



WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCE

DEPARTMENT OF INTERNAL MEDICINE

**GLYCEMIC CONTROL AND ITS DETERMINANTS AMONG TYPE 2
DIABETES PATIENTS AT PUBLIC HOSPITALS IN GURAGE ZONE,
CENTRAL ETHIOPIA, 2025.**

**A THESIS REPORT SUBMITTED TO WOLKITE UNIVERSITY, COLLEGE OF
HEALTH SCIENCE, SCHOOL OF MEDICINE, DEPARTMENT OF INTERNAL
MEDICINE FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR INTERNAL MEDICINE SPECIALITY PROGRAM**

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JAN, 2025

WOLKITE, ETHIOPIA

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APPROVAL SHEET

DIRECTORATE FOR POSTGRADUATE PROGRAMS

We hereby certify that we have read and evaluated this Thesis titled "glycemic control and its determinants among type 2 diabetes patients at public hospitals in Gurage Zone, central Ethiopia, 2025"; Hospital based cross-sectional study prepared under our guidance by **Dr. Yonas Girma**. We recommend that the thesis shall be submitted as fulfilling the requirements for the award of **Certificate of Specialty in Internal Medicine**.

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
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As members of the Board of Examiners of the Certificate of Specialty in Internal Medicine Thesis open defense examination, we have read and evaluated this thesis prepared by **Dr. Yonas Girma**, and examined the candidate. We hereby certify that, the thesis is accepted for fulfilling the requirements for the award of the **Certificate of Specialty in Internal Medicine**

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DECLARATION

By my signature below, I declare and affirm that this specialty thesis entitled “Glycemic control and its determinants among type 2 diabetes patients at public hospitals in Gurage Zone, central Ethiopia, 2025” is my own work and I declare that this thesis has not been submitted to any other university anywhere for the award of any academic degree and I have cited and referenced all sources and material used in this document.

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ACRONYM

ADA	American Diabetes Association
BMI	Body Mass Index
BP	Blood Pressure
CBHI	Community based health insurance
CI	Confidence in Interval
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
DPN	Diabetic peripheral neuropathy
GC	Glycemic control
HgA1C	Hemoglobin A1C
LMICs	Low and Middle Income Countries
WHO	World Health Organization

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Abstract

Background: Poor glycemic control is a major public health issue among patients with type 2 diabetes mellitus and it is a significant risk factor for the progression of diabetic complications. Numerous studies have documented the importance of glycemic control and the factors that influence it. However; as of the studies done previously in Ethiopia the result are wide in terms of magnitude and its determinants. This study aimed to assess the magnitude and its determinant factors of poor glycemic control among type 2 diabetes patients public hospitals of Gurage zone, central Ethiopia.

Methods and materials: A hospital-based cross-sectional study was conducted among 316 patients with type 2 diabetes mellitus attending follow-up clinics at public hospitals in the Gurage Zone from November to December 2025. Study participants were selected using a systematic probability sampling technique, and all eligible patients who met the inclusion criteria were included. Data were collected through face-to-face interviews using a structured questionnaire and by reviewing patients' medical charts. The data were entered into EpiData version 3.1 and exported to SPSS version 23 for analysis. Descriptive statistics were used to summarize the data, while bivariate and multivariable logistic regression analyses were performed to identify factors associated with glycemic control.

Results: Among the 316 study participants, 216 (68.4%) had poor glycemic control and 100 (31.6%) had good glycemic control. Longer duration of diabetes (AOR = 4.12; 95% CI: 1.73–9.80), poor medication adherence (AOR = 7.64; 95% CI: 3.59–16.28), non-adherence to dietary recommendations (AOR = 2.55; 95% CI: 1.15–5.65), and older age (AOR = 6.38; 95% CI: 2.41–16.86) were independently associated with increased odds of poor glycemic control. Access to a health care facility was associated with reduced odds of poor glycemic control (AOR = 0.25; 95% CI: 0.12–0.54). Diabetic complications, comorbidity status, and community-based health insurance were not significant in the adjusted analysis.

Conclusion and Recommendations: Poor glycemic control was highly prevalent among patients with type 2 diabetes mellitus in Gurage Zone public hospitals. Longer duration of diabetes, poor medication and dietary adherence, older age, and who lack access to health care facilities were significant predictors of poor glycemic control. Strengthening patient education on adherence, improving access to chronic care services, and prioritizing high-risk groups are essential to improve glycemic outcomes

Keywords: Glycemic control; Type 2 diabetes mellitus

1. Introduction

1.1. Background

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Several distinct types of DM caused by a complex interaction of genetics and environmental factors. Depending on the etiology of the DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production (1, 2).

Poor glycemic control refers to a condition where blood glucose levels consistently remain outside the recommended target ranges, either too high (hyperglycemia) or too low (hypoglycemia), over an extended period (3,4). On the other way it can be considered if individuals are failed to maintain optimal blood glucose levels within a target range to prevent both short-term and long-term complications of diabetes. According to ADA recommendations the goal of glycemic control is Glycated Hemoglobin (A1C) Target of <7% or pre-prandial blood glucose value of between 80 to 130 mg/dL/(FBS<126mg/dl)/(4.4-7.2 mmol/L) for most non pregnant adults with diabetes or a Postprandial Blood Glucose (2 Hours after Meals) value of between <140 to 180 mg/dL (<10.0 mmol/L). While these values are general it is critical that the glycemic goals be woven into an individualized, person-centered strategy (1,2,3)

Optimal glycemic control is the most important area to intervene to prevent diabetes associated complication and to delay the disease progress. Glycemic control is critical for reducing the burdens of diabetes such as micro/macro vascular complications, hospitalization rates, and medical costs (5,,6,7). Major Consequences of Poor Glycemic Control in Diabetes can be Short-Term Consequences like Hyperglycemia and Diabetic Ketoacidosis (DKA) and Long-Term Consequences like Cardiovascular Disease (CVD) and stroke. A High blood glucose can damage blood vessels and leads to atherosclerosis which is a risk for Heart attack, Stroke, Peripheral artery disease, Heart failure, Diabetic Retinopathy(which is a major cause of preventable blindness worldwide), Diabetic Nephropathy leading to end-stage renal disease (ESRD) requiring dialysis or kidney transplantation(1,2,3,8).

Poor glycemic control is a significant global health crisis. According to the International Diabetes Federation (IDF) Diabetes approximately 589 million adults aged 20–79 living with diabetes in 2024, a number projected to rise to 853 million by 2050. This surge is particularly a big concern in low- and middle-income countries (LMICs) including Ethiopia in which poor glycemic control is a major problem and where almost 90% of adults with diabetes are reside (2).

1.2. Statement of the problem

Globally a large-scale study published in *The Lancet Diabetes & Endocrinology* showed that only 50% of people with diabetes have their HgA1C levels within the target range of <7% (9). And these factors are varied and influenced by factors like access to healthcare, education, socioeconomic status, healthcare infrastructure and medication availability (2, 3, 4). And about 56% of adults with diabetes in the U.S. have an A1C of <7%, but the percentage drops significantly in those who are older, uninsured, or have lower socioeconomic status (5). In Europe: According to a study in *Diabetes Research and Clinical Practice* A1C control is generally better in Northern and Western European countries but challenges remain, particularly in southern and eastern Europe, with a higher percentage of patients reaching an A1C of <7% (10). In Asia countries like China, India, and Japan, the rates of achieving optimal glycemic control are generally lower, for example a China National Diabetes Survey showed that only 39% of Chinese adults with diabetes had their A1C <7%, a reflection of the challenges in achieving glycemic control due to healthcare infrastructure and lifestyle (2,11,12).

Sub-Saharan Africa poor glycemic control among individuals with type 2 diabetes remains suboptimal. With multiple systematic reviews highlighting a high prevalence of poor control and multifactorial barriers; A meta-analysis of 74 studies involving 21,133 participants across the region reported a pooled prevalence of good glycemic control of only 30% (95% CI: 27.6–32.9%), indicating that approximately 70% of patients fail to achieve target glycemic levels (13). Similarly, another systematic review and meta-analysis comprising 45 studies with 15,981 participants in low- and middle-income countries (LMICs), including Ethiopia, found a 69.06% prevalence of poor glycemic control (14). These findings are corroborated by broader reviews, such as one analyzing 239 studies, which emphasized the persistence of poor glycemic control across LMICs and attributed it to a combination of clinical, socioeconomic, and systemic factors (15). Key determinants consistently identified include low socioeconomic status, medication non-adherence, and longer duration of diabetes, obesity, and limited access to healthcare services. Importantly, insulin use often required in advanced disease was paradoxically associated with poorer control in low-resource settings due to regimen complexity, inadequate patient education, and challenges in self-administration. Additionally, behavioral factors such as alcohol consumption, smoking, and poor dietary adherence further exacerbate poor glycemic outcomes. Other contributing elements include absence of health insurance, pill burden, treatment side effects, and the presence of comorbidities and diabetes-related complications (13, 14, 15).

Ethiopia, the second most populous country in Africa, is experiencing a growing burden of diabetes mellitus, with an estimated national prevalence of 4.4%; however, the true prevalence may be higher due to under-diagnosis and limited access to screening services, especially in rural areas. Urbanization, dietary transitions, physical inactivity, and population aging are key drivers of the diabetes epidemic in the country (2, 19). Poor glycemic control remains a major challenge in management of both Type 1 and Type 2 diabetes mellitus. Multiple studies indicate alarmingly high rates of poor glycemic control among diabetic patients in Ethiopia, with pooled prevalence estimates ranging from 61.1% to 64.7% (17, 18, 19) and individual facility-based studies reporting rates as high as 80.3% in Menelik II Referral Hospital (20). 64.1% in Adama Comprehensive Hospital and 72.7% in Mettu Karl Referral Hospital (21, 22). Studies done in Debre Berhan, Dessie and tigray hospital also showed 72.6% of and 73.5% of participants had poor glycemic control respectively (23, 24, 25). The Addis Ababa region also exhibited the highest prevalence at 68.57% in a meta-analysis involving 6,643 patients (26).

Findings across systematic reviews reveal several key determinants of poor glycemic control with variable degree of level of association; These include poor medication adherence, lack of diabetes education, low health literacy, absence of formal education, and longer duration of diabetes (≥ 10 years) (22-25). Additionally, comorbidities such as dyslipidemia, peripheral neuropathy, and obesity, as well as poor diet adherence and insufficient physical activity, were frequently identified as predictors (24, 25). Socioeconomic barriers including low income, lack of health insurance, and rural residence also limit access to continuous care and essential medications such as insulin and oral hypoglycemics (22, 23). Health system deficiencies, particularly in rural areas, such as the shortage of trained diabetes specialists, lack of structured patient education, and irregular availability of glucose monitoring tools, significantly impair effective disease management (22-25). Furthermore, behavioral and cultural factors including alcohol consumption, khat chewing, and reliance on alternative treatments compound the problem (22, 25). The absence of self-monitoring tools (e.g., glucometers) and weak patient-provider communication also negatively affect treatment adherence and disease outcomes (25, 26).

Despite the availability of several studies conducted in Ethiopia on poor glycemic control and its determinants, most of these investigations were carried out primarily in the Oromia and Amhara regions. As a result, their findings may not accurately represent the population in this study area. Many patients in this setting come from diverse sociodemographic backgrounds and other contextual factors that can influence glycemic control. Furthermore, most existing studies were institution-based and conducted in

single referral hospitals, which limits their generalizability to a broader regional level. In addition most of previously done studies have not adequately considered important variables such as patient health insurance status, which may significantly affect access to diabetes care and consequently influence glycemic control. Importantly, no scientific study has been conducted in this specific area to explore these issues. Given the substantial differences in socioeconomic, cultural, and lifestyle characteristics between this population and those involved in earlier studies, it is reasonable to anticipate variations in both the magnitude of poor glycemic control and its associated factors. Therefore, this study aims to assess the prevalence and determinants of poor glycemic control while incorporating variables that have been under-represented in previous research.

1.3. Significance of the study

This study is essential in advancing the understanding of factors that hinder the achievement of optimal glycemic control among patients with diabetes. Identifying these determinants will help clinicians develop more individualized and effective treatment strategies tailored to patient needs, ultimately improving diabetes management outcomes.

The findings would provide baseline evidence for public hospitals in the Gurage Zone, supporting healthcare providers in delivering more efficient, patient-centered, and cost-effective diabetes care. Additionally, the study offer valuable insights that can facilitate collaboration between the study hospitals and the Ethiopian Diabetes Association (EDA). Such collaboration is crucial in improving quality of care through professional training, medical supply support, and direct patient services including free medications, education, and follow-up care.

Moreover, the evidence generated from this research will contribute to the existing body of knowledge and serve as a reference for policymakers, program planners, and future researchers working in the field of diabetes care and glycemic control in Ethiopia.

2. Literature Review

2.1 introduction

Diabetes mellitus is a group of metabolic disorders of carbohydrate metabolism in which glucose is both underutilized as an energy source and overproduced due to inappropriate gluconeogenesis and glycogenolysis resulting in hyperglycemia (1). Diabetes can be diagnosed by demonstrating increased concentrations of glucose in venous plasma or increased A1C in the blood. It is classified conventionally into several clinical categories (e.g., type 1 or type 2 diabetes, gestational diabetes mellitus, and other specific types derived from other causes, such as monogenic diabetes, exocrine pancreatic disorders, and high-risk medications) (3).

The current criteria for the diagnosis of DM issued by consensus panels of experts and the World Health Organization reflect new epidemiologic and metabolic evidence based on variation in normal individuals on the spectrum of FBG and response may be diagnosed based on Plasma glucose criteria include either Fasting plasma glucose (FPG) of more than or equal to 126 mg/dL or more than or equal 200 mg/dl blood sugar level during Oral Glucose tolerance test (OGTT) or an individual with classic symptoms of hyperglycemia or hyperglycemic crisis with a random plasma glucose level of more than or equal 200 mg/dL Or Hemoglobin A1C of more than or equal 6.5% (2,3).

The ultimate goals of treatment for diabetes are to prevent or delay complications and optimize quality of life which can be addressed by achieving optimal glucose level persistently, however; the word is failed to meet the desire target because of different factors (3, 4).

Therefore Good glycemic control is of paramount importance in the care and management of patients with diabetes. Poor glycemic control is a major health problem that greatly contributes to the development of diabetic complications including either acute/chronic consequence of persistent hyperglycemia premature or death.

2.2 magnitude of poor glycemic control

Globally, as of large-scale study published showed that only about 50% of people with diabetes have their A1C levels within the target range of <7%, but this number is varies from region to region depending different factors; for example it is demonstrated that between 50% and 70% of individuals with T2DM fail to achieve recommended HbA1c targets in low- and middle-income countries; often exceeding 70% (3,17)

A systematic review and meta-analysis of 45 studies involving 15,981 participants from LMICs, including Ethiopia, found a pooled prevalence of poor glycemic control of 69.06% (13, 16, 20). Evidence from Asian countries similarly demonstrates wide variability, with the prevalence of poor glycemic control ranging from 20% to 77.2% in facility-based and pooled analyses, similarly in USA the prevalence of poor glycemic control is stagnant and still demanding attention (11, 14,)

In Africa multiple studies shows suboptimal glycaemic control is pervasive among patients with type-2 diabetes. In sub-Saharan Africa of the studies a systematic review and meta-analysis done from 2012 to 2022 showed the pooled prevalence of good glycaemic control was 30% (ranges from 10%-60%)(52). Institution based studies done in Ghana and Uganda reported poor glycemic control of 38.8% and 84.35% respectively (28, 29, 30).

Ethiopia, the second largest population in Africa after Nigeria is becoming one of the high burdens of Diabetes (4.4%) with large number of undiagnosed (78%) asymptomatic diabetes mellitus, Multiple systematic reviews and meta-analyses have consistently shown a high burden of poor glycemic control, with pooled prevalence estimates ranging from 61% to 65.6%. Individual facility-based studies further report prevalence rates between 50% and 80%, underscoring the magnitude of the problem nationwide(2. 17, 19, 24, 27).

2.3 Variables associated with poor glycemic control

Across global, regional, and Ethiopian studies, poor glycemic control has been linked to a wide range of interrelated factors. Sociodemographic determinants include older age, female sex, low educational status, low socioeconomic status, rural residence, marital status, and limited family or social support. Clinical factors consistently associated with poor control include longer duration of diabetes (≥ 5 or ≥ 10 years), presence of comorbidities and diabetic complications (such as hypertension, dyslipidemia, retinopathy, and peripheral neuropathy), obesity or high body mass index, unfavorable lipid profiles, insulin-based or complex treatment regimens, pill burden, and medication side effects. Behavioral and lifestyle factors such as poor adherence to antidiabetic medications and dietary recommendations, physical inactivity, smoking, alcohol consumption, inadequate self-monitoring of blood glucose, and low illness perception have also been repeatedly identified as significant predictors. In addition, health-care-related factors including irregular follow-up, limited access to diabetes education and counseling, lack of glucometers, absence of health insurance, and delayed diagnosis and treatment intensification contribute substantially to poor glycemic outcomes. Conversely, good medication and dietary adherence, regular exercise, effective coping

strategies, strong family support, higher diabetes health literacy, and consistent follow-up have been shown to improve glycemic control (19, 27-32, 35-37). Below are specific variables explained one by one, which has uniformly and clearly linked to poor glycemic control based on different evidence.

2.3.1 Older age and poor glycemic control

Ethiopian studies consistently report that patients aged ≥ 50 years have significantly poorer glycemic control compared with younger adult. This association is explained by age-related decline in β -cell function, increased insulin resistance, and higher prevalence of comorbidities such as hypertension and dyslipidemia. In addition, older Ethiopian patients often experience reduced physical activity, limited diabetes self-care skills, and delayed treatment intensification, all of which contribute to persistent hyperglycemia (1, 17, 19, 22, 24, 34).

2.3.2 Longer duration of diabetes and poor glycemic control

Multiple Ethiopian facility-based studies and meta-analyses show that duration of diabetes ≥ 5 –10 years is a strong predictor of poor glycemic control; Progressive β -cell failure and worsening insulin resistance over time reduce the effectiveness of oral antidiabetic agents, leading to higher fasting and postprandial glucose levels despite treatment (1, 17, 19, 21, 35-37).

2.3.3 Obesity (high BMI) and poor glycemic control

Overweight and obesity have been repeatedly identified as determinants of poor glycemic control in Ethiopian patients with T2DM; Excess adiposity increases insulin resistance through inflammatory cytokines and free fatty acids, impairing glucose uptake and increasing hepatic glucose production (1, 3 17, 24, 34).

2.3.4 Poor medication adherence and poor glycemic control

Poor adherence to antidiabetic medications is one of the most consistently reported predictors of poor glycemic control in Ethiopian studies (13, 16, 19, 20, 35-37,44). Missed doses, improper insulin administration, and insulin-induced lipohypertrophy reduce drug effectiveness, resulting in sustained hyperglycemia (1, 2,).

2.3.5 Poor dietary adherence and poor glycemic control

Diet non-adherence has been strongly associated with poor glycemic control in Ethiopia (17, 19, 24, 34). High consumption of carbohydrate-dense diets with limited fruits and vegetables increases postprandial glucose excursions and worsens overall glycemic status (1, 3, 13, 16, 17, 24, 34).

2.3.6 Physical inactivity and poor glycemic control

Several Ethiopian studies report inadequate physical activity as an independent predictor of poor glycemic control (17, 19, 34). Reduced muscle glucose uptake and increased insulin resistance contribute to elevated blood glucose levels among sedentary patients (1, 3).

2.3.7 Alcohol consumption and poor glycemic control

Alcohol intake has been identified as a significant behavioral risk factor for poor glycemic control in Ethiopian diabetic populations (17, 19). Alcohol interferes with hepatic glucose regulation and is often associated with poor adherence to dietary and medication recommendations (1)..

2.3.8 Presence of comorbidities and diabetic complications

Ethiopian studies consistently demonstrate that patients with comorbid conditions such as hypertension and dyslipidemia, as well as chronic complications like neuropathy and retinopathy, are more likely to have poor glycemic control (13, 19-22, 35-,36, 38-40). These conditions reflect advanced disease and increase treatment complexity and pill burden.

2.3.9 Poor self-monitoring of blood glucose and poor glycemic control

Lack of glucometers for self-monitoring has been reported as a major determinant of poor glycemic control in Ethiopia (17, 24, 34). Without regular glucose monitoring, patients fail to recognize hyperglycemia early, delaying appropriate treatment adjustments.

2.3.10 Limited access to health-care facilities and poor glycemic control

Limited access to health-care facilities has been identified as an important determinant of poor glycemic control in Ethiopian studies (16, 17, 19, 20, 24, 34). Patients living far from health facilities or in rural areas often experience irregular follow-up visits, delayed diagnosis, and late treatment intensification. This results in prolonged periods of uncontrolled hyperglycemia due to inadequate monitoring, suboptimal

medication adjustment, and limited exposure to diabetes education. From a pathophysiologic perspective, delayed intervention allows persistent insulin resistance and progressive β -cell dysfunction to worsen, leading to sustained poor glycemic control.

2.3.11 Absence of community-based health insurance and poor glycemic control

Absence of community-based health insurance (CBHI) has been indirectly associated with poor glycemic control in Ethiopia through reduced access to continuous diabetes care, medications, and laboratory monitoring (19, 21, 22, 35). Uninsured patients are more likely to miss follow-up appointments, interrupt medication use, and avoid routine blood glucose and HbA1c testing due to financial constraints.

2.4 Summary of literature review

Diabetes mellitus poses a significant public health challenge in Ethiopia, with a growing burden reflected in high prevalence rates and substantial numbers of undiagnosed cases. Despite numerous studies revealing that over 60% of diabetic patients exhibit poor glycemic control, critical gaps remain in understanding the complex determinants contributing to this problem. Existing research highlights several associated factors including demographic variables (such as age and gender), socioeconomic status, educational level, lifestyle behaviors (such as diet adherence, physical inactivity, and substance use like khat chewing), presence of comorbidities, and healthcare access issues. However, these factors have been inconsistently studied across different regions and populations, with limited exploration of the interplay between clinical and behavioral determinants.

Moreover, specific clinical factors such as lipid profiles and combined medication regimens have not been sufficiently examined in the Ethiopian context. Given the high rates of poor glycemic control and its associated complications, there is a critical need for comprehensive studies that identify and analyze the multifaceted determinants influencing glycemic outcomes among Ethiopian diabetic patients. Understanding these factors will enable the design of targeted interventions to improve diabetes management and reduce the disease burden nationwide.

2.5 Conceptual framework of the study

Based on the review of the literature and objectives of the study the conceptual frame work was done. This conceptual framework looks at the relationship between dependent and independent variables.

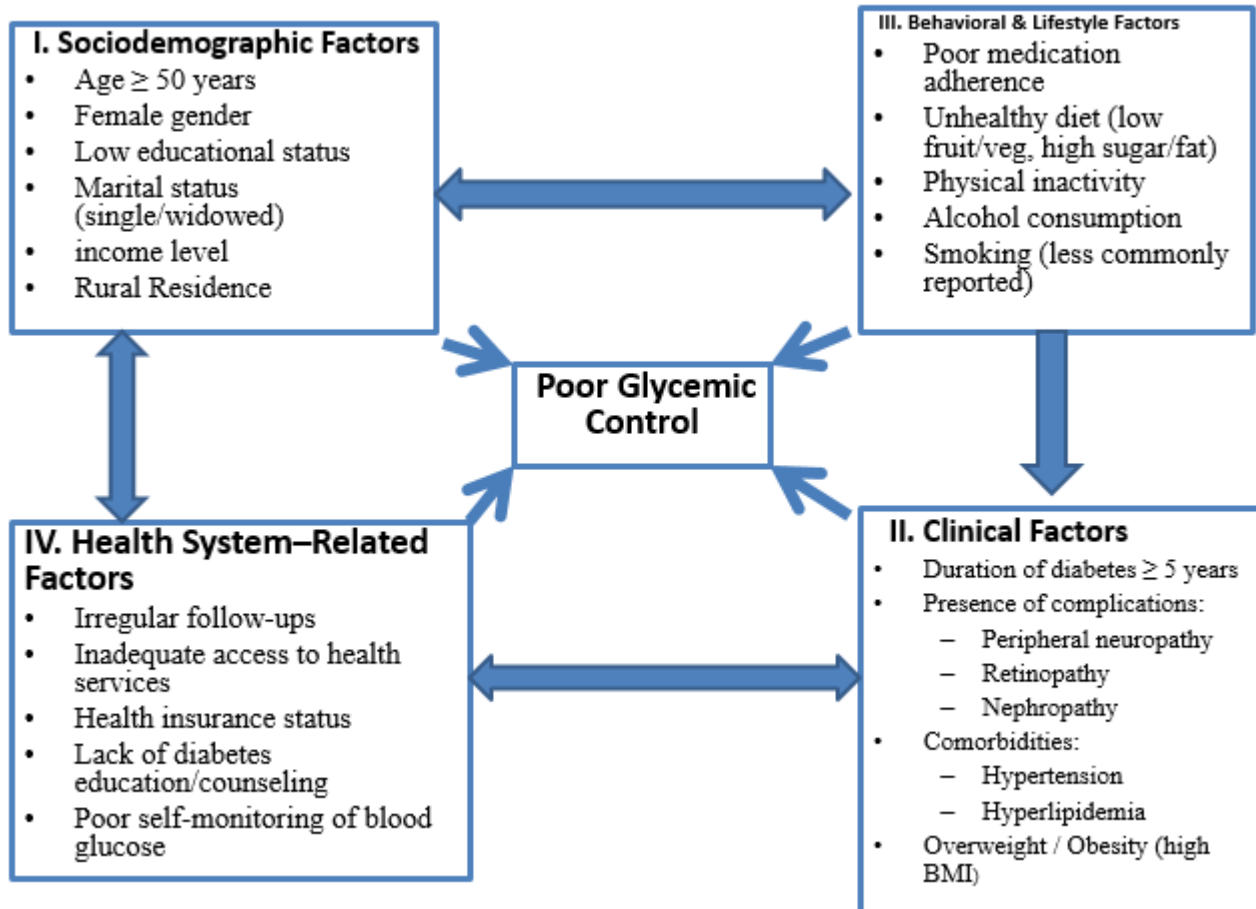


Figure 1: Conceptual frame work for Assessment poor glycemic control and its determinants among type 2 DM who are attending at Gurage zone public hospitals, adapted from different literatures reviewed above (13-17, 20-27, 30, 31, 35-40, 44,45,48, 54 -56).

3.1 Objective of the study

3.1.1 General objective:

- To assess glycemic control and its determinants among patients with type 2 diabetes mellitus at public hospitals in Gurage Zone, Central Ethiopia, in 2025.

3.1.2 Specific objective

- To assess the prevalence of poor glycemic control among type 2 diabetes patients at public hospitals in Gurage Zone, Central Ethiopia, in 2025.
- To assess factors associated with poor glycemic control among type 2 diabetes patients at public hospitals in Gurage Zone, Central Ethiopia, in 2025.

4. Methods and Materials

4.1 Study Area

The study was conducted in public hospitals located in Gurage Zone, Central Ethiopia. Gurage Zone is situated approximately 157–190 km south of Addis Ababa and 90–118 km north of Hosanna. Administratively, the zone comprises 15 woredas (10 rural and 5 urban) and a total of 315 kebeles, of which 271 are rural and 44 are urban. The zone has an estimated total of 261,998 households.

The health care system of Gurage Zone includes seven public hospitals (six primary hospitals and one tertiary hospital), 53 health centers, 101 private clinics, and 236 health posts that constitute the primary health care structure and provide essential health services, including maternal and child health care. According to the 2017 E.C. report, these public hospitals provide diabetes care to a total of 4,265 patients on follow-up. Of these, 1,560 patients were attending Wolkite University Specialized Hospital (WUSH), 1,005 Gunchire Primary Hospital, 800 Atat Primary Hospital, 274 Kuante Primary Hospital, 256 Agena Primary Hospital, 204 Hawariyat Primary Hospital, and 166 Mehalamba Primary Hospital.

4.2 Study Period

The study was conducted from Nov to Dec 2025 G.C

4.3 Study Design

A hospital based cross-sectional study among type 2 diabetes patients who were on follow-up at public hospitals of Gurage zone public hospitals of Gurage zone, Ethiopia.

4.4 Target population

All type 2 diabetes patients in Gurage Zone

4.5 Source population

All type 2 diabetes patients on follow-up at selected public hospitals of Gurage zone was the source population.

4.6 Study Populations

Type 2 diabetes patients who came for follow up in the study period and who fulfill the inclusion criteria were the study population

4.7 Eligibility

Inclusion Criteria

Age \geq 18 years.

Patients who were diagnosed to have type 2 diabetes.

Patients with at least three consecutive blood glucose measurements for three months.

Patients who have a willingness to participate in the study.

Exclusion Criteria

Pregnant patients during the study period; because pregnancy alters glucose metabolism and insulin sensitivity and if gestational diabetes has distinct diagnostic and treatment.

Critically ill patients.

patients who are not on treatment for at least for 3 months(Because patient should take medication for about three month to level their glycemic level poor or optimal

If the patient chart will not be available during the data collection period

Anemic patient (Patients with Iron deficiency anemia (IDA) (because IDA falsely elevates the level of HgA1C)

4.8 Sample Size Determination

The sample size was determined using the single population proportion formula. The proportion of diabetes patients with poor glycemic control was taken as 68.3% from a previous study conducted at Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia (56). A 5% margin of error and a 95% confidence level were assumed, and a 10% non-response rate was added. Accordingly, the final calculated sample size was 339 participants.

Based on the 2017 E.C. reports of the selected hospitals, a total of 4,265 diabetes patients were on follow-up. Of these, 1,560 (36.6%) were from Wolkite University Specialized Hospital (WUSH), 1,005 (23.6%) from Gunchire Hospital, 800 (18.8%) from Atat Hospital, 274 (6.4%) from Kuante Primary Hospital, 256 (6.0%) from Agena Primary Hospital, 204 (4.8%) from Hawariyat Primary Hospital, and 166 (3.9%) from Mehalamba Primary Hospital. The calculated sample size of 339 was allocated proportionally to each hospital based on patient load, resulting in 124 participants from WUSH, 80 from Gunchire Hospital, 64 from Atat Hospital, 22 from Kuante Primary Hospital, 20 from Agena Primary Hospital, 16 from Hawariyat Primary Hospital, and 13 from Mehalamba Primary Hospital.

Using the formula for sample size calculation for cross-sectional studies using single proportion formula

Estimated proportion $p = 68.3\%$ (0.683)

Confidence level = 95% $\rightarrow Z = 1.96$

Margin of error $d = 0.05$

Population size $N = 4265$

Contingency (non-response adjustment): 10%

Step 1: Initial Sample Size (without correction)

$$n = Z^2 \cdot p(1-p) / d^2 =$$

$$n = (1.96)^2 \cdot 0.683 \cdot (1 - 0.683) / (0.05)^2 = 332$$

Step 2: Finite Population Correction (FPC)

$$n_f = n / (1 + n - 1 / N) = 332 / (1 + 332 - 1 / 4265) = 308$$

Step 3: Add 10% Contingency = 308 + (0.10 * 308) = 338.8

Final Sample Size = 339 participants

Sample Size Determination for second objectives

Using double proportion formula:

$$n = ((Z_{\alpha/2} + Z_{\beta})^2 * [p_1(1-p_1) + p_2(1-p_2)]) / (p_1 - p_2)^2 :$$

Sample size was determined using statistical software Epi-Info™ statcalc 7.1.2.0 by assuming prevalence of different poor glycaemic control, margin of error 5%, confidence level of 95%, power 80%, and 10% of non-respondent as follows:

Table1. : Sample Size Calculation for Key Predictors of Poor Glycaemic Control (35-37).

Variable	Category	Cases (Poor Control)	Controls (Good Control)	Proportion (p1 / p2)	Adjusted OR (AOR)	Sample Size per Group	Total Sample Size (with 10% non-response)
Physical Exercise	Poor	148	71	0.943 / 0.193	3.71(1.44-7.54)	89	198
Physical Exercise	Good	9	17	0.057 / 0.193		89	198
Medication Adherence	Poor	134	30	0.817 / 0.624	3.0(1.5-6.0)	81	178
Medication Adherence	Good	88	53	0.624 / 0.624		81	178
Duration of Diabetes	Poor (≥10 yrs)	120	40	0.750 / 0.400	2.5(1.3-4.8)	76	168
Duration of Diabetes	Good (<10 yrs)	80	60	0.400 / 0.400		76	168

Finally, the optimal sample size for this study was determined to be **339** participants, calculated using the single population proportion formula

4.9 Sampling methods and techniques

A proportional allocation sampling technique was used based on the 2017 E.C. hospital reports of 4,265 diabetes patients on follow-up. The initially calculated sample size of 339 was allocated proportionally across the hospitals; however, due to non-response, 316 participants were finally included, with 116 from WUSH, 72 from Gunchire, 64 from Atat, 20 from Kuante, 18 from Agena, 15 from Hawariyat, and 11 from Mehalamba hospitals. Within each hospital, a systematic random sampling technique was employed. The sampling interval (Kth value) was calculated by dividing the total number of patients in each hospital by the hospital-specific sample size. The first participant was selected randomly by lottery method, and every Kth patient thereafter was included until the required sample for that hospital was reached.

4.10 Variables

Dependent Variable (Outcome):

- Glycemic Control Status

Independent Variables (Determinant Factors):

Sociodemographic Variables

- Age
- Sex (gender)
- Ethnicity
- Marital status
- Educational level
- Occupation
- Monthly income
- Residence (urban/rural)
- Having health care insurance(CBHI) or not
- Average house hold monthly income

Clinical Variables

- Duration of diabetes
- Type of treatment (oral, insulin, both)
- Body Mass Index (BMI)
- Waist circumference
- Presence of comorbidities
- Presence of complication

Behavioral & Lifestyle Variables

- Medication adherence
- Physical activity
- Dietary habits (dietary adherence)

- Alcohol consumption
- Smoking

Health System–Related Variables

- Frequency of follow-up (health facility visits per year for diabetes care)
- Access to health facility (geographical accesses)
- Health education/counseling receive

4.11 Operational Definition

Poor Glycemic Control: Fasting Blood Glucose (FBG) ≥ 126 mg/dL (on two consecutive visits or average in the last 3 months) OR HbA1c $\geq 7\%$ and Good control: FBG < 126 mg/dL or HbA1c $< 7\%$ (2, 3)

Adherence to dietary: individuals with T2DM is characterized by a regimen consisting of modest, frequent meals, with a minimum of five servings daily, rich in fruits, vegetables, high-fiber diets, healthy grains, and little sugar content. Objectively assessed by Likert scale using a five item dietary assessment score. Participants who score 4 and above are categorized as good adherence (15).

Adherence to Medication: was defined as the study participant taking all prescribed antidiabetic medications over the past seven days, WHO recommendation to use to recall the last days or week of visit (12, 15).

Physical Activity: Engagement in regular physical exercise as recommended for diabetic patients by WHO : ≥ 150 minutes of moderate-intensity exercise per week, which is equivalent to about 30 minutes of daily activities for five and more days of the week (such as farming, brisk walking, carrying loads, digging, or cycling) (2, 12)?

Access to health facility (geographical accesses): Average physical distance to the nearest health center or hospital. 5 km threshold for primary care access or either public or private transport is regularly available to reach health facilities (12).

Co-Morbidity: Patients with any chronic disease that coexisted with their diabetes were considered to be co-morbid (21).

Dyslipidemia: the most recent blood result of the lipid profile shows out of clinical range (Triglycerides ≥ 150 mg/dl or HDL ≤ 40 mg/dl, LDL ≥ 100 mg/dl, total > 200 mg/dl) (3)

Abdominal obesity (waist circumference ≥ 94 cm for men or ≥ 80 cm for women, A cut off point for sub-Saharan region(1, 2, 12)

Frequency of follow-up visits: Diabetes patient's follow up visit should be individualized but it should be at least every 3-6 months (12)

Diabetic nephropathy: was defined as persistent proteinuria ($\geq 1+$ on urine dipstick) and/or elevated serum creatinine above the normal laboratory reference range documented on at least two occasions three months apart among patients with diabetes mellitus, adapted for resource limited regions (1) ,

Diabetic Retinopathy: Defined as a documented diagnosis of diabetic retinopathy confirmed by ophthalmoscopic retinal examination performed by an eye care professional and recorded in the patient's medical chart, or based on patient report of being informed by a health professional that their visual impairment was due to diabetes mellitus. This approach is consistent with methods used in previous Ethiopian studies (55)

4.12 Data Collection Methods and Instruments

Data was collected through face- to -face interview by using pre-tested structured questionnaires and reviewing patients chart on the same day. The questionnaire was developed through reviewing of various relevant literatures and first it was prepared in English, translated to Amharic and then back to English in order to ensure its consistency. It had five parts such as Sociodemographic Information of participants, Age, Sex, Marital status, Educational level, Occupation, Monthly income, Residence (urban/rural) and health insurance. Clinical Characteristics: Duration of diabetes, type of treatment (oral hypoglycemics, insulin, both). Comorbidities (e.g., hypertension, hyperlipidemia, chronic heart failure and other), Presence of diabetes complications (neuropathy, retinopathy, nephropathy), Family history of diabetes, three months average FBG or recent HbA1c results, BMI (was used by measuring the patients anthropometric upon visit and self-reported). Personal habits and lifestyle: Medication adherence, Dietary adherence, Physical activity, Smoking status and Alcohol use. Health System Related Factors: Regularity of follow-up visits, distance to health facility and availability of glucometer. Anthropometric and Laboratory Measurements: and weight (for BMI). Fasting Blood Glucose, HbA1c levels, Blood pressure and Lipid profile.

Data was collected by using clinical nurses, health officers, physicians and interns who are fluent in Amharic and Gurage language. All data collectors was oriented for one day on their responsibilities for describing the purpose of the study, how to collect the data and telling clients the importance of honest and genuine reply towards the questions. The principal investigator and supervisors strictly followed the overall activities of the data collection on daily base and ensured the completeness of questionnaire.

4.13 Data Quality Assurance

To ensure data quality, the data collection tool was prepared after an intensive review of relevant literature and similar studies. Properly designed data collection instruments were administered following appropriate training of data collectors. A one-day orientation was provided for all data collectors focusing on the objectives of the study, data collection procedures, interviewing techniques, methods of data collection, and data management processes.

A pretest was conducted on 5% of the sample size one week prior to the actual data collection to assess the clarity of the questionnaire, skip patterns, and completeness of responses. Necessary modifications and amendments were made based on the pretest findings. Additionally, the completeness and quality of the collected data were checked on a daily basis by supervisors, and detailed feedback was provided to data collectors. Any inconsistencies or incomplete data were corrected by the principal investigator on the following day

4.14 Data Processing and Analysis

The data were coded, cleaned, and entered using EpiData version 3.1 and then exported to the Statistical Package for Social Sciences (SPSS) version 23.0 for analysis. Inconsistencies and missing values were checked by running frequency distributions and other descriptive analyses. Bivariate logistic regression analysis was performed to identify independent variables associated with the dependent variable (poor glycemic control). Variables with a p-value ≤ 0.25 in the bivariate analysis were entered into a multivariable logistic regression model to determine independent associations. The Hosmer–Lemeshow goodness-of-fit test was used to assess model fitness. Adjusted odds ratios (AORs) with 95% confidence intervals were calculated to measure the strength of associations, and statistical significance was declared at $p < 0.05$. The results were presented using tables, figures, and text

4.15 Ethical Considerations

Ethical clearance was obtained from the Ethical Review Committee of Wolkite University, College of Medicine and Health Sciences, Department of Public Health. Following approval, an official letter of cooperation was issued to the concerned bodies by the Department of Public Health of Wolkite University. Permission was also obtained from the respective public hospitals.

Participants were provided with clear information about the purpose and procedures of the study, the importance of their participation, and their right to withdraw at any time without any consequences. Privacy and confidentiality were maintained throughout the study, and no personal identifiers were recorded from the study participants.

4.16 Dissemination of Results

The final findings of the study were initially communicated and submitted to Wolkite University, College of Medicine and Health Sciences, Department of Internal Medicine, before and after the final thesis defense. The results were also disseminated to the respective health offices, public hospitals, and other concerned bodies at various managerial levels. Furthermore, efforts were made to publish the findings in national and international scientific journals

5. Result

Table 2: Distribution of respondents and poor glycemetic control level among diabetes patients by hospital at public hospitals in Gurage zone, central Ethiopia, 2025 E.C.

Hospital	Follow-up Patients (2017 E.C.)	Sample & Response Rate (n, %)	Poor Glycemic Control (n, %)
Wolkite University Specialized Hospital (WUSH)	1,560 (36.6%)	124, 116 (93.5%)	76 (65.2%)
Gunchire Primary Hospital	1,005 (23.6%)	80, 72 (90.0%)	50 (69.4%)
Atat Primary Hospital	800 (18.8%)	64, 64 (100%)	45 (70.0%)
Kuante Primary Hospital	274 (6.4%)	22, 20 (90.9%)	14 (70.0%)
Agena Primary Hospital	256 (6.0%)	20, 18 (90.0%)	13 (72.2%)
Hawariyat Primary Hospital	204 (4.8%)	16, 15 (93.8%)	10 (66.7%)
Mehalamba Primary Hospital	166 (3.9%)	13, 11 (84.6%)	8 (72.7%)
Total	4,265 (100%)	339, 316 (93.2%)	216 (68.4%)

5.1 Socio-demographic characteristics

A total 316 individuals participated in the study making a response rate 93.2%., 164(51.9%) were male and 152(48.1%) were female. Nearly half were Muslim 152(48.1%), and the majority belonged to the Gurage ethnic group 230(72.8%). Most participants were married 243(76.9%) and resided in rural areas 170(53.8%). More than half earned a household monthly income of ≥ 6000 Ethiopian Birr 169(53.5%). The majority were aged 50–80 years 237(75%) with mean age of $(55.51 \pm SD 9.1)$, and about half had no formal education 160(50.6%). Farmers 103(32.6%) and housewives 95(30.1%) constituted the largest occupational groups.

Table 3: Socio-demographic and economic characteristics of the study participants attending diabetic clinic at public hospitals in Gurage zone, central Ethiopia, 2025.

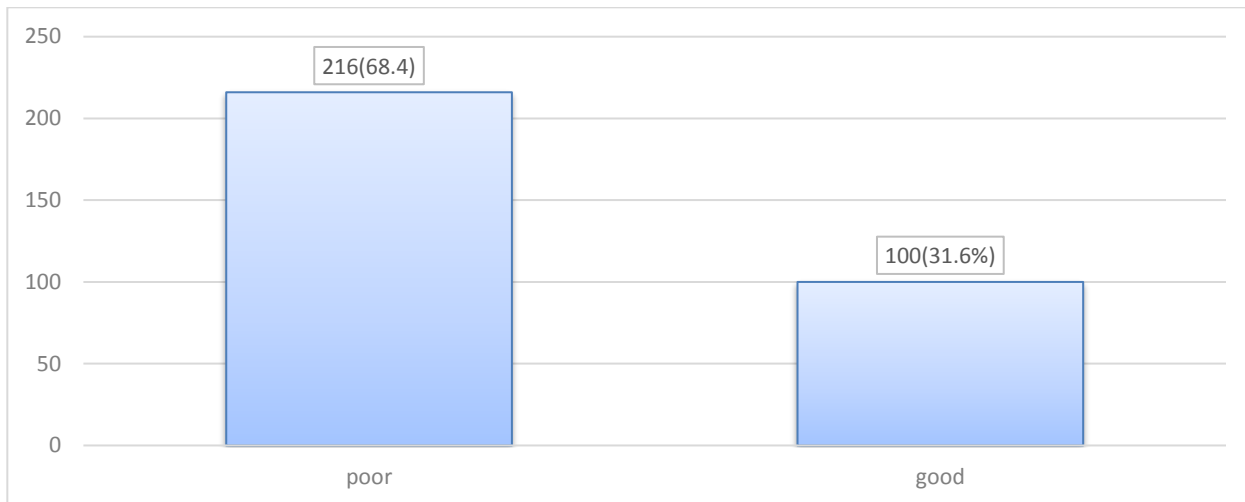
Characteristics(N = 316)	Categories	Number (%)
sex	Male	164(51.9%)
	Female	152(4.1%)
Religion	Muslim	152(48.1)
	orthodox	129(40.8)
	Catholic	19(6)
	Protestant	16(5.1)
Ethnicity	Gurage	230(72.8)
	Oromo	44(13.9)
	Amahara	28(8.9)
	Other	14(4.4)
Marital status	Married	243(76.9)
	Single	42(13.3)
	Widowed	24(7.6)
	Divorced	7(2.2)
Monthly income (Average)	<6000 EB	147(46.5)
	>=6000 EB	169(53.5)
Residence	Urban	146(46.2)
	Rural	170(53.8)
Age	18- 50yrs	79(25)
	50 -80yrs	237(75)
Educational status	No formal education	160(50.6)
	Formal education	156(49.4)
Occupation	farmer	103(32.6)
	house wife	95(30.1)
	government employee	43(13.6)
	private	75(23.7)
Community based health insurance (CBHI)	Yes	220(69.6)
	No	96(30.4)

5.2 Clinical and Metabolic Characteristics of Participants

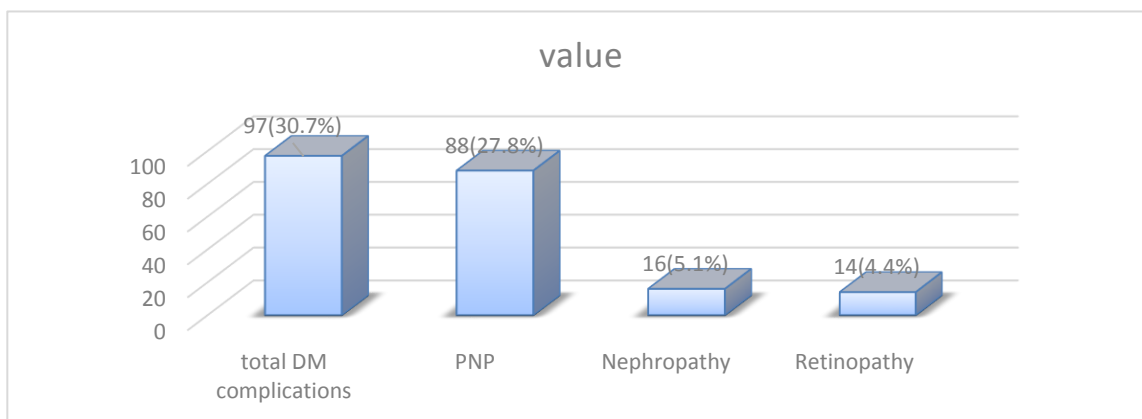
Among the 316 study participants, poor glycemic control was observed in 216 (68.4%) of the participants, while 100 (31.6%) had good glycemic control. the majority had a normal body mass index (18.5–24.9 kg/m²) (242, 76.6%). Most participants had a normal waist circumference (247, 78.2%), whereas 69 (21.8%) had an abnormal waist circumference. Two-thirds of the respondents had a duration of diabetes of ≥10 years (202, 63.9%). About 97 (30.7%) had at least one diabetic complication, with DPN (27.8%) being the most common, followed by nephropathy (5.1%) and retinopathy (4.4%). Regarding comorbid conditions, 129 (40.8%) of participants had at least one comorbidity. The most frequently reported comorbidities were hypertension (26.3%), dyslipidemia (9.8%), obesity (11.1%), and heart failure (5.4%).

Table 4: Clinical and metabolic characteristics of the study participants attending diabetic clinic at public hospitals in Gurage zone, central Ethiopia, 2025.

Characteristics(N = 316)	Categories	Number (%)
BMI	<18.5	14 (4.4)
	18.5-24.9	242 (76.6)
	25.0-29.9	44 (13.9)
	>=30	16 (5.1)
WC	Normal	247 (78.2)
	Abnormal	69 (21.8)
Duration of DM	<10yrs	114 (36.1)
	>=10yrs	202 (63.9)
Diabetic complications	yes	97 (30.7)
	No	219 (69.3)
Diabetic Peripheral neuropathy	Yes	88 (27.8)
	No	9 (2.8)
Retinopathy	Yes	14 (4.4)
	No	83 (26.3)
Nephropathy	Yes	16 (5.1)
	No	81 (25.6)
Comorbidities	Yes	129 (40.8)
	No	187 (59.2)
Characteristics(N = 316)	Categories	Number (%)
Hypertension	yes	83 (26.3)
	no	46 (14.6)
Dyslipidemia	Yes	31 (9.8)
	No	98 (31.0)
Obesity	Yes	35 (11.1)
	No	94(29.7)
Heart failure	Yes	17(5.4)
	No	112(35.4)
other comorbidity	Yes	24(7.6)
	No	105(33.2)
Level of glycemic control	Good	100 (31.6)
	Poor	216 (68.4)



Graph 2: Shows level of glycemic control of the study participants from Gurage zone public hospitals, central Ethiopia, 2025



Graph 3: Shows total number of Diabetes complication and the types of complication from the study participants of Gurage zone public hospitals, central Ethiopia 2025

5.3 Treatment, Behavioral, and Lifestyle Characteristics of Participants

Among the 316 study participants, half were treated with metformin alone (159, 50.3%) followed by those receiving a combination of metformin and glibenclamide (123, 38.6%). A smaller proportion used metformin with injectable therapy (29, 9.2%), while only 5 (1.6%) were treated with glibenclamide alone. Regarding medication adherence, 122 (38.6%) participants had good adherence, whereas 194 (61.4%) had poor adherence. In similarly, adherence to dietary recommendations was low, with only 84 (26.6%) adherent and 232 (73.4%) not adherent.

Almost half of the participants reported adequate physical exercise (155, 49.1%), while 161 (50.9%) had inadequate physical activity. Most respondents did not consume alcohol (251, 79.4%), and the majority did not use traditional medicine as an alternative treatment (287, 90.8%). Only 102 (32.3%) of participants practiced self-monitoring of blood glucose, while 214 (67.7%) did not. The most commonly reported barrier to self-monitoring was lack of measurement tools (198, 62.7%), followed by lack of awareness (7.6%), lack of time or inconvenience (3.5%), and other reasons (3.2%).

Most participants reported having family or social support (295, 93.4%), and 53 (16.8%) had a family history of diabetes. Cigarette smoking was uncommon, with only 14 (4.4%) reporting a history of active smoking.

Table 5: Treatment, Behavioral, and Lifestyle Characteristics of Participants Attending Public Hospitals in Gurage Zone, Central Ethiopia, 2025

Characteristics(N = 316)	Categories	Number (%)
Type of medication used	Metformin	159(50.3)
	Metformin and Glibenclimide	123 (38.6)
	Metformin and injection	29 (9.2)
	Glibenclimide	5(1.6)
Adherence to medication	good	122(38.6)
	poor	194(61.4)
Adherence to diet	adherent	84(26.6)
	not adherent	232(73.4)
Physical exercise	Adequate	155 (49.1)
	Inadequate	161 (50.9)
consumption of Alcohol	Yes	65 (20.6)
	No	251 (79.4)
Have you used traditional medicine as alternative	Yes	29(9.2)
	No	287(90.8)
Self-monitoring of blood glucose	Yes	102(32.3)
	No	215(67.7%)
Lack of measurement tools	Yes	198 (62.7%)
	No	17 (5.4%)
	Yes	24 (7.6%)
lack of awareness/knowledge	No	191 (60.4%)
	Yes	11 (3.5%)
	No	204(64.6%)
lack of time or inconvenience	Yes	10 (3.2%)
	No	205(64.9%)

	Other reason	
	Yes	295 (93.4)
	No	21 (6.6)
family or social support	Yes	53 (16.8)
	No	263 (83.2)
Family history of diabetes	Yes	14(4.4)
	No	302(95.6)

5.4 Health Service–Related Characteristics of Participants

Among the 316 study participants, the majority reported visiting a health facility three to six times per year (227, 71.8%), while 48 (15.2%) had six or more visits annually and 41 (13.0%) had fewer than three visits per year. Nearly half of the participants reported having access to a health facility (153, 48.4%), whereas 163 (51.6%) reported no access. Almost all participants had received diabetes education (308, 97.5%), with only a small proportion reporting that they had never received diabetes-related education (8, 2.5%)

Table 6: Health Service–Related Characteristics of Participants Attending Public Hospitals in Gurage Zone, Central Ethiopia, 2025

Variables (N = 316)	Categories	Number (%)
frequency of visits per year	<3x	41 (13.0)
	>=3-6x	227(71.8)
	>=6x	48(15.2)
Access to health facility	Has access	153(48.4)
	No access	163(51.6)
Having diabetes education	Yes	308(97.5)
	No	8(2.5)

5.5 Glycemic Control and Laboratory Characteristics of Participants

Among the 316 study participants, 216 (68.4%) had poor glycemic control, while 100 (31.6%) had good glycemic control. Similarly, based on the average three-month fasting blood sugar (FBS), 216 (68.4%) had FBS levels ≥ 126 mg/dL, whereas 100 (31.6%) had FBS levels below 126 mg/dL. The overall mean three-month FBS level was 175.59 ± 60.74 mg/dL. Regarding lipid status, 31 (9.8%) of participants had dyslipidemia, while the majority 285 (90.1%) had no dyslipidemia. Concerning renal function, 300 (95.0%) of participants had normal serum creatinine levels, and 42 (13.3%) had proteinuria, indicating renal involvement, whereas 274 (86.7%) had no proteinuria.

Table 7: Laboratory and Biochemical Profile of Study Participants Attending Public Hospitals in Gurage Zone, Central Ethiopia, 2025

Variables (N = 316)	Categories	Number (%)
Level of glyceemic control	Good	100 (31.6)
	Poor	216 (68.4)
Average three month FBS	<126mg/dl	100 (31.6)
	>=126mg/dl	216 (68.4)
	Mean \pm SD	175.59mg/dl \pm 60.736
Lipid profile (any of the lipid types) mg/dl	dyslipidemias	31(9.8)
	No dyslipidemias	285(90.1)
Creatinine mg/dl	Normal	300(95%)
	Abnormal	16(5%)
Proteinuria	Yes	42(13.3)
	No	274(86.7)

5.6 Association of Independent Variables with Poor Glycemic Control in Bivariate and Multivariable Analyses

In the bivariate logistic regression analysis, duration of diabetes, medication adherence, dietary adherence, age category, access to chronic care follow-up, diabetic complications, comorbidity status, and community-based health insurance showed varying degrees of association with poor glycemic control. Variables with a *p*-value less than 0.25 in the bivariate analysis were considered candidates for the multivariable logistic regression model.

After adjustment for potential confounders in the multivariable logistic regression analysis, duration of diabetes, medication adherence, dietary adherence, age category, and access to health care facility remained significantly associated with poor glycemic control. Patients with a longer duration of diabetes had higher odds of poor glycemic control compared with those with a shorter duration (AOR = 4.12; 95% CI: 1.73–9.80; *p* = 0.001). Poor medication adherence was strongly associated with poor glycemic control (AOR = 7.64; 95% CI: 3.59–16.28; *p* < 0.001). Non-adherence to dietary recommendations was also significantly associated with poor glycemic control (AOR = 2.55; 95% CI: 1.15–5.65; *p* = 0.021).

Age category remained an independent predictor, with older patients having increased odds of poor glycemic control compared with younger patients (AOR = 6.38; 95% CI: 2.41–16.86; *p* < 0.001). And also access to health care facility was significantly associated with reduced odds of poor glycemic control (AOR

= 0.25; 95% CI: 0.12–0.54; $p < 0.001$). Diabetic complications, comorbidity status, and community-based health insurance were not significantly associated with poor glycemic control in the multivariable analysis.

Table 8: Cross-tabulation with bivariate and multivariable logistic regression analysis of factors associated with poor glycemic control among patients with diabetes mellitus in Gurage Zone public hospitals, central Ethiopia, 2025

Variable	Category	Good n (%)	Poor n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Medication adherence	Good	73(23.1)	49(15.5)				
	Poor	27 (8.5)	167(52.8)	9.22 (5.35–15.8)	<0.001	7.64 (3.59–16.28)	<0.001
Duration of diabetes (yrs)	<10	75(23.7)	39 (12.3)				
	≥10	25 (7.9)	177(56.0)	13.62 (7.70–24.08)	<0.001	4.12 (1.73–9.80)	0.001
Age category (yrs)	18–<50	59(18.7)	20 (6.3)				
	≥50–80	41(13.0)	196(62.0)	14.10 (7.67–25.92)	<0.001	6.38 (2.41–16.86)	<0.001
Dietary adherence	Adherent	50(15.8)	34 (10.8)				
	Non-adherent	50(15.8)	182(57.6)	5.35 (3.13–9.15)	<0.001	2.55 (1.15–5.65)	0.021
Access to health facility	Yes	30 (9.5)	123(38.9)				
	No	70(22.2)	93 29.4)	3.09 (1.86–5.12)	<0.001	0.25 (0.12–0.54)	<0.001
Comorbidity	No	70(22.2)	117(37.0)				
	Yes	30 (9.5)	99 (31.3)	1.97 (1.19–3.27)	0.008	1.27 (0.59–2.74)	0.537
Diabetic complications	Yes	19 (6.0)	78 (24.7)				
	No	81(25.6)	138(43.7)	2.41 (1.36–4.27)	0.003	2.09 (0.87–5.00)	0.098
CBHI	Yes	62(19.6)	158(50.0)				
	No	38(12.0)	58(18.4)	1.67 (1.01–2.76)	0.046	0.28 – 1.27	0.182

6. Discussion

The present study conducted among type 2 diabetes patients attending public hospitals in Gurage Zone revealed that 68.4% of participants had poor glycemic control, indicating that suboptimal glycemic control remains a major public health challenge in the study area. This prevalence is highly comparable with findings from other hospital-based studies in Ethiopia, including Hadiya Zone (72.8%), Jimma Medical Center (72%), Menelik II Referral Hospital (80.3%), Dessie Comprehensive Specialized Hospital (73.5%), and Tikur Anbessa Specialized Hospital (63.8 and 73.8%) (20, 29, 36, 37, 39, 52, 56). Furthermore, national systematic reviews and meta-analyses have reported pooled prevalence estimates ranging from 61% to 65%. (16, 17, 23, 24, 26, 34) demonstrating that poor glycemic control is consistently high across different Ethiopian settings. The close agreement between the current study and these reports suggests that inadequate glycemic control is a persistent and widespread problem within the Ethiopian healthcare system.

Globally, evidence indicates that nearly half of people with diabetes fail to achieve the recommended HbA1c target of <7%, with the burden being substantially higher in low- and middle-income countries (LMICs), where 50–70% or more of patients experience poor glycemic control. A pooled prevalence of 69.06% has been reported in LMICs, including Ethiopia, which closely mirrors the magnitude observed in the present study. Similar prevalence ranges have been reported in Asian and Middle Eastern countries, including Pakistan, China, and Saudi Arabia, reinforcing that poor glycemic control is a common challenge in resource-limited settings (1, 2, 11, 45, 46).

Regarding association factors: in the present study, poor medication adherence was strongly and independently associated with poor glycemic control. Patients with poor adherence were 7.64 times more likely to have uncontrolled blood glucose compared to those with good adherence (AOR = 7.64, 95% CI: 3.59–16.28). The relatively higher AOR observed in this study may be due to differences in patient characteristics, healthcare setting, and adherence measurement methods, which could amplify the impact of poor adherence on glycemic control. Behavioral, cultural, and follow-up factors may also have intensified this association. This strong association is consistent with findings from other Ethiopian studies. For example, a study conducted at Tepi Hospital in Southwest Ethiopia reported an even higher magnitude of association, where low medication adherence increased the likelihood of poor glycemic control by nearly twelve times (AOR = 11.78, 95% CI: 1.09–17.17; Similarly, our study has consistency with Jimma Medical Center and Hadiya zone reports; Other institution-based studies and meta-analyses in Ethiopia

have also reported adjusted odds ratios ranging from 2.76 to 5.82, The consistency of these findings across different regions of the country reinforces the evidence that medication adherence is a critical and modifiable determinant of glycemic control among diabetes mellitus patients (15-19, 23, 24, 39, 44). Similarly; China, Thailand, Ghana, and Nigeria, where medication adherence was consistently linked to glycemic outcomes (11, 29, 41, 51). Strengthening adherence-focused interventions and ensuring appropriate dose adjustments during follow-up visits are therefore essential strategies for improving glycemic outcomes in Ethiopian healthcare settings

Dietary adherence also remained significant in the adjusted model. Taking adherent patients as the reference category, non-adherent individuals had 2.55 times higher odds of poor glycemic control (AOR = 2.55, 95% CI: 1.15–5.65). Since inappropriate meal timing, excess carbohydrate intake, and unhealthy food choices directly contribute to persistent hyperglycemia and reduced effectiveness of antidiabetic therapy. This is aligned with findings from Menelik II Referral Hospital, Tikur Anbessa Specialized Hospital, Gamo and Gofa Zone, and several Ethiopian meta-analyses (16, 20, 23, 24, 26, 34, 38, 52, 56). Similar associations have been reported in Ghana, Uganda, and Thailand, where adherence to healthy dietary practices was associated with improved glycemic control; however, some Asian studies, particularly from China, emphasized obesity and central adiposity rather than dietary adherence itself. (11, 45, 46, 51) . This discrepancy may be explained by differences in dietary assessment methods, cultural dietary patterns, and variations in nutritional transitions across regions.

The present study further demonstrated that Duration of diabetes was also significantly associated with poor glycemic control. Compared to patients with a diabetes duration of less than 10 years (reference category), those with a duration of ≥ 10 years had 4.12 times higher odds of poor glycemic control 9AOR = 4.12, 95% CI: 1.73–9.800 which may be explained by progressive β -cell dysfunction, increased insulin resistance, and cumulative challenges in long-term disease course and management. This finding is consistent with evidence from Ethiopia, China, Saudi Arabia, and other developing countries, where longer disease duration was a strong predictor of poor glycemic outcomes (11, 19-22, 25-28, 30-31, 35, 45). Ethiopian meta-analyses have reported AORs ranging from 2.57 to 3.60, while studies from Saudi Arabia reported AORs of 2.33 for 5–10 years and 5.19 for durations exceeding 10 years. (16, 17, 23, 24, 26, 28, 34, 45) The stronger association observed in the current study may be attributed to progressive β -cell dysfunction, increasing insulin resistance, and delayed treatment intensification among patients with long-standing diabetes.

Similarly, Age category was another significant predictor. Patients aged 18–<50 years were used as the reference group. Those aged ≥ 50 –80 years were 6.38 times more likely to have poor glycemic control (AOR = 6.38, 95% CI: 2.41–16.86). Possibly due to age-related insulin resistance, multiple comorbidities, polypharmacy, and reduced ability to adhere to lifestyle and medication recommendations. This finding agrees with studies from Adama, Dessie, Uganda, and Saudi Arabia, as well as national meta-analyses, which reported increased odds of poor glycemic control among older patients. (30, 35, 37, 45) Older age is often associated with comorbidities, polypharmacy, reduced physical activity, and diminished self-care capacity, all of which may complicate diabetes management. However, this finding contrasts with a Nigerian study that reported better glycemic control among older patients, possibly due to better health insurance coverage, improved follow-up, and stronger health system support in that context.

As discussed above, The relatively higher adjusted odds ratios observed in this study—7.64 for poor medication adherence and 6.38 for age ≥ 50 years—likely reflect both the high prevalence of these exposures in the study population (61.4% for poor adherence and 75% for older age) and their true independent effects on poor glycemic control, rather than representing statistical anomalies. The calculated population attributable fractions were approximately 80% for both factors, indicating that a substantial proportion of poor glycemic control could potentially be prevented if these exposures were addressed. Differences in patient characteristics, healthcare delivery, and behavioral or cultural factors may have further amplified these associations. The strong relationship between poor adherence and glycemic control is supported by a study at Tepi Hospital, Southwest Ethiopia, which reported an even higher magnitude of effect (AOR = 11.78, 95% CI: 1.09–17.17), and by several Ethiopian meta-analyses reporting adjusted odds ratios ranging from 2.76 to 5.82. (16, 2123, 24, 34, 36, 44, 48, 52). Collectively, these findings justify the higher AORs in the present study while demonstrating consistency with similar research in Ethiopia.

Access to health care facilities remained a significant protective factor for glycemic control. Patients without access to health facilities had 75% lower odds of achieving good glycemic control (AOR = 0.25, 95% CI: 0.12–0.54). Which is justified by limited access to health facilities may hinder regular follow-up, medication refills, diabetes education, and timely adjustment of therapy, thereby contributing to poor glycemic control. This finding is consistent with Ethiopian studies from Hadiya Zone, Jimma, and Adama, as well as global and African evidence (2, 15, 21, 35, 36, 39). Emphasizing the role of regular follow-up, continuity of care, and patient–provider interaction in improving glycemic outcomes. Improved access

likely enhances medication adherence, reinforces lifestyle counseling, and allows timely treatment adjustments.

In contrast, diabetic complications, comorbidity status, and community-based health insurance (CBHI) were not significantly associated with poor glycemic control in the multivariable analysis of the present study. This finding differs from most Ethiopian, Asian, and Middle Eastern studies that reported comorbidities, obesity, dyslipidemia, and complications as significant predictors (45, 48, 51, 52). These discrepancies may be due to differences in study design, sample size, measurement of complications, and the dominance of behavioral factors such as medication and dietary adherence after adjustment. Health insurance was not significantly associated with glycemic control, possibly due to the predominance of insured participants, which limited variability between groups. In addition, stronger clinical and behavioral factors may have outweighed the effect of insurance coverage.

To summarize; Out of 42 variables assessed, bivariate analysis identified 8 with a potential association with poor glycemic control, but after adjusting for confounders, only five factors; age, access to health facilities, poor medication adherence, poor dietary adherence, and longer duration of diabetes were remained significant. Which can be explained by being older age increased the risk of poor control, likely due to age-related insulin resistance, comorbidities, and challenges in adhering to lifestyle and medication recommendations. Limited access to health facilities reduced the likelihood of good glycemic control, emphasizing the importance of regular follow-up, timely medication refills, and diabetes education. Poor medication and dietary adherence were key modifiable behavioral determinants, while longer duration of diabetes reflected progressive β -cell dysfunction and cumulative management challenges. Overall, these findings align with Ethiopian, regional, and global evidence, confirming that poor glycemic control is highly prevalent and driven by behavioral, clinical, and healthcare access factors. The results underscore the need to strengthen diabetes self-management education, enhance adherence support, and improve access to continuous follow-up care in Gurage Zone public hospitals and similar low-resource settings.

7. Strengths and Limitations

To the best of my knowledge, this is the first study conducted in Gurage Zone public hospitals assessing the magnitude and determinants of poor glycemic control among patients with Type 2 Diabetes Mellitus. This provides important baseline information for future research and public health planning in the area. The study used proportionate sampling from all public hospitals in the zone, based on each hospital's annual diabetic patient load. This approach ensured that the sample accurately represented the overall diabetic population in the Gurage Zone. A total of 316 participants were included, which improved the statistical power and reliability of the findings. The use of both structured questionnaires and medical chart reviews enhanced the completeness and validity of the collected data. The study identified actionable risk factors such as poor dietary, medication adherence and inaccessibility of health service which can guide future intervention strategies.

Nevertheless, the Study is a Cross-Sectional Design, it is not possible to establish causal relationships between the identified factors and poor glycemic control. Due to the limited availability of HbA1c testing; majority of the sugar level were assessed using Fasting Blood Sugar measurement which reflects short-term rather than long-term glucose control. Because some data are from Self-Reported Information; such as diet and medication adherence are prone to recall bias or social desirability bias.

8. Conclusion

The present study conducted in Gurage Zone public hospitals revealed that poor glycemic control among patients with type 2 diabetes mellitus is highly prevalent. Among 42 variables assessed, age, access to health facilities, medication adherence, dietary adherence, and duration of diabetes were identified as independent determinants of poor glycemic control. Older age and longer duration of diabetes increased the risk, while better access to healthcare and adherence to prescribed medications and dietary recommendations were protective. These findings highlight that poor glycemic control is largely influenced by modifiable behavioral factors and healthcare accessibility. The study underscores the urgent need to strengthen diabetes self-management education, support adherence to medications and diet, and improve access to continuous follow-up care in Gurage Zone public hospitals and similar low-resource settings. Addressing these key determinants could significantly improve glycemic outcomes and reduce the risk of diabetes-related complication

9. Recommendations

For age (older adults at higher risk), clinicians should provide intensified monitoring and individualized counseling for older patients, taking into consideration comorbidities and functional limitations. Health officers and facility managers should implement age-sensitive diabetes care programs that include follow-up reminders and support services tailored to older adults. Policy makers should develop and support policies that prioritize older adults' access to diabetes care and education programs.

To improve access to health facilities, clinicians should identify patients with limited access and implement alternative follow-up strategies, such as telemedicine or community outreach. Health officers and facility managers should expand the reach of diabetes services by establishing mobile clinics and satellite follow-ups in remote areas. Policy makers should invest in healthcare infrastructure and transportation systems to enhance geographic accessibility, particularly in rural and underserved regions.

Regarding medication adherence, clinicians should regularly assess adherence, address barriers, and provide guidance on dosing schedules and management of side effects. Health officers and facility managers should develop adherence support programs, including reminders, counseling sessions, and educational materials for patients. Policy makers should ensure a consistent supply of essential diabetes medications and integrate adherence strategies into national diabetes care guidelines.

For dietary adherence, clinicians should provide individualized nutritional counseling and practical guidance tailored to locally available foods. Health officers and facility managers should organize group education sessions, cooking demonstrations, and culturally appropriate dietary materials to support patients. Policy makers should promote community nutrition programs that improve the availability and accessibility of fruits, vegetables, and diabetes-friendly foods.

For duration of diabetes (longer duration increases risk), clinicians should intensify monitoring and adjust treatment plans for patients with long-standing diabetes to prevent complications. Health officers and facility managers should establish high-risk patient registries or specialized clinics to ensure continuous follow-up and monitoring. Policy makers should allocate resources to strengthen chronic care programs that target long-term diabetes management, including ongoing patient education and routine complication screening.

Future research should employ prospective cohort or longitudinal study designs to better establish causal relationships between identified predictors and poor glycemic control. Studies utilizing HbA1c as the primary indicator of glycemic control are recommended to improve measurement accuracy and capture long-term glycemic status. Interventional studies targeting modifiable factors such as medication adherence and lifestyle behaviors are warranted to evaluate effective strategies for improving diabetes outcomes. Additionally, qualitative and mixed-methods research is recommended to explore contextual, behavioral, and health system-related barriers to optimal glycemic control. Further investigation into therapeutic inertia and the role of health insurance and healthcare accessibility in influencing glycemic outcomes is also suggested.

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List of Annex

Annex-1: Participant information sheet and informed consent form

Good morning/afternoon dear participant! My name is _____. I am working as a data collector for the study being conducted in this Hospital on the level of glycemic control and its determinant factors done by Dr. Yonas Girma. He is studying for his specialty in internal medicine at Wolkite University, college of Medicine and Health sciences. I kindly request you to lend me your attention to explain about the study and being you selected as the study participant.

The purpose of the study is to assess level of glycemic control and its determinant factors. And the Findings from the study can be used by the any of the respected health facilities administration. This may take not more than 20 minutes. All the information that you are going to provide me will remain confidential and you don't need to mention your name. For this reason, I kindly request you to give me your sincere and truthful answer.

All of your participation is completely on voluntary bases and you have the right to refuse from participation. Participation or non-participation and refusal to answer questions will have no effect on your life. If you have further questions or would like to know the results of this study, please feel free to contact the principal investigator; with the following address.

Principal investigator: Dr. Yonas Girma.(MD)

Mobile phone: +251-922-08-42-42

E-mail: yonasgirma716@gmail.com

Consent Form English Version

I have read all the process and the objective of the study and I have understood about the purpose, advantage, and disadvantage of this study explained to me above in Gurage zone. I understood that the research imposes no risk and no composition would be provided to me. I have been told that if I feel discomfort to respond to any of the question, I am free to drop it any time I wish to do so. I have understood the information given and the participation is completely voluntary based.

I have been told that my answers to the questions will not be given to anyone and not expect to write my name. Now I am giving my consent to participate in the study voluntarily.

Could I have your permission to continue?

1. Yes _____ 2. No _____, Stop and thank the respondent.

Data collector: Name _____ Signature _____ Date _____

Annex-2: Research Questionnaire English version

Wolkite University College of medicine department of public health

Instruction: This questionnaire is designed for the purpose of face to face interview to collect data from type 2 DM patients participating in this study. It will have five sections. First section will deal with Identification and socio demographic characteristics of participants, the second section Health characteristics of the study participant, third section contains Behavioral and Lifestyle Factors, fourth is about Health System–Related Variables and the fifth section is about the biochemical tests of the study participants .

Note: This questionnaire has to be filled only by the interviewer once informed consent is obtained from respondents. Please circle the numbers that contain answers you received.

Questionnaire ID No	
Name of Hospital	
Date of Interview	____/____/____E.C
Interviewer	Name _____ signature _____
Checked by Supervisor	Name _____ Signature _____ Date ____/____/____
Result code	001. Completed 002. Discontinued interview 003. Refused ; Reason for refusal-----

Part 1 – Identification and socio demographic characteristics of participants			
1. Age _____	years		
2. Sex	1. Male	2. Female	
3. Ethnicity	1. Amhara	2. Oromo	3. Gurage 4. other (Specify)
4. Religion	1. Muslim	2. Orthodox	3. Protestant 4. other (Specify)
5. Marital status	1. Single	2. Married	3. Divorced 4. Widowed
6. Educational status	1. Illiterate	2. Primary	3. Secondary 4. Higher
7. Occupation	1. Farmer 2. House wife 3. Government employee 4. Other private		
8. Place of residence	1. Urban 2. Rural		
9. Presence of health care insurance (CBHI)	1. Yes	2. No	
10. Average Monthly income	1. <6000 EB		2. >= 6000 EB
Part 2 – Health characteristics of the study participant			
1. Height _____	Weight _____	Body mass index (BMI)	
2. Central /abdominal obesity (waist circumference \geq 94 cm for men or \geq 80 cm for women)?			
1. Yes 2. No			
3. Level of glycemc (Good = HA1c < 7% or FBS <126mg/dl)			
1. Good 2. Poor			
4. Duration of diabetes			
1. <10 years 2. \geq 10 years			
5. Presence of diabetic complications: 1. yes 2. No			
6. If yes which complication do you have? 1. Peripheral neuropathy 2. Retinopathy 3.Nephropathy: Diabetic Retinopathy: identified as documented either through clinical examination by an ophthalmologist or via review of patient medical records/chart notes			
7. Presence of comorbidities: 1. Yes 2. No (check for : HTN, obesity, dyslipidemia heart failure and other)			
8. If yes 1. HTN 2. Obesity 3. Dyslipidemia 4. Heart failure Other specify			

Part 3- Treatment, Behavioral and Lifestyle Factors:		
1. Type of medications taken	1. Metformin	2. Glibenclimide
	3. Metformin + Glibenclimide	4. Injection
	5. Metformin + injection	6. Other specify_____
2. Adherence to medications:	1. Good B.	2. Poor
Good = if the participant took all his/her medication in the last week as prescribed		
3. Dietary adherence:	1. Yes	2. No
Yes = if only both adherent to eat vegetables and/or fruits every day as advised for diabetes and limit simple sugar foods, sweets, honey, cakes, , and fruit juices? See the five item check list for dietary assessment on attachment		
4. Physical exercise: (Adequate =at least 150min/week) or being active in routine physically active activities on most of the days of the week	1. Adequate	2. Inadequate
(Ask: In a typical week, do you engage in physical activities that make you breathe faster or increase your heart rate (such as farming, brisk walking, carrying loads, digging, or cycling any other activity for at least 30 minutes per day on 5 or more days? If yes = record as Adequate)		
5. Alcohol consumption? (Currently)	1. Yes	2. No
6. Do you use traditional medicine as alternatives	1.yes	2. No
7. Self-monitoring of blood glucose (when needed by the patient or as the treating physician order during the previous follow ups)	1. Yes	2. No.
8. If you do not, what is the reason?	1. Lack of measurement tools	2. Lack of awareness/knowledge
	3. Lack of time or inconvenience	Other: _____
9. Do you smoke cigarette? (currently)	1. Yes	2. No
10. Do you have Family/social support on your Diabetes care actions	1. Yes	2. No
11. Is there Family history of diabetes	1. Yes	2. No
Part 4- Health System–Related Variables		
1. Frequency of follow-up visits	1. < 3x/ yr	2. >= 3-6X/yr
		3. >=6X/yr
2. Access to health facility (geographical accesses with in 5km):	1. Yes	.2. No

3. Have you ever got diabetes education (by Health worker) 1. Yes 2. No

Part 5- Biochemical tests

S.N	Variables (latest result)	value
1	FBS mg/dl (the 3 months average) or HGA1C% or	
2	Lipid profile mg /dl (TGS/ LDL/HDL/ Total)	Any of the available lipid profile
3	Creatinine level mg/dl(done in the one year)	1. Normal range of the lab reference (0.1 -- <1.1) 2. Beyond normal range
4	Proteinuria (yes/ no)	1. Yes 2. No

Part 6- dietary assessment tool

Sn	Questions	Yes or no
1	Do you follow the meal plan or diet recommendations by your health professional?	
2	Do you avoid eating foods high in sugar content (Soft drinks, sweets, cakes..)	
3	Do you limit eating fatty and fried foods?	
4	Do you include vegetables and fruits in your daily meals?	
5	Do you eat meals at regular times each day?	

Good >= 4/5 questions **poor** = <4/5 questions

የመረጃ ቅጽ

ሰላምታ:-ጤና ይስጥልኝ!! እኔ _____ እባላለሁ::ይህ ጥናት የሚካሄደው በዶ/ር ዮናስ ግርማ በተባሉት የወልቂጤ ዩኒቨርሲቲ ህክምናና ጤና ሳይንስ የውስጥ ኮሌጅ ደዌ ስፔሻሊቲ ተማሪ ሲሆን በዩኒቨርሲቲው ሙሉ ፈቃድ ታግዘው የሁለተኛ ዲግሪያቸው መመረቂያ ጽሁፍ በዞኑ ባሉ ሆስፒታሎች ውስጥ የስካር ታካሚዎች ላይ የስካር ህምማቸውን በበቂ ሁኔታ እንዳቆጣጠሩ ህክምና በሚድረገቸው ሁኔታዎች ላይ ለማጥናት የተዘጋጀ መጠይቅ ሲሆን ::ከጥናቱ የሚገኘው ውጤት/ ግኝት በዞኑ ላሉ የስካር ታካሚዎች ሁኔታ ለማሻሻል የሚረዳ ሲሆን በተጨማሪም የጥናቱ ባለቤት በዩኒቨርሲቲው ህክምናና በህብረተሰብ ጤና ሳይንስ ትምህርት ክፍል የሁለተኛ ዲግሪያቸውን ለማግኘት እንደ ማሟያ ፅሁፍ በመሆን ይረዳል::

ይህን መጠይቅ ለመሙላት ከ 20 ደቂቃ የማይወስድ ሲሆን ሲሆን በዚህ ቃለ መጠይቅ ፈቃደኛ ካልሆኑ ያለመሳተፍ መብትም የተጠበቀ ነው::እርስዎ በዚህ ጥናት ተሳታፊ በመሆንዎ በቀጥታ ሊያገኙ የሚችሉት ነገር ላይኖር ይችላሉ፤ ነገር ግን የእርስዎ ተሳትፎ በአገልግሎቱ አጠቃቀምና ምክንያት ዙሪያ ያሉችግሮች ወይም ክፍተቶች ለማሳየት እና ትክክለኛ የመፍትሔ አቅጣጫ ለመጠቀም እጅግ አስፈላጊ ነው:: ጥናቱ ውጤታማ ሊሆን የሚችለው እርሶ በሚሰጡት ትክክለኛ መልስ ላይ የተመረኮዘ በመሆኑ፤ጥያቄዎቹን በጥንቃቄ እንዲመልሱልን ፍቃደኝነትዎን በትህትና እንጠይቃለን:: በተጨማሪም የሚሰጡት መረጃ ከተባለለት ጉዳይ ውጪ እንደማይውል እና ሚስጥራዊነቱ የተጠበቀ እንደሚሆን አረጋግጣለሁ::በቃለ መጠይቅ ወቅት ለእርስዎ ግልጽ ያልሆነ ነገር ካለ መጠየቅ ይችላሉ:: ለመመለስ ፈቃደኛ ያልሆኑበት ጥያቄ ካለም ማለፍ ይችላሉ::በየትኛውም ምክንያት መጠይቁ መሃል ማቋረጥ ቢፈልጉ ጥያቄዎን የማቋረጥ መብት አለዎት:: ተጨማሪ ጥያቄ ካለዎትና እንዲሁም በቀጣይ የተሰበሰበው መረጃ ውጤት ለማወቅ ከፈለጉ ከዚህ በታች በተጠቀሰው የዋናው የጥናቱ ባለቤት ስልክ ቁጥርና አድራሻ ተጠቅመው ማግኘት ይችላሉ::

እርሶም በዚህ ጥናት በመሳተፍ ከልብ አመሰግናለሁ!!!!!!

ዶ/ር ዮናስ ግርማ

ስልክቁጥር +251922084242

ኢ.ሜል:- yonasgirma716@gmail.com

ህክምናና ጤና ሳይንስ ኮሌጅ የማህበረሰብ ጤና አጠባበቅ ትምህርት ክፍል

በጉራጌ ዞን ውስጥ በሚገኙ የመንግስት ሆስፒታሎች ውስጥ በሚታከሙ የስኳር ህመም ክትተል በሚያደርጉ ግለሰቦች ጋር የህክምና ሁኔታቸውና የስር መጠናቸውን በተገቢ እንዳያረጉ የሚያደርጋቸውን ሁኔታዎች ለማጥናት የተዘጋጀ መጠይቅ ነው።

መመሪያ፡- ይህ መጠይቅ የተዘጋጀው በቃለ ምልልስ መልክ መረጃ ለመስብሰብ ነው። መጠይቁ ከታች እንደሚከተለው አምስት ዋና ዋና ክፍሎች አሉት። የመጀመሪያው ክፍል ክፍል ግላዊና ማህበራዊ መረጃ ሲሆን ሁለተኛው ክፍል የጥናቱ ተሳታፊ የጤና ባህሪያት የሚዳሰስ ሲሆን ሶስተኛው የታካሚውን የባህሪ እና የአናናር ዘይቤ ሁኔታ ሲያሳይ አራተኛው ክፍል የጤና አገልግሎት ሁኔታ በመጨረሻም አምስት የላብራቶሪ ውጤቶች ያሳያል።

ማስታወሻ፡- ይህ መጠይቅ የተሳታፊዎቹ ፍቃደኝነት ከታወቀ በኋላ መሞላት ያለበት በጠያቂው ብቻ ነው። እባክዎን የተቀበሉዎቸውን መልሶች የያዘውን ፊደል ያክቡ።

የሆስፒታሉ ስም _____

የመጠይቁ መለያ ቁጥር	
የቀበሌው ስም	
መጠይቁ የተደረገበት ቀን	_____ / _____ / _____
መጠይቁ የተጀመረበት ሰአት	_____ : / _____ /
መጠይቁ ያበቃበት ሰአት	_____ :
የጠያቂው	ስም _____ ፊርማ _____
ያረጋገጠው ተቆጣጣሪ	ስም _____ ፊርማ _____ ቀን ____ / ____ / ____
የውጤት መለያ	001. ሙሉ በሙሉ ተሞልቶአል 002. መጠይቁ ተቋርጧል 003. ለመሳተፍ ፍቃደኛ አልሆኑም ፍቃደኛ ያልሆኑበት ምክንያት _____

Annex-3: Research Questionnaire Amharic version

ክፍል 1:- ግላዊና ማህበራዊ መረጃ	
1. ዕድሜ _____	ዓመት
2. ልጅ:-	1. ወንድ 2. ሴት
3. ብሄር:-	1. አማራ 2. አሮሞ 3. ጉራጌ 4. ሌላ (ይግለጹ) _____
4. ሃይማኖት:-	1. ሙስሊም 2. ኦርቶዶክስ 3. ፕሮቴስታንት 4. ሌላ (ይግለጹ) _____
5. የጋብቻ ሁኔታ:-	1. ያላገባ/ች 2. ያገባ/ች 3. ተፋትሟል 4. ባል/ሚስት በህይወት የለም
6. የትምህርት ደረጃ:-	1. ያላተማረ/ች 2. የመጀመሪያ ደረጃ 3. የሁለተኛ ደረጃ 4. ከፍተኛ ትምህርት
7. የሥራ ሁኔታ:-	1. ገበሬ 2. የቤት እመቤት 3. የመንግስት ሰራተኛ 4. የግል ድርጅት ሰራተኛ 5. ተማሪ 6. የግል ንግድ 7. ሌላ (ይግለጹ) _____
8. የመኖሪያ ቦታ:-	1. ከተማ 2. ገጠር
9. የጤና ኢንሹራንስ (CBHI) አለዎት?	1. አዎ 2. የለኝም
10. ወርሃዊ ገቢ:-	1 < 6000 ብር 2. ≥ 6000 ብር
ክፍል 2:- የጥናቱ ተሳታፊ የጤና ባህሪያት	
1. ቁመት _____	ከብደት _____ የሰውነት መለኪያ (BMI) _____
2. የሆድ የዙሪያ መጠን (የወንድ ≥ 94 ሴ.ሜ ሴት ≥ 80 ሴ.ሜ)?	1. አዎ 2. አይደለም
3. የደም ስኳር መቆጣጠር ደረጃ: (የሶስት ወር አማካኝ FBS <126mg/dl or HGA1c <7% ከሆነ ጠሩ በላይ ከሆነ ደካማ)-	1. ጥሩ 2. ደካማ
4. የስኳር ህመም ቆይታ :-	1. <10 ዓመት 2. ≥ 10 ዓመት
5. የስኳር ህመም ተጨማሪ ችግሮች (የእግር ወይም የእጅ ነርቭ ህመም ፣ከስኳር ጋር የተያያዘ የአይን ህመም ፣ ከስኳር ጋር የተያያዘ ኩላሊት ህመም) አለ?	1. አዎ 2. የለም
6. ተጨማሪ በሽታ (ግፊት ፣ የደም ውስጥ ቅባት መብዛት ወይም ልብ ህመም ፣ሌላ ካለ ይገለጥ) አለ?	1. አዎ 2. የለም
ክፍል 3:-የህክምና ፣ የባህሪ እና የአኖር ዘይቤ ሁኔታ	
1. የሚወስዱት መድሃኒት(የታካሚውን ካርድ በማየት ወይም ታካሚውን መጫኛ እና በማየት ረጋግጡ)(:1. Metformin 2. Glibenclimide 3. Metformin + Glibenclimide 4. መርፌ ብቻ 5. Metformin + መርፌ	
2. የስኳር የመድሃኒትን በተከታታይነት የመውሰድ ሁኔታ:(ታካሚው ሳምንቱ መዳኒት በተማላ ሁኔታ ወስዳልአዎ= ጥሩ) -	1. ጥሩ 2. ደካማ
3. ለስኳር ታካሚ የሚመከር የአመጋገብ ስረዓት	1. አዎ 2. አይ . አዎ=በየቀኑ አትክልት እና/ወይም ፍራፍሬ የሚመገቡ ከሆነና እና ስኳር፣ ጣፋጭ መጠጠቶች፣ ማር፣ ኬክ፣ ፍራፍሬ ጭማቂ የማይጠቀሙ ከሆነ እና ወይም ከቴዙት አምስት ነትቦች ውስጥ ከአራት በታች ከመለሱ በቂ አይደለም::
4. የአካል ብቃት እንቅስቃሴ(ቢያንስ 150ደቂቃ በሳምንት):-	1. በቂ 2. በቂ አይደለም (በመደበኛ ሳምንት፣ ትንፋሽ እንዲፈጥን ወይም ልብዎ እንዲመታ የሚያደርጉ አካላዊ እንቅስቃሴዎችን ወይም ስራዎችን ቢያንስ 30 ደቂቃ ለ5 ወይም ከዚያ በላይ ቀናት ታደርጋላችሁ?)

5. በአሁን ሰዓት አልኮል ይጠጣሉ:-	1. አዎ	2. አልጠጣም
6. እንደ አማራጭ የባህላዊ መድሃኒት ሕክምና ይጠቀማሉ?	1. አዎ	2. አልጠቀም
7. የስኳር መጠንዎን ራስዎ በቤት ውስጥ ይከታተላሉ:-	1. አዎ	2. አልከታተልም
8. የማይከታተሉ ከሆነ ምክንያትዎ ምንድነው?	1. መለኪያ መሳሪያ አለመኖር	2. ግንዘቤ አለመኖር
	3. አለመመቻት	4. ሌላ ምክንያት-----
9. ሲጋራ ያጨሳሉ?	1. አዎ	2. አላጨሳም
10. የቤተሰብ/ማህበራዊ ድጋፍ አለዎት:-	1. አለኝ	2. የለኝም
11. የስኳር ህመም በቤተሰብ ውስጥ አለ :-	1. አዎ	2. የለም

ክፍል -4: የጤና አገልግሎት ሁኔታ

1. የመከታተያ ጉብኝት ብዛት በአመት :-	1. < 3 ጊዜ/ዓመት	2. ≥ 3 ጊዜ/ዓመት
2. በአካባቢዎ በቅርበት የሚገኝ የጤና ተቋም አለ (ከርቀት አኳያ ቢያንስ በእምሰት ኪ.ሜ ውስጥ ካገኙ በቂ ነው)	1. አዎ	2. የለም
3. የስኳር ህመም ትምህርት ከጤና ባለሙያዎች ተቀብለዋል ያቃሉ?	አ1 አዎ	2. አላውቅም

ክፍል -5: የላብራቶሪ /የምርመራ ውጤቶች

S.N	Variables (latest result)	value
1	FBS (3 month average)/ ha1c mg/dl or	
2	Lipid profile mg /dl (TGS/ LDL/HDL/ total)	
3	Creatinine level mg/dl	
4	Proteinuria (yes/ no)	

ክፍል -6: የአመገብ ስረዐትን መጠየቂያ ችክ ሊሰት

Sn	Questions	አዎ ወይ አይ
1	የጤና ባለሙያ የሰጥዎትን የአመገብ ስርዓት ይከተላሉ	
2	ከስኳር እና ሌሎች ጠፋጭ የበዛበቸውን ምግብ ይቆጣጠራሉ	
3	ቅባትነት የበዛባቸውን ምግብ አቋመዋል	
4	በዕለታዊ ምግብዎ አትክትና ፍራፍሬ ያካትታሉ	
5	ዕለታዊ የአመገብ ስዐትዎን ጠብቀው ይመገባሉ	