0.07) *(0.93)}{(0.05)^2} = 100.04$$

None response rate 10% =10.004

Net sample size= 100.04+10.004=110.044= 111

4.5.2. Sampling Technique

Proportional Systematic A random sampling method was used in order to select a representative sample of respondents from all five CBE branches: Mdre-genet, Suhul, Shire, Endaslasie, and Main District, with a total of around 334 CBE employees in Shire Endaslasie Town.

All CBE workers were listed in all branches of Shire Endaslasie town.

The total sample sizes were distributed to the listed branches proportional to their staff number.

Systematic random sampling technique was used to recruit the study participants. The total number of staff in Ethiopian Commercial Bank at Shire Endaslasie town was 334. Then the total number of staff was divided by the sample size (111) to calculate the interval, i.e. 3, up on which study participants are selected from the list. But initially selection from one to three listed participant was done randomly using lottery method, then using the first selected participant as starting study unit, every third staff was recruited.

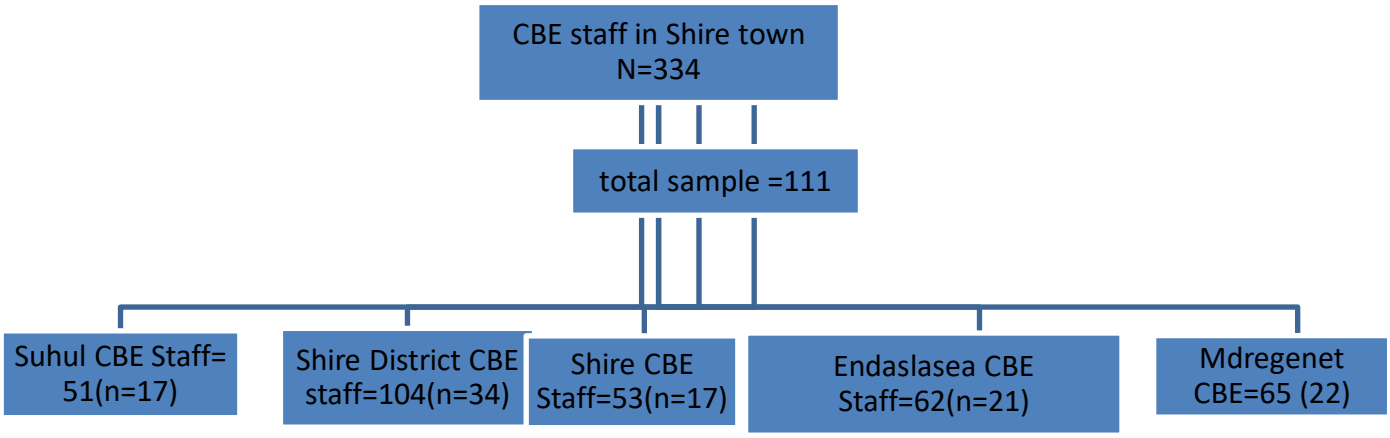


Figure 3: Sampling procedure of selection

4. 6. Study Variables

4.6.1. Dependent variable

Impaired fasting glucose (prediabetes)

4.6.2. Independent variables:

- Age ,family history of diabetes and big baby born
- Hypertension
- Physical inactivity, Job stress
- Body mass index, waist hip ratio
- Alcohol consumption
- Sex, Educational status
- Feeding habit

4.7. Operational definitions

First degree relative: who suffered from diabetes: Previous history of the respondent father, mother, full brother or sister has been diabetes (46).

Risk factor: Any attribute, characteristic or exposure of individual, which increase the likelihood of developing the prediabes of interest.

Heavy Alcohol drank (Heavy **Alcohol Consumption):** Refers to the average consumption of more than two standard alcoholic drinks per day for men and more than one 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 (69).

Physical activities: for the purpose of this study participant was measured by asking the amount of time they spend doing different types of physical activities in their employment, transport and leisure time.

Finally, the time they spend on different activities will be added and converted in to MET. The term MET is an abbreviation for metabolic equivalent and used to reflect the intensity of the specific physical activity. MET is defined as the ratio of the associated metabolic rate for specific activity divided by the resting metabolic rate. The resting metabolic rate is equivalent to 1MET and reflects the energy cost of sitting quietly. The MET values for the three domains (67).

- ✓ Inactive - <600 MET minutes per week. defined as self-reports of less than 150 min

- ✓ Moderately active from 600- 1500 MET minutes per week.
- ✓ Vigorously active- > 1500 MET minutes per week. (running, carrying or lifting heavy loads, digging)

Body Mass Index (BMI): is defined as follows (63, 65, 68)

- ❖ Underweight BMI<18.5 kg/m^2
- ❖ Normal BMI 18.5 to 24.9 kg/m^2
- ❖ Overweight BMI≥25.0 and <29.9 kg/m^2
- ❖ Obese BMI ≥30.0 kg/m^2

Central obesity a waist hip ratio greater than1.0 in men or greater than 0.85 in women (65).

Diabetes mellitus:

Cut off point fasting plasma glucose level for diagnosis of prediabets by different organization

Definition	Fasting plasma glucose (mmol/l) cute of point by different organization
Euglycemia (normal)	ADA < 5.5 mmol/l, < 100 mg/dl WHO < 6.1 mmol/l, 110 mg/dl IDF < 6.1 mmol/l, < 110 mg/dl
Impaired fasting glucose	ADA = 5.5 -6.9 mmol/l ,100 mg/dl-126 mg/dl WHO = 6.1- 6.9 mmol/l, 110 mg/dl-126 mg/dl IDF =6.1- 6.9 mmol/l, 110 mg/dl-126 mg/dl
Diabetes mellitus	IDF, ADA and WHO = > 7.0 mmol/ = >126 mg/dl

Blood test level diagnosis of Diabetes and Pre-diabetes (2,3,10)

Hypertension: The average systolic blood pressure readings ≥140mmHg and/or diastolic blood pressure readings ≥90 mmHg (69).

Prediabetes: IFG a fasting capillary whole blood glucose value was ≥110mg/dl and <126mg/dl (26) or 100-125 mg/dl (3).

4.8. Method of Data Collection

4.9.1 Questionnaire

A questionnaire was specifically developed per sample size, which helps to either including or excluding from the study. The questionnaire includes the question that assess the socio demographic characteristic such as age, sex, educational level, income per month, and co-morbidities, WHO identified risk factors of IFG with expanded and optional questions to suit local needs also include in the question. The questionnaire also contains behavioral risk factors

like tobacco use, alcohol consumption, Khat chewing, fruits and vegetable intake and physical activity

4.8.2. Blood pressure measurement

Blood pressure measurements were taken two times on the right arm of the survey participants in a sitting position, using a sphygmomanometer with a universal cuff and automatic blood pressure. The mean of two measurements was used for analysis. The measurements were taken after the participant had rested for 5 minutes, and each with 5 minutes of rest between the measurements by Nurse.

4.8.3. Anthropometric measurement

Physical measurements such as weight, height, waist circumference, hip circumference, and blood pressure were used. Standardized methods and adjusted equipment. Weight was measured in kilograms. With light cloths and no wearing of shoes, the participant's height was measured in centimeters using a height board with no shoes wearing and in an upright position and then BMI and waist-to-height ratio (WHtR) was calculated to determine the obesity status. BMI measures body weight and height and calculates with (Body weight (kg)/Body height (m2). Normal BMI <= 24.99 kg/m², overweight BMI = 25-30 kg/m², obese BMI >= 30 kg/m². Waist circumference will be measured in centimeters at the narrowest point between the lower costal border and the iliac crest with a constant tension tape and measurement of blood pressure at the midpoint of the right arm after participants rest for at least five minutes or 30 minutes for those who take hot drinks like coffee, and two blood pressure readings were taken for all participants, and then the mean blood pressure value was taken by Nurse proffisonal.

4.9.4. Assessing physical activity

According to World Health Organization, physical activity is defined as any body movement produced by skeletal muscles that require energy expenditure. Physical activity was categorized into vigorous and moderate, and sedentary (low) activity. A vigorous-intensity activity is defined as any activity that causes large increase in breathing or heart rate, if continued for at least 10 minutes (e.g., running, carrying or lifting heavy loads, digging or construction work) at least for three days per week (>1500METminute per week) (67, 69).

Moderate-intensity activity is defined as any activity that causes a small increase in breathing or heart rate if continued for at least 10 minutes (brisk walking or carrying light loads). Or Three or more days of moderate-intensity activity of at least 10 minutes per day, or five or more days of

moderate-intensity activity or walking for at least 30 minutes per day. Physical activity related to work, transportation, and leisure time is assessed in terms of minutes that caused them to feel breathless or feel palpitations (600-1500 MET minutes per week). Low-level physical activity involves a person not meeting any of the above-mentioned criteria for the moderate- or high-level categories (<600 MET minutes per week). (26.67.69)

4.8.5. Blood sample collection and processing

About one drop of blood sample was collected following minimum of eight hour fasting or early in the morning before breakfast from each participant by trained laboratory technologist. The process of blood sample collection is through aseptic/sterile technique.

4.8.6. Biochemical analysis

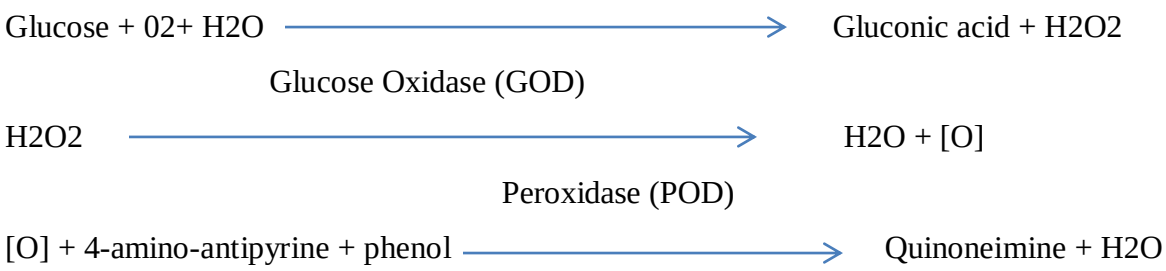
A laboratory test was performed for blood glucose using a digital Glucometer clinical chemistry analyzer. This test was done the next of after steps 1 and 2 data collections with minimum 8 hours fasting. Laboratory test results was assessed and categorized according to the definition.

4.8.6.1. Glucose estimation

Glucose: - Glucose is the major carbohydrate present in the peripheral blood. Oxidation of glucose is the major source of cellular energy in the body. Glucose derived from dietary sources and is converted to glycogen for storage in the liver or to fatty acids for storage in adipose tissue. The concentration of glucose in blood is controlled within narrow limits by many hormones, the most important of which are produced by the pancreas.

Test principle: - Enzymatic reference method with

One way of measuring blood glucose in the laboratory is by using the glucose oxidase-peroxidase (GOD-POD) method. The principle of the GOD-POD reaction is as follows: glucose is oxidized to gluconic acid while oxygen is simultaneously reduced to hydrogen peroxide by the enzyme glucose oxidase. Hydrogen peroxide is then split to form water and nascent oxygen by the enzyme peroxidase. That nascent oxygen reacts with 4-aminoantipyrine, and in the presence of phenol, this reaction produces quinoneimine, which is a colored compound that can be analyzed using colorimetric analysis. The intensity of the color produced correlates directly to the concentration of glucose in the sample. The colorimetric analysis is performed at 505 nm and compared to the standard, which is treated similarly



4.9. Data quality control and management

The questionnaire was prepared in English; translated to the local language (Tigrigna), and lastly retranslated to English and pretesting was done with other site commercial bank workers. Data was collected by interviewing clients using trained nurse and lab professionals. The data collectors were professional laboratory technologists and nurses under the close supervision of investigators and were trained before data collection. The training sessions covered every detail of the study and the full range of skills involved in the study and addressed the objectives of the study. Blood sample collection was done through standardized, calibrated, and sterile technique. The questionnaire for the pretest was done prior to the concrete data collection process to check the reliability of the data and to increase the quality of the data. Data collected was entered into a personal computer to check for completeness and missing values or for analysis. The biochemical tests were analyzed on a calibrated. The tests were done by well-trained and experienced professionals with strictly followed SOP

Table 1: Component and study variables for data collection used in the Ethiopia Commercial Bank worker, Shire Endaslasie Town, Tigray, 2023/2024

Steps	Core	Remark [Expanded]
Step1: Behavioral	Basic demographic information, including age, sex, literacy, and highest level of education.	Expanded demographic information including years at school, marital status, household income
	alcohol consumption, fruit and vegetable consumption, physical activity, Job stress and diet	Alcohol drinking, Oil and fat consumption, History of blood pressure, treatment for raised blood pressure, History of diabetes Chat consumption

Step2: Physical measurement	Weight and height, Waist, Hip circumference, blood pressure	
Step3: Biochemical measurement	Fasting blood sugar	

4.10. Data processing and analysis plan

Data was entered into Epidata then exported and analyzed by SPSS version 20.0. The entered data was checked, coded, cleaned, and analyzed. SPSS version 20.0 was used to do logistic regressions and other more advanced tests. Descriptive data analyses were presented in tables and/or graphs with means, proportions, and frequency distributions. Besides to this percentage, tables and charts were used to show result of univariate analysis. Bivariate and multivariate logistic regression analysis was used to determine the potential determinants of risk factors with prediabetes. Cross tabulation, chi-square tests, and 95% confidence interval was used to present results of bivariate analysis. Multivariate logistic regression analyses were done to control potential confounding variables.

4.11. Ethical consideration

The research proposal was approved and ethically cleared by the Institutional Review Board of the College of Health Sciences, Mekelle University. Participants were provided with clear information about the aim, purpose, risk, and benefit of asking questions, doing physical measurements, and taking blood. Data collection was started after informed consent was obtained from those who participated. Confidentiality of response was maintained throughout the study.

4.12. Dissemination of the results

The results of this study will be disseminated or communicated to Mekelle University Collage of Health Science Department of Medical Biochemistry Molecular Biology, School of Public Health, Axum University, Regional Health Bureau, local institutions and other concerned bodies. The result will be disseminated through workshops, seminars and published in an international, professional

5. RESULTS

A total of five Ethiopian commercial banks of the Shire district were involved in this study, and the total potential eligible participants were 111, and all were enrolled in the study, yielding a 94.6. % response rate.

5.1. Univarate Analysis of Results

5.1.1. Socio-demographic characteristics

Participants in the study were between the ages of 24 and 61, with an average age of 35.21 (SD ± 9.162) and an average of 8 ± 5.9 years of banking experience (ranging between 2 & 31 years). About 74.3% of participants were men and the rest 25.7% are female. More than three (76.4%) of the participants were Orthodox. From the total participants, over three quarters (84.5%) had a degree or higher educational status. Moreover, nearly a quarter (27.6%) of the participants were managers or supervisors, while more than three-quarters (86.7%) of the participants' had higher income (Table 3).

69.5% of study subjects were married. However, there were also some proportions of single 31 (29.5%) of the study subjects and the rest 1 (1%) divorced. A total of 9 (8.6%) of study subjects had a first-degree relative who suffered from diabetes, and from these, 6 (26%) were born big babies. Among the female respondents, 6 (26%) reported having a history of having born a big baby, while 21 (74%) had not. However, this was highly subjective since many of the women did not know the exact birth weight of their babies (Table 3).

Table 2: Socio-demographic characteristics of study participants, CBE, Ethiopia, Shire, 2024 (n=105)

Variable	Categories	Frequency(n)		Percent (%)
		Male	Female	
Gender	Male	78	0	74.3
	Female	0	27	25.7
Mean of age +SD		35.31+-9.176		
Age in Year	20- 34	28	11	37.1
	35-44	33	10	41.0
	>=45	17	6	21.9
Religion of participant	Orthodox	69	24	88.6
	Muslim	6	2	7.6
	Protestant	3	1	3.8
Marital status	Married	52	21	69.5
	Single	25	6	29.5
	Divorced and Widowed	1	0	1.0
Educational status	12th and blow grade Literate (can read and write).	6	1	6.7
	Diploma	6	3	8.6
	Degree and above	66	23	84.8
Monthly income	<=6500 ETB	5	3	7.6
	6501-20000 ETB	48	17	61.9
	>20,000 ETB	25	7	30.5
Mean incomes		19286.19+_6602.121		
Experience	1-10 year	50	17	63.8
	10-20 year	23	9	30.5
	> 20 years	5	1	5.7
Family History of DM	Yes	3	6	8.6
	No	75	21	91.4
Big baby born	Yes	0	6	26
	No		21	74

5.1.2. Behavioral characteristics

The majority of study subjects (61%) had busy workloads and were feeling stressed, but the rest felt well during work hours since almost all worked more than 8 hours a day. 21.9% of the study participants were heavy drinkers who drank three and above bottles per day. Most of the study participants (66.7%) did not eat vegetables and fruits every day. The remaining subjects (33.3) either eat vegetables and fruit once or more a day.

Overall, 36.2% of the study participants were physically inactive, that is, they reported inactive work, travel, or leisure time physical activity. The prevalence of physical inactivity increased with age from 8% among 20-34-year-olds to 18% among those aged ≥45 years, with the greatest increase between the 35-34-year-old and 45-61-year-old age groups (Table 4).

There was some variation in the prevalence of systolic and diastolic hypertension in the study population. Among study subjects, 77.1% of participants had systolic blood pressure of less than 140 mmHg, and 22.9% were found to have systolic hypertension. The mean of systolic blood pressure was 122.971 mmHg (±9.8170 mmHg). From the study participants, 70.5% had diastolic blood pressure less than 90 mmHg, and 29.5% were found to have diastolic hypertension. The mean was 81.05 mmHg (±6.3585 mmHg). In general, 29.5% of the study participants were found to have hypertension. Out of the 31 hypertensive subjects, 23 (21%) were males and 8 (7.6%) were females.

74.3% of the study participants had a body mass index (BMI) < 25 kg/m2, and 26% of the study subjects had BMI ≥ 25.0 kg/m2, out of which 23.8% were overweight and 1.8% were obese. Based on waist-to-height ratio (WHtR), around 37.1% of the study subjects were found to have central obesity. Also based on waist-hip ratio (WHR), there were around 32.3% of study subjects who were found to have central obesity, of whose 13.3% and 19% were female and male, respectively.

Table 3: Prevalence of Behavioral, Clinical and Biological Characteristics of study Participant compared by sex, CBE, Shire, Ethiopia, 2024 (n=105)

Characteristics	Category	Sex		Total Percent %)
		Male	Female	
Work condition	Work overload and stress	46	24	66.7
	normal or nothing feeling	32	3	33.3
have you heavy drink alcohol	Yes	14	9	21.9
	No	64	18	78.1
Days of fruit & Vegetable Intake per Week (WHO Recommendation)	>= 5	3	1	3.8
	3-5	23	8	29.5
	<3	52	18	66.7
Duration of Work	<=8 hour	1	0	1
	>8hour	77	27	99
Physical activity: level	Active	50	17	63.8
	Inactive	28	10	36.2
Un Healthy diet	Yes	33		31.4
	NO	72		68.6
Systolic blood pressure in mmhg	Normal	61	20	77.1
	Hypertension	17	7	22.9
Diastolic blood pressure in mmhg	Normal	55	19	70.5
	HTN	23	8	29.5
Body Mass Index	Normal	59	19	74.3
	Overweight	18	7	23.8
	Obesity	1	1	1.9
WC Male	<94cm	55	3	55.2
	>= 94 cm	20	0	19
WC Female	< 80 cm	0	14	13.3
	>=80 cm	0	13	11.4
WHRM	<.9 cm	57	0	54.3
	>=.9 cm	21	0	19
WHR female	<.85 cm	0	13	11.4
	>=.85 cm	0	14	13.3
WHtR	<.5	49	17	62.9
	>=.5	29	10	37.1

5.1.3 Study of outcome variable

According to the WHO definition, 3.6% of the participants tested had undiagnosed diabetes, while 21% shown impaired fasting glucose (IFG), indicating that 24.8% of respondents experienced overall impaired glucose homeostasis. Under the ADA definition, 31.4% of study participants were classified as having prediabetes, with 14 men (13.3%) and 8 women (7.7%) identified as having this condition.

Age category based analysis of prediabetes revealed that the highest prevalence was in the ≥45-year age group at 13%, followed by 7% in the 35-44 age groups, and only 1% in those aged 20-34. The data also showed a significant increase in IFG prevalence with age ($X^2 = 25.67$; $p < 0.001$).

Figure 4: prediabets level among the study participants with age categorization

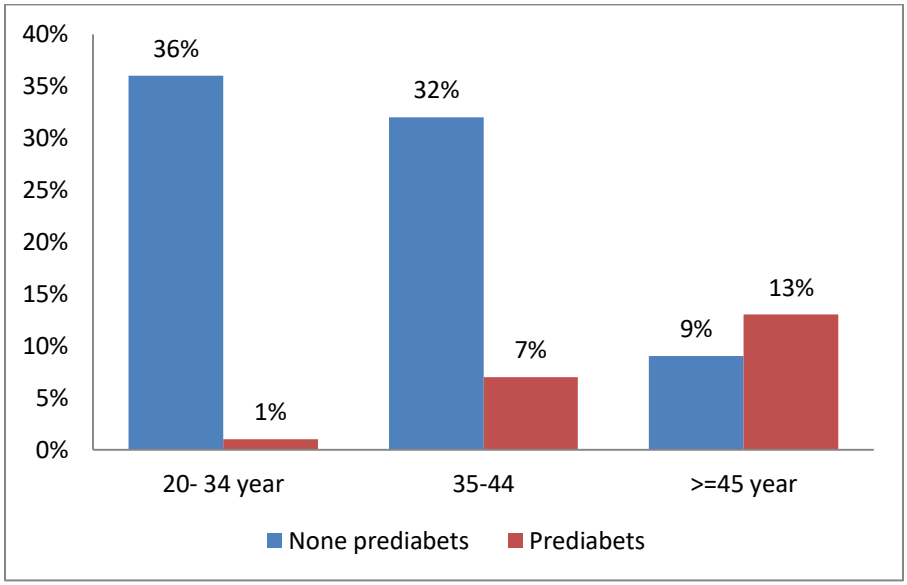
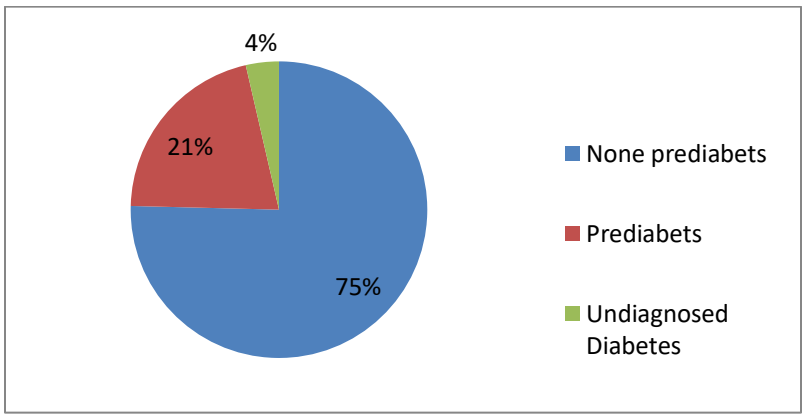


Figure 5 Impaired glucose hemostasis categorization among the study participants



5.2. Bivariate analysis of risk factor variables with prediabetes

This study determined the factors associated with the prevalence of prediabetes among participants. A binary logistic regression model was employed to analyze these factors, categorizing fasting glucose levels as follows: 0 for levels below 110 mg/dl and above 125 mg/dl and 1 for levels between 110 mg/dl and 125 mg/dl. The analysis aimed to identify associations with prediabetes, using a significance threshold of $P < 0.2$ in bivariate analysis and $P < 0.05$ in multivariate analysis.

In the bivariate analysis of socio-demographic variables, significant associations with prediabetes were found for age (P=0.0002) and education level (P=0.000). However, no statistically significant associations were observed with sex, marital status, religion, or monthly income.

Regarding behavioral characteristics, factors such as physical inactivity (P=0.000), heavy alcohol intake (P=0.000), banking experience (P=0.000), family history of diabetes (P=0.007), and a history of having large babies were significantly associated with prediabetes (P=0.008). In contrast, no significant association was found between prediabetes and the consumption of fruits and vegetables.

From the perspective of anthropometric and biochemical characteristics, significant associations were noted with waist-to-height ratio (WHtR) (P=0.000), hypertension (P=0.000), body mass index (BMI) (P=0.000).

Table 4: The distribution of prediabetes by socio-demographic and behavioral characteristics of the study participants in Commercial bank Ethiopia of Shire Endaslasie town, Northern Ethiopia, 2024 (N = 105).

characteristics	category	Prediabetes		Total (%)	X^2	P. Value
		Yes (%)	NO (%)			
Age in Year	20- 34 year	1	36	39	25.67	.000
	35-44 year	7	32	43		
	>=45 year	13	9	23		
Heavy drink alcohol	Yes	12(11)	11(10)	23	17.33	.000
	No	9(8)	73(70)	82		
physical activity: level	Vigorous	0	10(10)	10	35.7	.000
	Moderate	1(1)	52(49)	53		
	Low	20(19)	22(21)	42		
Days of fruit & Vegetable Intake per Week (WHO Recommended	>=5	0	3(3)	3		
	3-5	3(3)	22(21)	25		
	<3	18(17)	59(56)	77		
Sex of participant	Male	14(13)	64(61)	78		
	Female	7(7)	20(19)	27		
Religion of participant	Orthodox	17(16)	76(72)	93		
	Muslim	3(3)	5(5)	8		
	Protestant	1(1)	3(3)	4		
Martial statues	Married	18(18)	55(52)	73		
	Single	3(3)	28(27)	31		
	Divorced and Widowed	0	1	1		
Educational status	12th and blow grade Literate (can read and write).	3(3)	4(4)	7	14.470	.002
	Diploma	4(4)	5(5)	9		
	Degree and above	14(13)	75(71)	87		
level of Position in CBE	Guard & Clerical	4(4)	7(6)	8	9.72	.002
	Officer	9(9)	59(58)	68		
	supervisor and Manager	8(8)	21(20)	28		
Experience at CBE	1-10 year	2(2)	64(61)	66	35.9	.000
	10-20 year	15(14)	20(19)	35		
	> 20 years	4(4)	0	4		
Monthly income	4501-10000 ETB	4(4)	9(9)	13		
	10,000 -20,000ETB	13(12)	74(70)	87		
	>20,000	4(4)	1(1)	5		

Table 5: The distribution of prediabetes by anthropometric measurements and clinical characteristics of study participants in Commercial Bank Ethiopia, Shire Endaslasie town, Northern Ethiopia, 2024 (N = 105).

characteristics	Category	Prediabetes				
		Yes (%)	NO (%)	Total	X^2	p. value
BMI	< 25 kg/m^2	1	72	73	55.46	0.000
	>= 25 kg/m^2	20	12	32		
Central Obesity (WHtR)	<.5	2(3%)	64	66	28.8	0.000
	>=.5	19(48.7%)	20	39		
Diastolic blood pressure	<90 mmhg	2	72	74	43.11	0.000
	>=90 mmhg	19	12	31		
systolic blood pressure in	<140 mmhg	5	76	81	39.25	0.000
	>=140 mmhg	16	8	24		
Family History of DM	Yes	5	4	9	3.28	0.007
	No	17	79	96		
Have you born big baby	Yes	6	1	7	7.071	0.008
	No	2	19	24		

5.3 Multivariate association of risk factors variables with Prediabetes

Multivariate logistic regression analysis found statistically significant associations with prediabetes among participants with high body mass index, heavy alcohol use, physical inactivity, and hypertension. Compared to study participants with normal blood pressure, those with diastolic hypertension had a 1.7-fold increased risk of developing prediabetes (AOR=1.694 (1.12-2.57)).

The study showed that participants with a BMI of ≥25 kg/m² were 4.3 times more likely to develop prediabetes than study participants with a BMI of <25, AOR = 4.3 (1.146-16.2). When you compared study participants who did not drink alcohol or who drank two or fewer dranks with those who drank heavily, they had a 14.6-fold higher chance of developing prediabetes (AOR=14.6 (1.11-191.1)). Individuals who did not engage in physical activity were shown to be 60 times more vulnerable to prediabetes. AOR = 60(2.29-159.3)

Based on the study conducted, almost all socio demographic and some behavioral characteristics, such as family history of DM, age, sex, marital status, educational background, fruit and vegetable intake, income, and all biochemical characteristics of the study subjects, were found to have no statistically significant association with prediabetes.

Table 6: Multivariate logistic associations of socio-demographic, behavioral, and anthropometrics measurements with prediabetes at Shire 2023/ 2024 Shire, Ethiopia (n=105)

		Prediabetes		Total			
		Yes	NO		COR	P.Value	AOR
Have you heavy drinker alcohol	Yes	12(52%)	11(47.8%)	23	9.1(3.21-25.60)	0.041	14.6(1.11-191.1)
	No	10(12.2)	72(87.8%)	82			
Physical activity	Active	5(7.5%)	62(92.5%)	67			
	Inactive	17(44.7%)	21(55.3%)	38	8.6(3.1-23,5)	0.014	60(2.29-159.3)
Hypertension (DBS)	No	3(4.1%)	71(95.9)	74			
	Yes	19(61.3)	12(38.7)	31	37.4(9.6-146)	0.013	1.694(1.116-2.572)
BMI	< 25 kg/m^2	1(1.4%)	72(98.6%)	73			
	>= 25 kg/m^2	21(65.6%)	11(34.4%)	32	137.45(16.76-11.27)	0.031	4.3(1.146-16.2)

6. DISCUSSIONS

Prediabetes is an intermediate stage of dysglycemia, which is a major public health concern and increasing rapidly worldwide. It is recognized as an important metabolic state; as well as predisposing individuals to a high probability of future progression to diabetes and other none communicable diseases, individuals with prediabetes are at increased risk of developing many of the pathologies normally associated with that disease, such as diabetic retinopathy, neuropathy, nephropathy, and macro vascular complications. (5)

Pre-diabetes denotes a heightened risk of type 2 diabetes and other none-communicable diseases. In light of this, my study sought to examine the prevalence and predictors of pre-diabetes among employees of the Commercial Bank of Ethiopia (CBE) in Shire city. The current study assessed the occurrence of pre-diabetes and associated risk factors among staff at the CBE in Shire Endaslasie town. Accordingly, pre-diabetes was found in 21% and 30.5% of the employees based on the World Health Organization (WHO) and International Diabetes Federation (IDF) criteria and the American Diabetes Association (ADA) criteria, respectively. This finding aligns with similar studies, reporting 19.8% in China (49), 23.6% in Saudi Arabia (8), and 22.3% among administrative staff in Southern Nigeria (31). Additionally, 19.4% of health workers in West Africa (47) and 20% and 18.1% among administrative and health professionals in various studies conducted in Ethiopia (4 & 23). The differences wa the living and working conditions of the populations studied could further explain these discrepancies

However, the prevalence observed in our study is significantly lower than the 51% reported among Armed Forces Hospital employees in Kuwait (48), 60% among high-risk adults in Vietnam (19), 36% in Egypt (20), and 51% among municipal workers in the United States (51). Conversely, our findings are higher than those from other studies in Ethiopia (32), Tanzania (30), and Vietnam (8.1%) (52), India (6.3%) (53), and Saudi Arabia (6.8%) (42), and smaller area studies in Ethiopia, which reported rates between 8% and 12.9% (23, 24, 33). The differences in prevalence rates can be attributed to various factors, including differences in target populations, sample sizes, study settings, socio-economic status, and genetic factors. Moreover, the living and working conditions of the populations studied could further explain these discrepancies.

It is known that people with pre-diabetes have an increased risk of progression to T2DM (5). Evidence shows that people with IFG or IGT develop frank T2DM at a rate of approximately 5%-10% per year (5). The risk appears similar to either IFG or IGT and is highest when people have both simultaneously. In this study, 3.6% of the employees had undiagnosed diabetes. This result is concordant with the 3.7% & 3.4% observed among hospital administrative staff in South Nigeria and Ayder CSH, respectively (4, 31). Nevertheless, it is lower than the prevalence revealed among health-care workers in Nigeria (3). The observed difference could be due to variation in health-checking behavior among African and Western societies. Westerners routinely check their status and take deterrent measures early.

There is a significant association between BMI and prediabetes with a p-value of 0.031, and individuals having a BMI >= 25 kg/m² being 4.3 times more likely to have prediabetes compared to those with a BMI < 25 kg/m². Overweight and obesity are the most significant modifiable risk factors for the development of prediabetes. A high BMI leads to increased fat deposition, particularly abdominal fat, which contributes to insulin resistance and impaired glucose metabolism. This finding is consistent with other studies linking obesity to the risk of diabetes and metabolic disorders. The results highlight the importance of maintaining a healthy weight as a key strategy for preventing prediabetes. Weight loss interventions, including dietary modifications and physical activity, should be encouraged to reduce the risk of prediabetes (58, 59).

The study reveals that participants with overweight had higher odds of developing pre-diabetes. This is supported by a cross-sectional study in northeastern China (49). Studies have shown that higher body mass index could lead to the accumulation of adipose tissues. An elevated amount of adipocytes and the increased production of TNF-α and IL-6 that results in insulin resistance,

which subsequently causes pre-diabetes and type 2 diabetes mellitus. Additionally, overweight status is identified as a strong predictor of pre-diabetes, with its prevalence positively influenced by physical inactivity and excessive intake of macronutrients. Notably, our findings indicate a higher prevalence of overweight among office workers (47, 51), highlighting the need for lifestyle interventions in this population to mitigate the risk of pre-diabetes.

Inactivity is also strongly associated with the presence of Prediabetes, with individuals who are inactive being 60 times more likely to develop Prediabetes compared to active individuals. The association is statistically significant, with a p-value of 0.014. Physical inactivity is a well-established risk factor for metabolic disorders, including diabetes and Prediabetes. Exercise helps to regulate blood sugar levels, improve insulin sensitivity, and promote overall metabolic health. The striking difference in the odds ratio suggests that physical activity is a key protective factor against prediabetes, reinforcing the importance of regular exercise in preventing and managing metabolic conditions. Encouraging physical activity in at-risk populations could significantly reduce the burden of prediabetes.

The findings of this study indicate that low levels of physical activity significantly increase the risk of developing pre-diabetes. This conclusion is reinforced by studies conducted in China (49), Saudi Arabia (50), and Ethiopia (16), which consistently show a similar association. The underlying mechanism for this relationship can be explained by decreased glucose uptake at rest, which results from reduced skeletal muscle contraction. As an individual's level of physical activity declines, the effectiveness of insulin on muscle and liver tissues also diminishes (44). This decline in insulin sensitivity contributes to elevated blood glucose levels, thereby heightening the risk of pre-diabetes.

Heavy alcohol consumption is strongly associated with the presence of prediabetes, with an odds ratio (AOR) of 14.6, which suggests that individuals who are heavy drinkers are 14.6 times more likely to have prediabetes compared to those who are non-heavy drinkers. The high odds ratio indicates that alcohol consumption plays a critical role in the development of prediabetes. Alcohol can affect insulin resistance and increase the risk of conditions like obesity, hypertension, and dyslipidemia, which are all risk factors for metabolic disorders such as prediabetes. The P-value of 0.041 suggests that this association is statistically significant. Therefore, reducing heavy alcohol intake could potentially lower the incidence of prediabetes, especially when combined with other lifestyle modifications.

The present study shows a significant association between alcohol consumption and pre-diabetes among CBE employees. Increased alcohol intake raises the concentration of gamma-glutamyl transferases (GGT) in the liver (60), which in turn elevates the odds ratio for impaired fasting glucose (61).

Additionally, hypertension is also significantly associated with prediabetes, with individuals who have hypertension being 1.7 times more likely to have prediabetes. The odds ratio (1.694) is statistically significant, with a p-value of 0.013. Hypertension and prediabetes often coexist due to shared risk factors such as obesity, insulin resistance, and inflammation. Both conditions are linked to cardiovascular diseases, and the presence of one increases the likelihood of developing the other. The significant association between hypertension and prediabetes in this analysis further emphasizes the need for early detection and management of both hypertension and metabolic disorders to reduce the risk of complications such as cardiovascular events. Monitoring blood pressure in individuals at risk of prediabetes could help in early identification and intervention.

Hypertension was identified as a risk factor for prediabetes. One potential explanation for this finding is that patients with hypertension had higher levels of angiotensin II activity in their circulatory systems. Angiotensin II causes islet fibrosis and decreased insulin production, which in turn causes insulin resistance by activating the renin-angiotensin-aldosterone system (RAAS) and influencing the function of the pancreatic islets (62).

7. CONCLUSION

To successfully reduce prediabetes prevalence and prevent its progression to diabetes, public health strategies must be multifaceted and tailored to specific risk factors and demographics. By focusing on age, alcohol consumption, physical activity, education, income, and diet. This study highlights the strong associations between heavy alcohol consumption, physical inactivity, high BMI, and the presence of prediabetes. These findings reinforce the importance of addressing lifestyle factors in the prevention and management of prediabetes, and they offer valuable insights for public health initiatives aimed at reducing the burden of metabolic disorders.

The sedentary nature of banking jobs, combined with high stress levels, contributes to an increased risk of prediabetes, as employees spend most of their working hours seated.

This study highlights associations between prediabetes and factors such as physical inactivity, body mass index (BMI), blood pressure, and alcohol consumption. However, it found no significant correlation with non-modifiable factors like age and sex, suggesting that lifestyle factors play a more critical role in the development of prediabetes among bank employees.

8. LIMITATION

- One major limitation is the lack of investigation into dyslipidemia levels
- Institution-based cross-sectional study
- Prevalence of prediabetes might have been overestimated
- Single diagnostic method—fasting blood glucose—without incorporating glucose tolerance tests (GTT) or HbA1c measurements may have resulted in missed cases of impaired glucose tolerance (IGT). Result might have been overestimated, as it does not account for variations in the broader population.
- Small sample size to assess the significance of risk factors
- Financial constraints (shortage of budget).

9. RECOMMENDATION

- Lifestyle modifications (exercise, reduced alcohol consumption, and weight control) are essential to reducing prediabetes prevalence.
- Employers should implement health programs focusing on physical activity and wellness screenings.
- Healthcare providers in all health facility and other institutions must enhance early detection strategies, particularly for individuals with hypertension
- Ethiopian DM association conducting workshops on physical activity and modifiable risk factor of DM
- Banks manager could consider redesigning work condition to encourage movement

10 REFERENCE

1. Rett K, Gottwald-Hostalek U. Understanding prediabetes: definition, prevalence, burden and treatment options for an emerging disease. Current Medical Research and Opinion. 2019 Apr 15.
2. American Diabetes Association. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2018. Diabetes care. 2018 Jan 1;41(Supplement_1):S13-27.
3. World Health Organization. Definition and diagnosis of diabetes mellitus and intermediate hyperglycemia: report of a WHO/IDF consultation.
4. Gidey G, Hiruy M, Teklu D, Ramanathan K, Amare H. Prevalence of Prediabetes and Related Modifiable Cardiovascular Risk Factors Among Employees of Ayder Comprehensive Specialized Hospital, Tigray, Northern Ethiopia. Diabetes, Metabolic Syndrome and Obesity. 2023 Dec 31:643-52.
5. Tabák AG, Herder C, Rathmann W, Brunner EJ, Kivimäki M. Prediabetes: a high-risk state for diabetes development. The Lancet. 2012 Jun 16;379(9833):2279-90.
6. Palladino R, Tabak AG, Khunti K et al (2020) Association between pre-diabetes and microvascular and macrovascular disease in newly diagnosed type 2 diabetes. BMJ Open Diabetes Res Care 8(1).
7. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, Chastin SF, Altenburg TM, Chinapaw MJ. Sedentary behavior research network (SBRN)–terminology consensus project process and outcome. International journal of behavioral nutrition and physical activity. 2017 Dec;14:1-7.
8. Huang Y, Cai X, Chen P, Mai W, Tang H, Huang Y, Hu Y. Associations of prediabetes with all-cause and cardiovascular mortality: a meta-analysis. Annals of medicine. 2014 Dec 1;46(8):684-92.
9. Jakes RW, Day NE, Khaw KT, Luben R, Oakes S, Welch A, Bingham S, Wareham NJ. Television viewing and low participation in vigorous recreation are independently associated with obesity and markers of cardiovascular disease risk: EPIC-Norfolk population-based study. European journal of clinical nutrition. 2003 Sep;57(9):1089-96.
10. IDF Diabetes Atlas 10th edition. (2021). www.diabetesatlas.org.
11. Cowie CC, Casagrande SS, Geiss LS. Prevalence and incidence of type 2 diabetes and prediabetes.
12. Parashar P, Maroof KA, Bansal R, Ahmad S, Pant B 2009: Prevalence and risk factors of diabetes among bank employees of Meerut district. Indian J Prev Soc Med; 40: 157–161
13. Luciane bresciani salaroli, benata aubin dias saliba, eliana zandonada, maria del carmen bisi molina and nazare souza bissoli, 2013. Prevalence of metabolic syndrome and related factors in bank employees according to different defining criteria. Victoria/ES Brazil sao Paulo. PMC3552453
14. Richter B, Hemmingsen B, Metzendorf MI, Takwoingi Y. Development of type 2 diabetes mellitus in people with intermediate hyperglycaemia. Cochrane Database of Systematic Reviews. 2018(10).
15. Huang Y, Cai X, Qiu M, Chen P, Tang H, Hu Y, Huang Y. Prediabetes and the risk of cancer: a meta-analysis. Diabetologia. 2014 Nov;57:2261-9.
16. Andargie TA, Mengistu B, Baffa LD, Gonete KA, Belew AK. Magnitude and predictors of pre-diabetes among adults in health facilities of Gondar city, Ethiopia: a cross-sectional study. Frontiers in Public Health. 2023 Dec 15;11:1164729.

17. Ligthart S, van Herpt TT, Leening MJ, Kavousi M, Hofman A, Stricker BH, van Hoek M, Sijbrands EJ, Franco OH, Dehghan A. Lifetime risk of developing impaired glucose metabolism and eventual progression from prediabetes to type 2 diabetes: a prospective cohort study. The lancet Diabetes & endocrinology. 2016 Jan 1;4(1):44-51.
18. Ampeire IP, Kawugezi PC, Mulogo EM. Prevalence of prediabetes and associated factors among community members in rural Isingiro district. BMC Public Health. 2023 May 25;23(1):958.
19. Vuong TB, Tran TM, Tran NQ. High prevalence of prediabetes and type 2 diabetes, and identification of associated factors, in high-risk adults in Vietnam: A cross-sectional study. Diabetes Epidemiology and Management. 2025 Jan 1;17:100239.
20. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes care. 2004 May 1;27(5):1047-53.
21. Hassan A, Mokhtar A, Samy M, Mahmoud A, Mohammed S. Prevalence of prediabetes and its associated risk factors among a sample of employees at faculty of medicine. Egypt J Occup Med. 2022;46(1):33-54
22. Endris T, Worede A, Asmelash D. Prevalence of diabetes mellitus, prediabetes and its associated factors in Dessie Town, Northeast Ethiopia: a community-based study. Diabetes, metabolic syndrome and obesity: targets and therapy. 2019 Dec 31:2799-809.
23. Vinodhini R, Kebede L, Teka Department of Public Health, College of Medicine and Health Sciences, et al. Prevalence of Prediabetes and its Risk Factors among the Employees of Ambo University, Oromia Region, Ethiopia. Res Mol Med. 2017;5(3):11–20. doi:10.29252/rmm.5.3.11
24. Worede A, Alemu S, Gelaw YA, Abebe M. The prevalence of impaired fasting glucose and undiagnosed diabetes mellitus and associated risk factors among adults living in a rural Koladiba Town, Northwest Ethiopia. BMC Res Notes 2017;10:251.
25. Yip WC, Sequeira IR, Plank LD, Poppitt SD. Prevalence of pre-diabetes across ethnicities: a review of impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) for classification of dysglycaemia. Nutrients. 2017 Nov 22;9(11):1273.
26. International Diabetes Federation. IDF Diabetes Atlas. 9th ed. Brussels, Belgium
27. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colagiuri S, Guariguata L, Motala AA, Ogurtsova K, Shaw JE. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes research and clinical practice. 2019 Nov 1;157:107843.
28. Federation ID. International diabetes federation: IDF diabetes atlas. Brussels, Belgium. 2013.
29. Rooney MR, Fang M, Ogurtsova K, Ozkan B, Echouffo-Tcheugui JB, Boyko EJ, Magliano DJ, Selvin E. Global prevalence of prediabetes. Diabetes Care. 2023 Jul 1;46(7):1388-94.
30. Chiwanga FS, Njelekela MA, Diamond MB, Bajunirwe F, Guwatudde D, Nankya-Mutyoba J, Kalyesubula R, Adebamowo C, Ajayi I, Reid TG, Volmink J. Urban and rural prevalence of diabetes and pre-diabetes and risk factors associated with diabetes in Tanzania and Uganda. Global health action. 2016 Dec 1;9(1):31440
31. Martins SO, Folasire OF, Irabor AE. Prevalence and predictors of prediabetes among administrative staff of a tertiary health centre, southwestern Nigeria. Annals of Ibadan postgraduate medicine. 2017;15(2):114-23.
32. Teshome AA, Baih SZ, Wolie AK, Mengstie MA, Muche ZT, Amare SN, Seid MA, Yitbark GY, Molla YM, Baye ND, Ayehu GW. Magnitude of impaired fasting glucose and undiagnosed diabetic mellitus and associated risk factors among adults living in

Woreta town, northwest Ethiopia: a community-based cross-sectional study, 2021. BMC Endocrine Disorders. 2022 Oct 5;22(1):243.
33. Tesfaye T, Shikur B, Shimels T, Firdu N. Prevalence and factors associated with diabetes mellitus and impaired fasting glucose level among members of federal police commission residing in Addis Ababa, Ethiopia. BMC endocrine disorders. 2016 Dec;16:1-9.
34. Nwatu CB, Young EE. Prediabetes in Sub-Saharan Africa: Pathophysiology, Predictors, and Prevalence. Nigerian Journal of Medicine. 2020 Oct 7;29(3):343-50.
35. DeFronzo RA, Abdul-Ghani M. Type 2 diabetes can be prevented with early pharmacological intervention. Diabetes care. 2011 May 1;34(Supplement_2):S202-9.
36. Dagogo-Jack S. Diabetes Risks from Prescription and Nonprescription Drugs: Mechanisms and Approaches to Risk Reduction. American Diabetes Association; 2016 May 20.
37. Nathan DM, Davidson MB, DeFronzo RA, Heine RJ, Henry RR, Pratley R, Zinman B. Impaired fasting glucose and impaired glucose tolerance: implications for care. Diabetes care. 2007 Mar 1;30(3):753-9.
38. Faeh D, William J, Tappy L, Ravussin E, Bovet P. Prevalence, awareness and control of diabetes in the Seychelles and relationship with excess body weight. BMC Public Health. 2007 Dec;7:1-9.
39. Jiang Y, Owei I, Wan J, Ebenibo S, Dagogo-Jack S. Adiponectin levels predict prediabetes risk: the Pathobiology of Prediabetes in A Biracial Cohort (POP-ABC) study. BMJ Open Diabetes Research and Care. 2016 Mar 1;4(1):e000194.
40. DeFronzo RA. From the triumvirate to the ominous octet: a new paradigm for the treatment of type 2 diabetes mellitus. Diabetes. 2009 Apr 1;58(4):773-95.
41. Ligthart S, van Herpt TT, Leening MJ, Kavousi M, Hofman A, Stricker BH, van Hoek M, Sijbrands EJ, Franco OH, Dehghan A. Lifetime risk of developing impaired glucose metabolism and eventual progression from prediabetes to type 2 diabetes: a prospective cohort study. The lancet Diabetes & endocrinology. 2016 Jan 1;4(1):44-51.
42. Alanazi NH, Alsharif MM, Rasool G, Alruwaili AB, Alrowaili AM, Aldaghmi AS, Al Shkra MK, Alrasheedi FA, Alenezi GS, Alanazi MT. Prevalence of diabetes and its relation with age and sex in Turaif city, northern Saudi Arabia in 2016–2017. Electronic physician. 2017 Sep;9(9):5294
43. Mohanty B. Prediabetes precursor to Type 2 diabetes, act todayblock the road to diabetes. Paripex Indian J Res. 2018;7:188-9.
44. Wilmot EG, Edwardson CL, Achana FA, Davies MJ, Gorely T, Gray LJ, Khunti K, Yates T, Biddle SJ. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. Diabetologia. 2012 Nov;55(11):2895-905.
45. World Health Organization. Global action plan on physical activity 2018-2030: more active people for a healthier world. World Health Organization; 2019 Jan 21.
46. Jakes RW, Day NE, Khaw KT, Luben R, Oakes S, Welch A, Bingham S, Wareham NJ 2003: Television viewing and low participation in vigorous recreation are independently associated with obesity and markers of cardiovascular disease risk: EPIC-Norfolk population-based study. Eur J Clin Nutr; 57: 1089–1096.
47. Onyemelukwe OU, Mamza AA, Suleiman YK, Iyanda MA. Prevalence of pre-diabetes, diabetes and associated cardiovascular risk amongst healthcare workers in ahmadu bello university teaching hospital (ABUTH), Zaria using glycated haemoglobin. West Afr. J. Med. 2020 Apr 1;37:91-9.

48. AlRandi M, Hussain AH, Al-Nesef A, Alsharbati WE, Alobaidly AM, Almelh AA. Identifying employees at high risk of diabetes among the medical staff of Jaber Al-Ahmed Armed Forces Hospital in Kuwait and screening them for diabetes. Journal of the Bahrain Medical Society. 201ethipi4;25(2):101-4.

49. Wang R, Zhang P, Li Z, Lv X, Cai H, Gao C, Song Y, Yu Y, Li B, Cui Y. The prevalence of pre-diabetes and diabetes and their associated factors in Northeast China: a cross-sectional study. Scientific Reports. 2019 Feb 21;9(1):2513.
50. Ghoraba M, Shiddo O, Almuslmani M, Jallad I, Khan A, Maranan G, Alharbi M, Alsaygh A. Prevalence of prediabetes in family and community medicine department, security forces hospital, Riyadh, Saudi Arabia. Int J Med Sci Public Health. 2016 Apr 1;5(777):10-5455.
51. O'Keefe LC, Brown KC, Frith KH, Heaton KL, Maples EH, Phillips JA, Vance DE. Obesity, prediabetes, and perceived stress in municipal workers. Workplace Health & Safety. 2016 Oct;64(10):453-61.
52. Nguyen VD, Vien QM, Do TH, Phan CD, Nguyen HC, Nguyen VT, Nguyen DL, Seok W, Chon Y. Prevalence of undiagnosed diabetes and pre-diabetes and its associated risk factors in Vietnam. Journal of Global Health Science. 2019 May 27;1(1).
53. Tripathy JP, Thakur JS, Jeet G, Chawla S, Jain S, Pal A, Prasad R, Saran R. Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. Diabetology & metabolic syndrome. 2017 Dec;9:1-8.
54. Teshome AA, Baih SZ, Wolie AK, Mengstie MA, Muche ZT, Amare SN, Seid MA, Yitbark GY, Molla YM, Baye ND, Ayehu GW. Magnitude of impaired fasting glucose and undiagnosed diabetic mellitus and associated risk factors among adults living in Woreta town, northwest Ethiopia: a community-based cross-sectional study, 2021. BMC Endocrine Disorders. 2022 Oct 5;22(1):243.

55. Swindell N, Mackintosh K, McNarry M, Stephens JW, Sluik D, Fogelholm M, Drummen M, MacDonald I, Martinez JA, Handjieva-Darlenska T, Poppitt SD. Objectively measured physical activity and sedentary time are associated with cardiometabolic risk factors in adults with prediabetes: the PREVIEW study. Diabetes care. 2018 Mar 1;41(3):562-9.
56. Ota T. Obesity-induced inflammation and insulin resistance. Frontiers in endocrinology. 2014 Dec 4;5:204.
57. Pérez MR, Medina-Gómez G. Obesity, adipogenesis and insulin resistance. Endocrinología y Nutrición (English Edition). 2011 Aug 1;58(7):360-9.

58. Haider, N., & Ziyab, A. (2016). Prevalence of prediabetes and its association with obesity among college students in Kuwait: A cross-sectional study. Diabetes Research and Clinical Practice, 119, 71-74. doi:10.1016/j.diabres.2016.07.001

59. Greiner GG, Emmert-Fees KM, Becker J, Rathmann W, Thorand B, Peters A, Quante AS, Schwettmann L, Laxy M. Toward targeted prevention: risk factors for prediabetes defined by impaired fasting glucose, impaired glucose tolerance and increased HbA1c in the population-based KORA study from Germany. Acta diabetologica. 2020 Dec;57:1481-91.
60. Sharpe PC. Biochemical detection and monitoring of alcohol abuse and abstinence. Annals of clinical biochemistry. 2001 Nov 1;38(6):652-64.
61. Li MJ, Ren J, Zhang WS, Jiang CQ, Jin YL, Lam TH, Cheng KK, Thomas GN, Xu L. Association of alcohol drinking with incident type 2 diabetes and pre-diabetes: the Guangzhou Biobank Cohort Study. Diabetes/Metabolism Research and Reviews. 2022 Sep;38(6):e3548

62. Wang, X.P.; Zhang, R.; Wu, K.; Wu, L.; Dong, Y. Angiotensin II mediates acinar cell apoptosis during the development of rat pancreatic fibrosis by AT1R. Pancreas 2004, 29, 264–270.
63. Siren R, Eriksson JG, Vanhanen H. Waist circumference a good indicator of future risk for type 2 diabetes and cardiovascular disease. BMC public health. 2012 Dec;12:1-6.
64. Yukunu B. Commercial bank Ethiopia of Shire Endaslasie District Ethiopia
65. Yakubu IM, Kaoje YS, Jabbe T, Abubakar AA. Best anthropometric predictors of fasting blood sugar, prediabetes, and diabetes. Diabetes. 2020;6:1-7.
66. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, Clement DL, Coca A, De Simone G, Dominiczak A, Kahan T. 2018 ESC/ESH Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH). European heart journal. 2018 Sep 1;39(33):3021-104
67. Okely AD, Kontsevaya A, Ng J, Abdeta C. 2020 WHO guidelines on physical activity and sedentary behavior. Sports Medicine and Health Science. 2021 Jun 1;3(2):115-8.
68. Consultation WE. Waist circumference and waist-hip ratio. Report of a WHO Expert Consultation. Geneva: World Health Organization. 2008 Dec;2008:8-11
69. WHO. Surveillance of Noncommunicable Disease Risk Factors, The WHO Stepwise Approach. 2001 Geneva: 12-18, 51-7
70. S Abu-Almakarem A. Prediabetes and its Relative Risk Factors in Saudi-adult Men. Egyptian Journal of Health Care. 2024 Jun 1;15(2):794-804..
71. Kim DJ, Noh JH, Cho NH, Lee BW, Choi YH, Jung JH, Min YK, Lee MS, Lee MK, Kim KW. Serum γ-glutamyltransferase within its normal concentration range is related to the presence of diabetes and cardiovascular risk factors. Diabetic Medicine. 2005 Sep;22(9):1134-40.

11. ANNEXES

Annex-I

Annex **1.1 Participant information sheet**

Project title: Assessment of magnitude and determinant of prediabetes among commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia

Investigator: Kbrom Tamene

Email: tamenekibrom121@gmail.com

Phone: 0932329914

Supervisor: Dr. Desalegn Teklu (DVM., Asst. Prof. of Medical Biochemistry)

Sponsor: Mekelle University

Introduction

Hello, I am **Kbrom Tamene**, from Mekelle University, College of Health Sciences. I am here today to collect data on "assessment of magnitude and determinant of prediabetes among commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia

The objective of this study is to assessment the magnitude and determinant of prediabetes among commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia, from November 2023 to April 2024. I kindly request that you take part in this study. Your cooperation and willingness are greatly helpful in identifying information related to prediabetes among commercial bank workers of Ethiopia. It needs about 20 minutes for the interview and blood collection producers. There is no direct benefit or possible risk associated with participating in this study except for the time spent responding to the questionnaire and collecting blood. The information you provide will be kept strictly confidential. Your participation is voluntary, and you are not obliged to answer any question that you do not want to answer. If you feel uncomfortable with the question or the blood collection producers, it is your right to drop it at any time you want.

Purpose

The overall purpose of this study is to assessment of magnitude and determinant of prediabetes among commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia, from November 2023 to April 2024. I want to find out the derangement of fasting blood glucose and its associated factors in commercial bank workers of Ethiopia found in Shire Endaslasie town,

Ethiopia. With this information, I will be able to give information to health care providers and policymakers and share it with the rest of the world to raise awareness about the prediabetes and its risk factors of commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia.

Procedure and participation

You will receive the Tigrigna version of this information sheet and consent form to read until you completely understand it. If you cannot read, that will not be a problem because I will also provide you with an oral briefing so that maximum understanding and clarity will be created. Then, subjects with an interest in participating in my study will be asked to sign the consent form, and the investigator will record their personal information. After providing your consent, I will ask you for demographic information, other relevant clinical data, and 5 mL of blood samples will be collected from you.

Confidentiality

We strongly assure you that your name and other identifiers will not be disclosed to anyone outside of the study.

Rights, Risk and Benefits of the Study

Your participation in the study will not have any adverse effects and will have minimum invasive procedures. You may have minor discomfort and pain during the blood drawing, and there may also be mild redness or swelling on the site from where the blood was taken. But this will be minimized, as the procedure will be carried out by experienced health professionals in the hospital with standard aseptic conditions. You will not receive a direct benefit from participating in this research. However, you will be assisted by public health professionals to gain an improved understanding of the adverse effects of prediabetes. At the same time, you will get to see some biochemical parameters and a clinical assessment of your health condition for free. The information you provide is confidential and will only be used for the objective mentioned above. Information about your health collected from the study will be stored in code numbers. No personal identification will be mentioned in the results of the study, which may be published for scientific purposes. Therefore, I want to assure you that your participation in this study will not involve any risks to you.

Inducement, incentive and compensation

There will not be any monetary payment linked with your participation in this study. The benefit you will gain are mentioned in the above under the section ‘‘Benefit’’,

Freedom to withdraw

Your participation in this study is completely voluntary. No penalty or loss of benefit is involved if you change your idea that you do not want to participate.

Person to contact

In case you have any questions, unclear ideas and doubt about the study please feel free to contact the following individuals through their addresses:

- Principal investigator: **Kbrom Tamene** (BSc. in Health Officer)

  Email: tamenekibrom121 @gmail.com

  Phone: 0932329914

Principal supervisor: **Dr. Desalegn Teklu** (DVM., Asst. Prof. of Medical Biochemistry)

- Email: gsh22006@yahoo.com
- Cell phone: 0972166291

Annex-1.2 Informed consent

I understand that the purpose of the study is to collect information regarding the assessment of magnitude and determinant of prediabetes among commercial bank workers of Ethiopia found in Shire Endaslasie town, Ethiopia. I have read the above information, or it has been read to me. I have had the opportunity to ask questions, and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate in this study and understand that I have the right to withdraw at any time without, in any way, affecting my social life or medical care.

1. Yes, of course ☐
2. No. ☐

Annex 2. Questioner (English Version)

Step 1 A. Socio Demographic Information of Respondent

No	Questions	Alternative Choices for Response	Code
1	Sex	1. Male 2. Female	
2	Age	_____Years	
3	Religion	1. Orthodox 2. Muslim 3. Catholic 4. Protestant	
4	Martial statues	1. Single 2. Married 3. Divorced 4. Widowed	
5	a. Educational status? If yes b. Level of education	1. Literate (can read and write). Yes No Diploma, Degree, Master_____	-------
6	How you see your job situation during delivery of service is there any feeling happened?	1. Work overloaded Unachievable deadlines 2. Exposed to repetitive stressful situations 3. Financial problems frustrate me in my job 4. Other specify it	-------
7	How many years of service in bank	_____years	
8	Huw much is your family's total monthly income?	1._____Birr 2. Don't know	
9	Does your families have medical history.	1. Yes 2. No If yes which type of disease? 1. Diabetes 2. Hypertension or heart disease	-------
10	For females only. Have you ever given birth to a very big baby(=>4kg)?	1. Yes 2. No	-------

B. Questions related to various health behaviors: smoking, drinking alcohol, eating fruits and vegetables, feeding sweetened or refined food and Physical activity.

1. smoking			Code
11	Have you ever smoked cigar?	1.Yes 2.No, If yes, are you currently smoking cigarette 1. Yes 2. No	
12	When did you start smoking and averagely how much cigars smoke per day, week, month? ____ no of cigars per day ____ no of cigars per week ____ no of cigars per month	1.Since the last---------years 2. Since the last--------months 3. Since the last--------weeks 4. On ------ day 5. At -----years of age	------
13	Do you chaw chat?	1. Yes, 2, no if yes, please specify 1. Yes, weekly 2. ye, daily 3,Yes,sometimes	------
	2. Alcohol: The next questions ask about the consumption of alcohol.		
14	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.17	-------
15	Have you consumed alcohol within the past 12 months? how frequently have you had at least one drink?	1. 5 or more days a week 2. 3-4 days a week 3. 1-2 days a week 4. -3 days per month 5. Less than once a month	-------
16	How many bottles do you drink per day?	____ no of beer, wine, sprite per day ____ no of beer, wine, per week ____ no of beer, per month	
	3. Diet: The next questions ask about the fruits, vegetables and oil/butter that you may eat		
17	How many times per day do you usually take fruits? (Select one response)	1. Don't eat fruits at all 2. Don't eat fruit everyday 3. I take fruits every day 4. I take fruits 3 times per week	
18	How many times per day do you usually eat vegetables?	1. I eat vegetables every day 2. Don't eat vegetables at all 3. I eat vegetables 10 days per month 4. I eat vegetables 2-4 times per week	
	How many times per day do you usually eat and saturated oil/butter solid oil? (Select one response)	1. No one eaten 2. Don't saturated oil/butter everyday 3. I eat saturated oil/butter once a day 4. I eat saturated oil/butter 2-4 times per day 5. I eat saturated oil/butter 5 or more times per day	-----

Note [∗One 'standard drink' is the equivalent of * one glass, can or bottle (330ml) of regular beer (which contains about 5% alcohol), * one measure (40ml) of spirit, or one glass of wine]
[One helping of fruit includes one banana, one orange, one apple or one slice of pineapple etc.].

Physical activity: Next, I am going to ask you about the time you spend doing different types of physical activity in minutes in a day in a week. Please answer these questions even if you do not consider yourself to be an active person. Think first about the time you spend doing work. Think of leisure time, means of transport and other	Code

19	Work-related physical activity: Firstly, how many hours do you typically spend at work each day?	---------no of hours	-----
20	During working hours, how frequently do you practice the following	A. Mostly sitting or standing or no activity done that increase heart rate or pulse rate _____Minute/day for_____day in a week B. Moderate-intensity activity, that causes small increases in breathing or heart rate such as(brisk walking or carrying light loads) for at least 10 minutes continuously _____Minute/day for_____day in a week C. Vigorous activity any activity that increase Heart rate and pulse rate (carrying or lifting heavy loads, digging or construction work) for at least 10 minutes continuously? _____Minute/day for_____day in a week	-----
21	How often do you use the following transportation methods on a typical day? A. private car or taxi, bus, minibus or train _____ minute/day B. bicycle_____ minute/day C. Walking (on foot) _____minute/day	1. Always = 5 time per week 2. Usually/Often = 4 time per week 3. Sometimes= 1-3 time per week 4. Never	-----
22	Outside the working hours in what activity spent the time and how long in minute in every activity stayed	A. Mostly Sitting or Standing: reclining with only a little walking playing cards or watching television,) ----------minute per week B. Activities that require the same effort as walking long distance, or backyard gardening, or climbing upstairs, running, playing football ----Minute a week C. Activities that require the same effort as lifting heavy weight or strenuous exercise. ------ minute a week d. Other ----------minute a week	-------
➢ Mild intensity activity (in active): standing, sitting, recalling or move less 150 minute per week ➢ Moderate-intensity activity, that causes small increases in breathing or heart rate such as (brisk walking or carrying light loads (<20 k/g ➢ Vigorous activity any activity that increase Heart rate and pulse rate (carrying or lifting heavy			

loads, digging or construction work, running NB to say active: make moderate intensity activity ≥150 minute per week or vigorous activity ≥ 75 minute/week			
Step 2. Physical Measurements			Code
23	Blood Pressure (measured 2 times)	1st___(systolic/diastolic) 2nd ----mmHg (systolic/diastolic)	-------
24	Height (measured 2 times)	1st ----------cm 2nd ----------cm	------
25	Weight (kg)	----------Kg	-------
26	Body mass Index	_____kg/m^2	
27	Waist circumference or abdominal girth (measured 2 times)	G1 ---------cm G2 --------cm	------
28	Hip circumference (measured 2 times)	1st -------cm 2nd -------cm	------
29	Waist to hip circumference ratio	1---------- 2----------	
30	Waist to height ratio		
Step 3. Biochemical Tests			Code
31	Blood glucose analysis: Fasting blood sugar	Result: _____mg/dl	-------

ልጋብ-1: ንተሳተፍቲ ብዛዕባ ዘካይዶ መጽናዕቲ ሓበሬታ ወሃቢ ጽሑፍ

ርእሲ እዚ መጽናዕቲ: - አብ ኢተዮጵያ ንግዲ ባንክ ሽረ አብ ምስራሕ ዝርከቡ ሰራሕተኛታት ናይ ቅድመ ሕማም ሽኮርያ ምርመራ እና መቃላዕቲ ነገራት ዘላዎም ርክብ ንምዕናዕ ዝተዳለወ ቃለ መሕተት እዩ።።

ተመራማሪ: ክብሮም ታመነ

ስፖንሰር: ባዮሜዲካል ዲፓርትመንት ኮሌጅ ጥዕና ሳይንስ ፣ ኣክሱም ዩኒቨርሲቲ

መማከርቲ : ዶር ደሳልኝ ተኩለ (ኤም.ኤስ.ሲ ሐ/ጋዚ ፕሮፌሰር)፣ ዶር ሓጎስ ኣማረ (ዶር, ኤምኤስ.ሲ ሓ/ጋዚ ፕሮፌሰር) ፣ መረሃዊት ሃይለዘጊ (ኤም.ኤስ.ሲ)

መእተዊ

እዚ ሓበሬታ ወሃቢ ጽሑፍ ሓፈሻዊ ዕላምኡ ኣብዚ ዘካይዶ መጽናዕቲ ተሳተፍቲ ንኽትኮኑ ፍቓድኩም ንምሕታት ኮይኑ ብዛዕባ እዚ ዘካይዶ መጽናዕቲ ሙሉእ ሓበሬታ ክዋህበኩም እዩ። ብተወሳኺ እውን ካብ ተሳተፍቲ እንደልዮ ሓገዝ ብዝርዝር ዝተገለጸ ኮይኑ ኣብዚ ከይዲ ድሕንነት፣ ክብርን መሰልን ተሳተፍቲ ብዘረጋገጸ መንገዲ ንኽኸውን እንወስዶም ጥንቃቐታት እውን ኣቐሚጥና ኣለና። ስለዝኾነ ኣብዚ መጽናዕቲ ተሳታፊ ንምኻን ንኽውስኑ/ና እዚ ሓበሬታ ብዕምቆት ምርዳእ ጠቓሚ ይኸውን። ዝኾነ ዓይነት ሕቶ ወይ ከዓ ግልጺ ዘይኮነ ነገር እንተ/ጋጢምዎም/ወን ብዘይዝኾነ ስኽፍታ ክንዲዝደለይዎ/ኦ ግዜ ንኽሓታ/ቱና ይላቦ። ኣብዚ መጽናዕቲ ተሳታፊ ንምኻን እንተወሲኖም/ነን እሞ እዚ ውሳኔኦም/አን እቲ መጽናዕቲ ይኹን ንሶም/ንሰን ዝገብሩልና/ራልና ሓገዝን ካልኦት ዝተጠቐሱ ዛዕባታት ሙሉእ ብምሉእ ተረዲእዎም/ወን ብሰናይ ድሌቶም/ተን ፈቂዶም/ደን ምኻኖም/ነን ኣብቲ ዝተዳለወ ናይ ስምምዕ ቾጥዒ ብምፍራም ከረ/ጋግጹልና/ከራ/ጋግፃልና እዮም/እየን። ንዝገብሩልና/ዝገብራልና ምትሕብባርን ሓገዝን ብቕድምያ ምስጋናይ የቕርብ።

ዓላማ ናይዚ መጽናዕትን ናቶም/ናተን ተሳትፎን

ሓፈሻዊ ዕላማ እዚ መዕናዕቲ አብ ኢተዮጵያ ንግዲ ባንክ ሽረ አብ ምስራሕ ዝርከቡ ሰራሕተኛታት ናይ ቅድመ ሕማም ሽኮርያ ምርመራ እና መቃላዕቲ ነገራተ ዘላዎም ርክብ ርእሲ ንምዕናዕ እዩ። ማለት እውን አብ ኢተዮጵያ ንግዲ ባንክ ሽረ ዘሎ ናይ ደም ዓቀን ሹከርን መቃላዕቲ ነገራተ ንምዕናዕን ካብዚ መዕናዕቲ እዚ ብዝርከብ መረዳእታ ድማ ብቐንዱ ንነደፍቲ ፖሊሲን ንባዓል ሞያ ጥዕና ሓበሬታ ብምሃብ ዝክኣል ግንዛበ ንኽፍጠር ክግበር እዩ።

ተሳተፍቲ እዚ መጽናዕቲ ብኸመይ ይሕረዩ?

ዒላማዊ መረዛ ተሳተፍቲ ምስኣካየድና እቲ ሓበሬታ ወሃቢ ወረቐት ክተንብብዎ/ኣ ክወሃበኩም/ን እዩ። ድሕሪ እዚ ተወሳኺ መብራህርሂ ክዋሃበክኩም/ን እዩ። ዝተወሰነ ሕቶታት ብምሕታት ሕድሕድ ነጥቢ ከምዝተረደኣኩም/ክን ምስ ኣረጋገጽኩ ኣብዚ መጽናዕቲ ንምስታፍ ድሌት ዘለዎም አብ ኢተዮጵያ ንግዲ ባንክ ሽረ አብ ምስራሕ ዝርከቡ ሰራሕተኛታት ብድሌተኩም/ክን ፈቃደኩም/ክን ኣብቲ ናይ ስምምዕ ቐጥዒ ብምፍራም የረጋግፁ/ፃ። ብድሌተኩም/ክን ምስገለፅኩም/ናልና ነዚ መዕናዕቲ እዚ ዝተዳለዉ ሕቶታት ብቐደም ሰዓብ ብምሕታትን ነቲ ፅንዓት ዘድሊ 5 ሚ/ሊ ናይ ደም ናሙና ካብ ደመ ሰራዊር ኢድክኩም/ክን ብምዉሳድ ዝክኣል መልሲ ክንረክብ ኢና።

ኣብዚ መጽናዕቲ ብምስታፍክን እንታይ ጥቕሚ ይረኽቡ/ባ?

ምስ እዚ መጽናዕቲ ዝተተሓሓዘ ንተሳተፍቲ ዝኽፈል ቀጥታ ክፍሊት ከምዘይህሉ ክንገልጽ ንፈቱ። ኮይኑ ግና ካብዚ መዕናዕቲ እዚ ብዝርከብ ሓበሬታ መሰረት ናይ ቅድመ ሕማም ሽኮርያ ምርመራ እና መቃላዕቲ ነገራተ ዘላዎም ርክብን ኣብ ቅድመ ምክልካል ግንዛብ ኣብ ምዕባይ ከም ውልቀ ሰብ ኮነ ከም ዓዲ ተረባሒቲ/ት እዮም/የን ኢለ የኣምን።

ኣብዚ መጽናዕቲ ብምስታፈይ እንታይ ጉድኣት ክበጽሐኒ ይኽእል?

እዚ መጽናዕቲ ናይ ተሳተፍቲ ድሕንነት፣ ክብርን መሰልን ብዝለዓለ ደረጃ ብዘረጋገፀ ከይዲ ንኽፍፀም ዓብዩ ጥንቃቐ ክግብር ኢየ። እቲ ዝእከብ ናሙና ብበዓል ሞያታት ስለ ዝኮነ ምስዚ ተተሓሒዙ ዝመፅእ ምንም ዓይነት ሳዕቤን የለን። ኮይኑ ግና ናሙና ኣብ ዝዉሰደሉ ከባቢ ዝተወሰነ ናይ ሕማም ስምዒት ክህሉ ይክእል እዩ።ብስሩ እውን ግን ኣብዚ መጽናዕቲ ንተሳተፍቲ ጉድኣት ዘብጽሕ ወይ ከዓ ናብ ሓደጋ ዘጋልጽ ተግባር የለን። ነዚ ቃለ መሕትት 20 ደቂቃ ግዜኦም/አን ክህቡ/ባና እዮም።

እቲ መጽናዕቲ ከቋርፆ ይኽእል ‘ዶ?

ቅድም ኢሉ ከምዝተገለፀ ኣብዚ መፅናዕቲ ምስታፍ ሙሉእ ንሙሉእ ኣብ ሰናይ ድሌት ተሳተፍቲ ዝተመርኮሰ እዩ። ኣብ ከይዲ ካብቲ መጽናዕቲ ምቁራጽ ይከኣል እዩ። ስለዘቕረባ ዝበጽሐን ዝኾነ ዓይነት ክፍሊት ይኹን ቅጽዓት ኣይህሉን።

ካብ ተሳተፍቲ እንወስዶ ሓበሬታ ምስጢራውነት ብዝምልከት

ካብ ተሳተፍቲ እንወስዶ ሓበረታ ናይመን ምኻኑ ብዘየፍልጥ መንገዲ ብኮድ እዩ ክፍፀም። ስለዚ ነዚ ፅነዓት ኢሎም/ለን ዝሃቦኡ ሓበሬታ ምስጢሩ ዝተሓለወ እዩ።

ምዝርጋሕ ውፅኢት ናይዚ መፅናዕቲ ዝምልከት

ውፅኢት ናይዚ መፅናዕቲ ብመልክዕ ሕታም ወይ ከዓ ኣብ ኮንፈረንስታት ብምቕራብ ክሰራጭ/ክዝርጋሕ እዩ። ከከም ኣድላይነቱ ካልኦት ሜላታት እናተጠቀምካ እውን እቲ ውፅኢት ናይ ምዝርጋሕ ስራሕቲ ክስራሕ ይኽእል እዩ።

ንመን ክረኽቡ/ባ ይደልዩ/ያ?

ኣብቲ ፅንዓት ዝልዓል ሕቶ እንተሃልይዎም/ን ዋና ተመራማሪ በዚ ዝስዕብ ኣድራሻ ምርካብ ይክእሉ/ላ፡

ክብሮም ታምነ

ስልኪቁፅሪ:0932329914

ኢሜይል:tamenekibrom121@gmail.com

ልጋብ 1.1: <u>ኣብ ኣፍልጦ ዝተመስረተ ናይ ተሳታፋይነት ስምምዕነት</u>

ዓላማ ናይዚ መዕናዕቲ ብዛዕባ ኣብ ኣብ ኢተዮጵያ ንግዲ ባንክ ሽረ ኣብ ምስራሕ ዝርከቡ ሰራሕተኛታት ናይ ቅድመ ሕማም ሽኮርያ ምርመራ እና መቃላዕቲ ነገራተ ዘላዎም ርክብ መረዳእታ ንምእካብ ምኻኑ ብዝግባእ ተረዲኡ ኣለኹ። ዝርዝር ብዛዕባ ንተሳተፍቲ ዝዋሃብ ሓበሬታ ወሃቢ ጽሑፍ እውን ኣንቢበን ተነቢቡለይን ኣሎ። ዘይበረሀለይ ሕቶ ናይምሕታት እኹል ዕድል ዝረኸብኩ እንትኸውን ዝግባእ እኹል መልሲ እውን ተዋሂቡኒ እዩ። ብተወሳኺ ብሰናይ ድለየተይ ኣብዚ መዕናዕቲ እዚ እናተሳተፍኩ እንትኾን ኣብ ዝደለኽዎ ግዜ ብዘይዝኾነ ምቅዋስ/ሃሰያ ማሕበራዊ ሂወት ወይካዓ ጥዕናዊ ኣገልግሎት ካብዚ መዕናዕቲ ምስታፍ ዓርሰይ ከግልል ዝኽእል ምኻነይ ተረዲኡ ኣለኹ።

1. እወ፣ ብዝግባእ ☐
2. ኣይፋል ☐

ልጋብ 1.2. መሕትት (ስርሒት ትግርኛ)

1.ማሕበራዉን ስነ-ህዝባውን ኩነታት			
ቁፅሪ	ሕቶ	መልሲ መማረጺ	ኮድ
1	ጾታ	ተባ ኣን	
2	ዕድሜካ/ኪ ክንደይ እዩ?	_____ ዓመት	
3	ሃይማኖትካ/ኪ እንታይ እዩ	ሀ) ኦረቶዶክስ ለ) ሙስሊም ሐ) ፕሮቴስታነተ	
4	ኩነታት ሓዳር	ሀ) ዝተመርዐወት ለ) ዝተፋተሐት ሐ) ሓዳር ዘይብላ መ) ካሊእ.....	
5	ኩንታት ትምህረቲይ	ሀ) ዝተመሃር ዘንበብ ለ) ዘይተማሃረ	-------
	ንዝተመሃር ደረጃ ተመህረቲይ	ዲፕሎማ ዲገሪ ማሰተረ	
6	አብ ግዜ ስራሕካ/ኪ እንታይ ይስመዓካ/ዓኪ?	1. ስራሕ ዓዕቂ 2. ኣብ ሓዊር ገዜ ቡዙሑ ስራሕ 3. ሰረሑ አሰለቻዊ እዩ ክፈዩኡ ግን ዕቡቅ 4. ፍርሒ ቅረሺ ከየጠፈአና 5. ካሊእ ዝተፈየ ሓሳብ-----	-------
7	ክንደይ ዓመት ሰሪሕካ/ኪ አብ ባነኪ? ከመኡ እውን አብ መዓለቲ ክንደይ ሰዓት ተሰርሕ/ሒ?	----------ዓመት ----------ሰዓት	
8	ክንደይ እዩ ወርሓዊ አታዊኩም/ክነ	1._____ቅረሺ 2. አይፈልጦን	
9	ካብ ቤትሰብ ብ ሕማም ሺኮርያ ወይ በዝሒደም ዘለዎ አሎ ዶ?	ሀ. እወ ለ. የለን እንድሕር ሃልዩ ነፀር	-------
10	ን ደቂ አንስትዮ ብቻ ክብደቱ ከቢድ ዘኮን ወይ ለዕሊ 4 ኪግ ዝምዘን ህጻን አለኩምዶ?		-------

ለ. ዝተፋላለየ ናይ ጥዕና ባህርያት መጠየቂታት ዘካትት አብዚይ ዝካተቱ እዞም ዝሰዕቡ እዮም

1. ብዛዕባ ሲጋራ ምጥቃም ይምልክት

ቁፅሪ	ሕቶ	መልሲ መማረጺ	ኮድ
11	ሲጋራ ኣትኪካ/ኪ ዶ ተፈልጡ/ጢ/ ክንደይ ግዜ	1.እወ, መዓልታዊ 2. እወ ሓሓሊፉ 3.አይፋል	
12	አብዝ ሕዚ ሰዓት ሲጋራ ተስሕብ/ቢ ዶ እወ እነደሕር ኮይኑ ካብ መዓዝ ምትካክ/ምስሓብ መዓዝ ጀሚረካ/ኪ	ሀ. ካብ ዘሓለፈ ዓመት 2. ካብ ዘሓለፈ ወርሒ 3. ካብ ዘሓለፈ ሰሙነ 4. ካብ ዘሓለፈ መዓልተይ	
13	ብማእከላይ በቢመዓልቱ ክንደይ ሳዒት ሲጋራ ትስሕብ/ቢ?	---------- ሲጋራ	------
14	ጫት ቂሕምካ ዶ ትፈልጥ/ጢ	1. እወ 2 እፋይል	------
2.	ብዛዕባ ንኣልኮል ተቃላዓይነት ሕቶታት.		
15	ዝኮነ ዓይነት መሰተ ሰቲካ/ኪ ዶ ትፈልጥ/ጢ ማለት ቢራ ሰፒራይት	1.እወ 2 እፋይል መልሲ አይኮነን እንደሕረ ኮይኑ ናብ ምግቢ አማጋግባ ቃለ ምሕተት ይሕለፉ	-------
16	አብ ዝሓለፈ ሓደ ወርሒ ክንደይ ዘአክል አብ መዓልታዊ፣ሰሙናዊ፣ወርሓዊ ሰቲካ/ኪ	1. 1-4 ግዜ አብ መዓልቲ 2. 5 ግዜ ሰሙናዊ 3. 3 ተ ማዓልቲ አብ ወርሓዊ	-------
	ክትሰቲ /ሰትዩ ከለካ/ኪ ብማእከላይ ክነደይ ትሰቲይ አብ ማዓልቲይ;	--------- (በዝሒ ዝተሰተየ)	
	ብዛዕባ መግቢ ኣማጋግባ		
17	ክንደይ ግዜ ዘኣክል ፍራፈምረ አብ መዓልቲ ትመገቢ/ብ)	1) ፍራምረ ምንም በሊዐ አይፈልጥን 2) ይበሊዐ እየ ሓሓሊፉ 3) በቢመዓልቱ 1 ግዜ ይበለዕ 4) አብ ማዓልቲይ 2-4 ግዜ የበልዕ 5) አብ ማዓልቲይ 5 ተን ካበኡ ንላዕሊ የበልዕ	
18	ክንደይ ግዜ ዘኣክል አሕምለቲ አብ መዓልቲ ትመገቢ/ብ)	1. አሕምልቲ ምንም በሊዐ አይፈልጥን 2. ይበሊዐ እየ ሓሓሊፉ 3. በቢመዓልቱ 1 ግዜ ይበለዕ 4. አብ ማዓልቲይ 2-4 ግዜ የበልዕ 5. አብ ማዓልቲይ 5 ተን ካበኡ ንላዕሊ የበልዕ	6.
አልኮል መሰተ ብጥርሙዝ ኢና ቁፅሪ ነቀመጥ ማለት ሓንቲ ጥረሙዝ ቢራ (330) = 5% ኣልኮል ይሕዝ ፣ ሓንቲ ጥረሙዝ ሰፐሪይትን & ዋዪን = (40ml)			

	ብዛዕባ ኣካላዊ ምንቃሳቀስ መሕተቲ መረዳእታ አብ ግዜ ስራሕን ካብ ስራሕ ወፃኢን		
19	አብ ስራሕ ዝሰ ክንደይ ሰዓት ዝአክል እናሰራሕካ ትሕልፎ	--------- ሰዓት	

18	አብዚ ስራሕ ግዜ ክነደይ ዘአክል እዞም ዘስዕቡ ተዘወተሮም ክምኡ እወን ንክነደይ ደቂቃ፣ሰዓት ዝኣክል ትፀንሕ	ሀ. ኮፍን ደውን ብምባል ን ደቂቃ ሰዓት ለ.ማእከላይ ደረጃ ምንቅስቃስ (ቅልጥፍጥፍ ኢልካ ምጉዓዝ፣ቀሊል ሽክሚ ን ደቂቃ ሰዓት ሐ.ከቢድ ዝኮነ ምንቅስቃሰ ክበድቲ ንገራት ምሸካምን፣ ሰፖርታዊ ምነቅሰቃስት ምግባር፣ ጉያ ን ደቂቃ ሰዓት	
20	ክንደይ ግዜ ዝአክል እዞም ዘስዕቡ መጋዓዝያ ትጥቀመሎም ሀ. ናይ ገዛ /ግሊ/መኪና/፣ ህዝባዊ መኪና፣/ ብሞትር------- ለ. ብሳይክል ን ደቂቃ ሰዓት ሐ. ብእገረ ን ደቂቃ ሰዓት	1.ኩሉ ገዜ 2. ሓሓሊፉ 3. ሳሕቲ 4. ምንም አይኣዘውተሮምን	
21	ካብ ስራሕ ወፃኢይ ዘሎ ግዜ ክነደይ ዘአክል እዞም ዘስዐቡ ተዘወተሪ/ረ ክምኡ እወን ንክነደይ ደቂቃ፣ሰዓት ዝኣክል ትፀንሕ/ሒ	ሀ. ኮፍን ደውን ብምባል ን ደቂቃ ሰዓት ለ.ማእከላይ ደረጃ ምንቅስቃስ (ቅልጥፍጥፍ ኢልካ ምጉዓዝ፣ቀሊል ሽክሚ ን ደቂቃ ሰዓት ሐ. ከቢድ ዝኮነ ምንቅስቃሰ ክበድቲ ንገራት ምሸካምን፣ ሰፖርታዊ ምነቅሰቃስት ምግባር ጉያ ን ደቂቃ ሰዓት	

አንትሮፖሜትሪክ ሜዘርምነት			
22	መጠን ፀቕጢ (2ተ ግዜ ትልካዕ)	ናይ መጅምሪያ ሲያስ ቶሉክ /ዱያ ስ ቶሉክ _____ሚ/ሜ ሲስ ቶሉክ /ዱያ ስ ቶሉክ _____ሚ/ሜ	
23	ቁመት	ቀዳማይ ----------ሳ/ሜ ካልኣይ ----------ሳ/ሜ	
24	ክብደት ብኪሎ ግራም	----------	
25	ናይ ሸምጢ ስፋሓት.	ቀዳማይ ----------ሳሜ ፣ ካልኣይ----------ሳ/ሜ	
26	ናይ ዳሌ/ጎሎ ዓቀን	ቀዳማይ ----------ሳሜ ካልኣይ ----------ሳ/ሜ	
27	ክብደት ምስ ቁመት እንትናፃፀር	ኪ/ግ/ ሜ^2	
27	ናይ ማጥቆ ዙርያ ንወሓት ምስ ናይ ዳሌዙርያ ንወሓት እንትናጸፀር	----------	
28	ማያጥቆ ዙርያ ንወሓት ምስ ቁመት ክናጻጸር ከሎ		
	ደረጃ ሰለስት ባዮከሚካልም ምርመራ		
30	መጠን ናይ ደም ገሉኮስ ቀድሚ ምገቢ	ሚግ/ደሊ	