



SCHOOL OF PUBLIC HEALTH

**GLYCEMIC CONTROL STATUS AND ITS ASSOCIATED FACTORS AMONG
ADULT WITH TYPE 2 DIABETES AT PUBLIC HOSPITALS OF ADDIS
ABABA, ETHIOPIA, 2023.**

BY: FASIKA MEGA ABZA (BSC. IN PUBLIC HEALTH)

**A THESIS REPORT SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,
SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER
OF PUBLIC HEALTH IN EPIDEMIOLOGY.**

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School of Public Health

Investigator Information

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This thesis by Fasika Mega is accepted in its present form by the board of examiners as a requirement for the degree of Masters of Public Health in Epidemiology.

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Abbreviations and Acronyms

AOR	Adjusted Odds Ratio
COR	Crudes Odds Ratio
CI	Confidence Interval
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
FMOH	Federal Ministry of Health
HbA1C	Glycosylated Hemoglobin
IDF	International Diabetes Federation
MMAS	Morisky Medication Adherence Scale
NGOs	Non-Governmental Organizations
ODK	Open Data Kit
RBS	Random Blood Sugar
SMBG	Self-Monitoring of Blood Glucose
SPHMMC	Saint Paul's Hospital Millennium Medical College
SPSS	Statistical Package for Social Sciences

Abstract

Background: Glycemic control is the foundation of diabetes management. Keeping glycemic level at an optimal state is important in preventing and slowing down acute, micro, and macro-vascular complications, as well as reducing treatment costs, and improving quality of life and life expectancy. However, the magnitude of poor glycemic control remains high around the globe and in Ethiopia. Even though, previous studies tried to assess the magnitude of glycemic control and its factors, other important factors like, availability of drugs and insurance coverage, have not been assessed well.

Objective: To assess magnitude glycemic control and its associated factors among adults with Type 2 diabetes in public hospitals of Addis Ababa, Ethiopia, 2023.

Method: A facility-based cross-sectional study was conducted in selected public hospitals of Addis Ababa from June 5 to July 10, 2023. A total of 524 study participants were selected by stratified sampling technique. The quantitative component of the study utilized ODK version 2023.2.2 for electronic data collection, employing a pre-tested interviewer questionnaire. FGD was employed for the qualitative data. The collected data were exported to SPSS version 25 for processing and analysis. Logistic regression was conducted to identify factors associated with glycemic control status. A p-value of <0.05 was considered statistically significant in the multivariable analysis. Focus group discussions were held with 27 purposefully selected participants, and inductive thematic analysis was used to manually analyze the qualitative data.

Results: From the study participant 294(58.4%) had uncontrolled blood glucose levels. Duration of diagnosis greater than 10years [(AOR = 1.71, 95 % CI (1.01, 2.91)], Good dietary compliance [(AOR = 0.183, 95 % CI (0.071, 0.471)], Poor medication adherence [(AOR = 8.87, 95 % CI (3.546,22.201)], Having comorbidity [(AOR=1.75, 95% CI (1.08, 2.82)] and Presence of complication [(AOR=3.50, 95% CI (2.106, 5.844)] were important factors associated with of poor glycemic control. In qualitative data analysis factors like dietary habit, blood glucose monitoring, treatment adherence, comorbidity, and Side effects of medication were the main factors that was associated with glycemic control

Conclusion: A significant proportion of patients did not attain the recommended glycemic level. Duration of diagnosis, dietary adherence, drug adherence, comorbidity, and complication were the predictors of glycemic control.

Keywords: Glycemic control, Type 2 Diabetes, Fasting blood glucose, Ethiopia.

1. INTRODUCTION

1.1. Background

Diabetes mellitus (DM) refers to a group of metabolic disorders with an elevated blood glucose level. This can occur due to reduced insulin secretion, decreased glucose utilization, or increased glucose production, depending on the cause of the DM. The development of DM is influenced by a combination of genetic and environmental factors (1). There are two major types of DM, namely type I and type II diabetes mellitus. Type II diabetes mellitus accounts for about 90% of cases and is characterized by insulin resistance and abnormal insulin secretion (1,2).

The term glycemic control refers to the target blood glucose level for individuals with diabetes, and it is crucial in managing the condition (3). There are three common methods for assessing glycemic control in diabetic patients: Glycosylated Hemoglobin (HbA1c), Random Blood Sugar (RBS), and Fasting Blood Sugar (FBS). Of these, HbA1c is considered the gold standard for monitoring glycemic levels as it reflects the average blood glucose level over the past two to three months (4). According to the International Diabetic Federation (IDF) guidelines, patients with diabetes are expected to maintain their blood glucose level below 7% (5).

Maintaining a glycemic level at optimal is essential in preventing and slowing down acute, macro, and microvascular diabetic complications, reducing diabetes-related treatment costs, improving the quality of life, and increasing the life expectancy of the patient (3). However, achieving this optimal glycemic level is not easy, and a significant number of patients with diabetes struggle to do so (6). Therefore, it is crucial to identify the factors that affect glycemic control to take proactive measures (7).

1.2 Statement of the problem

Diabetes is becoming more prevalent globally, with the International Diabetic Federation (IDF) estimating that around 537 million adults aged between 20 to 79 years are currently living with the condition in 2021 (5,8). This number is expected to rise to 700 million by 2045 if the current trend continues. Tragically, poorly managed diabetes has resulted in the deaths of 6.7 million people in 2021, with over a third of these deaths occurring in those under the age of sixty (5).

Studies show that globally, between 40 to 60 percent of people with diabetes have a poorly controlled glycemic levels (9). However, this varies across different regions. In Latin America, around 56.8 percent of people have poor glycemic control, and unfortunately, this has resulted in the deaths of 410,000 people in the area (5,10). Europe has a slightly lower percentage, with 38 percent of people with diabetes having poor glycemic control (11). According to IDF Africa 2021 data, there are around 19.4 million adults aged 20-79 living with diabetes in Africa (5). Unfortunately, poor glycemic control is more prevalent in Africa, with rates ranging from 40 to 90 percent due to poor diabetes care quality (12). In 2021, poorly controlled diabetes claimed the lives of 416,000 people in Africa (13)

Glycemic Control is also an issue in Ethiopia. Providing a good explanation for poor glycemic control is an important step for improving the status of glycemic control. In Ethiopia, poor glycemic control-related complications, mortality, morbidity, and admission rate are rising in hospitals (14). According to IDF Africa, 1.9 million individuals are living with diabetes in Ethiopia with a prevalence rate of 3.3% among the adult population (13). According to different studies conducted in Ethiopia, the prevalence of poor glycemic levels is unacceptable (3,7,15–19). According to WHO, diabetes is the seventh leading cause of death in Ethiopia and was responsible for the death of more than 16,000 people in 2020 (20).

Managing Type 2 diabetes improperly can be a serious threat to public health. It can cause microvascular and macro vascular complications such as retinopathy, nephropathy, neuropathy, cardiovascular disease, cerebrovascular disease, and peripheral vascular disease (21). However, lowering blood sugar levels can significantly reduce the risk of these complications. According to a study, lowering HbA1c levels from 9.1% to 7.3%

alone can reduce the risk of macro vascular complications by 41%, neuropathy by 60%, retinopathy by 63%, and nephropathy by 54% (7). Diabetes also affects a person's physical, social, and economic life. The costs associated with treatment and the debilitating effects of the disease can have a significant economic impact on individuals, society, and the world. In 2021, global health expenditure linked to diabetes reached almost one trillion dollars, representing a more than three hundred percent increase over the past fifteen years (5).

The World Health Organization (WHO) has introduced a global diabetes compact to enhance the standard of diabetes treatment and reduce the negative impacts of unmanaged diabetes (26). In Ethiopia, the Federal Ministry of Health (FMOH) and its associates carry out several initiatives, including raising awareness, generating guidelines, and implementing regulations on alcohol and tobacco (27).

In previously conducted studies investigators try hardly to assess the magnitude of glycemic control and other predictors of glycemic control status like duration of diagnosis, age, type of treatment, physical activity, alcohol consumption, smoking status, economic, education status, self-monitoring of blood glucose, and treatment adherence covered well (7,16,17,22,23). However, other important factors like, availability of drugs, insurance coverage have not been studied well. While prior studies relied solely on quantitative methods, this research breaks new ground by employing a mixed-method approach. This approach facilitates triangulation, solidifying the validity and reliability of our findings. In addition, methodological differences and limitations observed in previous studies like unclear operational definition, limiting the study to a single institution and application of the non-probability method, and inadequate sample size will be addressed. Therefore, by filling the observed gaps this study assesses glycemic control and its associated factors among adult with Type 2 diabetes attending selected public hospitals in Addis Ababa, Ethiopia.

1.3. Significance of the study

the study will be important in assessing these factors among Type 2 diabetes patients and will provide an up to date data on the topic for concerned bodies.

The finding of this study with previously conducted studies intends to contribute in expanding our understanding of glycemic control by providing new insights into its prevalence and factors responsible for glycemic control.

Also from previously conducted studies and the result that will be generated from this study concerned bodies like Addis Ababa Health Bureau, Federal Ministry of Health (FMOH) and Non-Governmental organizations (NGO) working on non-communicable disease can develop interventions based on evidences to improve glycemic control. This indirectly have a good impact on reducing the economic burden related to diabetes treatment for both the patient and a country in general.

In addition, the findings generated from this study will also benefit the selected hospitals under this study in particular and Addis Ababa's governmental as well as private hospitals in improving treatment outcome for their patients. Furthermore, this study will be used as a baseline data for future studies in the context of glycemic control in diabetic patients.

2. LITERATURE REVIEW

2.1 The magnitude of glycemic control

Research conducted worldwide indicates that the status of glycemic control in patients with Type 2 diabetes is poor. For instance, a study conducted at a healthcare facility in Malaysia revealed that 75.3% of patients had poor glycemic control (25). Moreover, a cross-sectional study done in Spain showed that the prevalence of poor glycemic control was 45% (28). In Saudi Arabia, a research study found that 74.9% of patients had inadequate glycemic control (9). On the African continent, a study carried out on Type 2 diabetes patients in Eastern Sudan and Tanzania reported that 71.9% (24) and 69.7% (29) of patients, respectively, had poor glycemic control.

In Ethiopia, previously conducted studies show a high burden of uncontrolled diabetes. A study conducted in Addis Ababa at Tekur Anbesa Specialized Hospital shows 73.8% of patient didn't achieve the expected glycemic level (30). Another study conducted in Menelik II Referral Hospital shows only 29.7% of patient able to keep their glycemic level in the normal range (6). Also a study undertaken at Jimma university medical center revealed 70.9 % of diabetic patients had poor glycemic control (22). In Ethiopia the lowest prevalence was observed at Shanan Gibe Hospital, it shows 59.2% of patient did not attain the optimal glycemic level (23). Other studies conducted in different part of Ethiopia shows prevalence of poor glycemic level ranging from 59.4 up to 70.8% (3,7,16–18). The above numbers clearly indicate poor glycemic control is highly impacting the life of the people in our country and around the world.

2.2 Factors associated with glycemic control

2.2.1 Socio-demographic factors

Previous Study conducted in Myanmar and Ethiopia shows there was a significant association between patients age and glycemic control status. A study conducted in Ethiopia revealed Type 2 diabetes patient above the age of 50 were more likely to have poor glycemic control compared with patients younger than 30 years (3). Similarly, a study conducted in Myanmar indicate poor glycemic control was higher among old ages compared to the younger ones (25). However, a study conducted in Australia indicates younger age were more likely to have unfavorable glycemic level compared to older age patients (31).

Being female in gender was also identified as a factor for poor glycemic control and male individuals with better glycemic control. A study carried out in west Shewa public hospitals shows glycemic level is poorly controlled in female patients compared to male patients (3), other study also found out female were more likely to have unfavorable glycemic level compared to male diabetic patients (16).

The educational status of the respondent was also a predictor in different studies. One study shows poor glycemic control among illiterate patients was higher than among those who were in university or college (22), another study also confirms patients who only have informal education was more likely to have poor glycemic control compared to those who reach a college level (18). Regarding the marital status of the patient, consistent findings were not observed, a study carried out in eastern Sudan and Ethiopia shows poor glycemic control was higher among single patients compared to married ones (3,32). However, another study found those patients who were married were more likely to have poor glycemic levels compared to single patients (17).

The occupational status of the patient was a determining factor in different studies. A previously conducted study shows Poor glycemic control was 10% higher in unemployed patients compared to the employed one (7). In contrast, another study revealed merchants were three times more likely to have poor glycemic levels compared to government employees (18).

Poor glycemic control may negatively impact the socioeconomic situation and in turn, the socioeconomic level of an individual may also be the causal factor for poor glycemic control. A study conducted in the United States of America low socioeconomic status was associated with an increase in HbA1c level by 0.1% (33). In contrast, a study conducted in China revealed patients with high monthly income were associated with poor glycemic control (34).

2.2.2 Diabetes Self-care related factor

Adherence to recommended diet by a healthcare provider has been associated with good glycemic control and improved quality of life. A study conducted in a tertiary health care setting shows Patients who didn't adhere to the recommended diets are associated with poor glycemic levels compared to those with good dietary adherence (30). Similarly,

another study carried out revealed that the odds of having poor glycemic levels were higher for patients who did not have a dietary plan than those who have one (6).

A cross-sectional study conducted in Saudi Arabia indicate insufficient physical inactivity was associated with poor glycemic control when they are compared to their counterpart (9). However, another study argues there is no significant association even in patients who are physically active on most days of the week and gives a recommendation to perform a structured exercise (35).

Type 2 diabetes patients who strictly adhere to their treatment have been linked with good glycaemic control. a study performed in Tanzania indicate patients with poor treatment adherence were two times more likely to have inadequate glycaemic levels compared to those who strictly adhere to their treatment (29). this study was also supported by a study conducted at a tertiary health care setting in our country (16). Regarding Self-monitoring of blood glucose (SMBG) there is a limited study conducted, a case-control study carried out in Jima City shows good glycaemic control observed in patients who have their own glucometer (19).

Several studies have shown that alcohol consumption is linked to glycemic control. In the west Shewa zone, a cross-sectional study found that patients who drank alcohol were more likely to have unfavorable glycemic levels compared to those who did not (3). However, a study conducted in Korea indicated that high alcohol consumption was associated with a decrease in HbA1c levels (36). On the other hand, cigarette smoking was found to be associated with poor glycemic levels. A retrospective matched cohort study conducted in China revealed that Type 2 diabetes patients who currently smoke cigarettes had a 0.33% difference in HbA1c reduction compared to non-smokers (37).

2.2.3 Disease related clinical factors

A family history of Type 2 diabetes was also a determining factor in previous studies. According to a study conducted in Saudi Arabia having a family history of Type 2 diabetes was significantly associated with unwanted glycemic levels (9). Similarly, another study found out patients with a family history of diabetes were approximately three times more likely to have poor glycemic levels compared to those who don't have one (3).

The duration of diabetes since diagnosis was also negatively associated with glycemic control. A study shows patients who had been diagnosed with diabetes for more than ten years were more likely to have inadequate glycemic levels when compared to patients with fewer years of diagnosis (6). And this result is usually shared among related studies (15,19).

Type 2 diabetes patients with Comorbidities and complications like hypertension, nephropathy neuropathy, retinopathy, coronary heart disease and others were associated with poor glycemic control. a study carried out in western Ethiopia revealed Patients who had diabetes related complications were three times more likely to have unwanted glycemic level compared to those who don't have one (38). Also patients with comorbidity were highly associated with inadequate glycemic control compared to their counterpart (19). Further study also agree with these findings (3).

2.2.4 Treatment related factors

In previous studies, poor glycemic control was associated with the types and number of anti-diabetic medications taken by the patient. According to a study Patients taking a combination treatment of metformin and glibenclamide were 2.5 times more likely to have inadequate glycemic levels compared with patients who were only on single therapy (29). Also, another study found out patients who took a combination of oral hypoglycemic agents with insulin were five times more likely to have poor glycemic control (22). Furthermore, being an insulin user is highly associated with poor glycemic control compared to one who was on oral monotherapy (19).

Generally, the reviewed literature reveals a high prevalence of poor glycemic control, despite variations in its magnitude across regions and populations. This poor control is influenced by various factors, the major factors identified are summarized as the patient's sociodemographic and economic factors, self-care-related factors, disease-related clinical factors, and treatment-related factors.

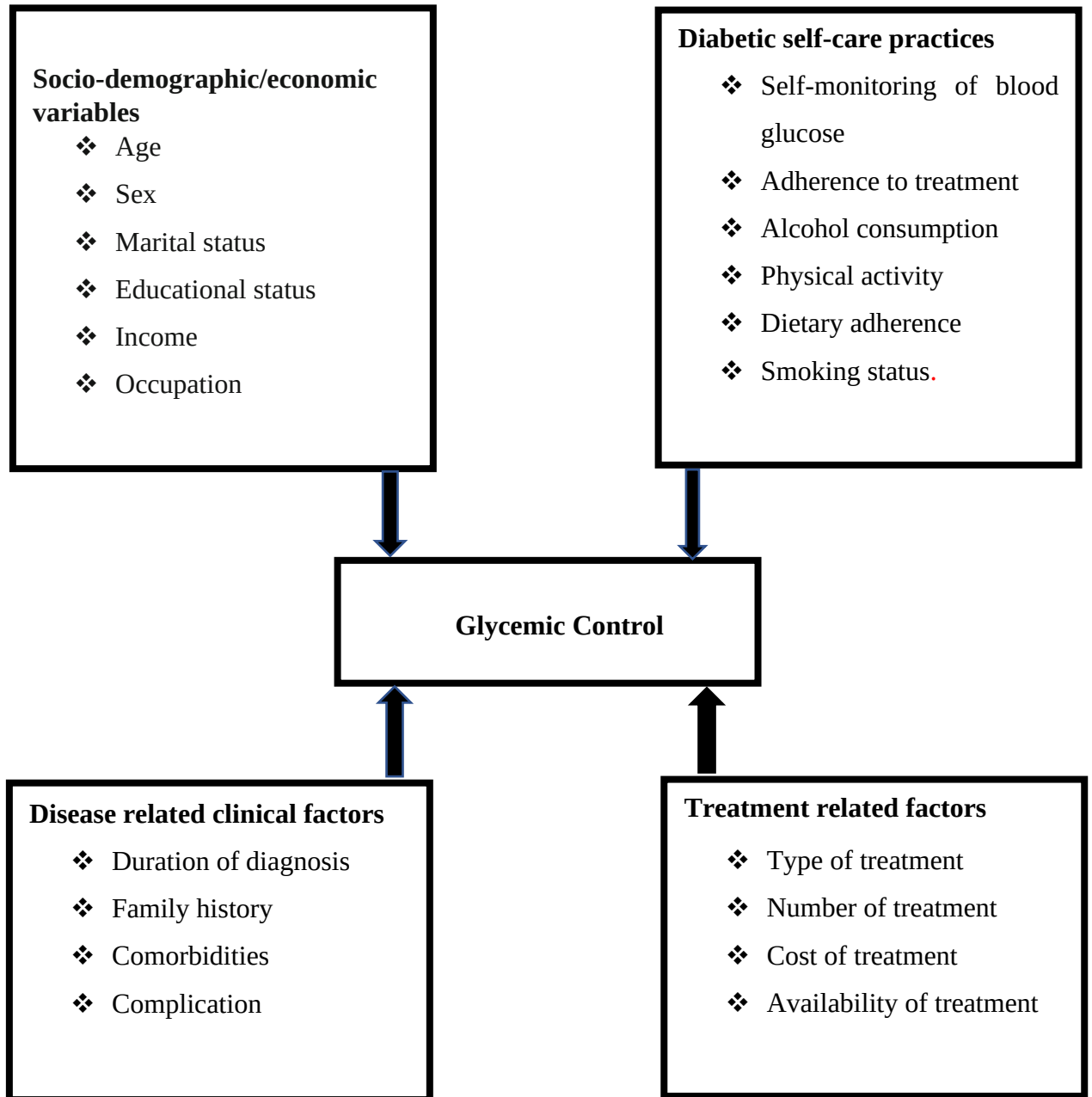


Figure 1: Conceptual frame work shows that the relation between dependent and independent variables developed from review of different literature (7,14-20,22,29-31,33-38).

3. OBJECTIVES

3.1 General Objective

To assess the magnitude of glycemic control and its associated factors among adult with Type 2 diabetes at selected public hospital of Addis Ababa, Ethiopia, 2023.

3.2 Specific Objectives

- ✓ To assess the magnitude of glycaemic control among adult with Type 2 diabetes at public hospital of Addis Ababa, Ethiopia, 2023.
- ✓ To identify factors associated with glycaemic control among adult with Type 2 diabetes at public hospital of Addis Ababa, Ethiopia, 2023.

4. METHODS AND MATERIALS

4.1 Study area and period

The study was conducted from June 5 to July 10, 2023, in public hospitals of Addis Ababa. Addis Ababa is the capital city of Ethiopia, with an estimated total population of 3,945,000 consisting of 1,861,000 males and 2,084,000 females and according to central statistics agency it was estimated to reach 5,132,000 by the year 2037(39). It is located in the bases of the entoto mountains and standing 2,355 meters above sea level. The city has 14 public hospitals (40,41). Among 14 of them 6 hospitals are under the administration of Addis Ababa city health bureau and the rest of them is responsible for FMOH. The study was conducted at four hospitals in Addis Ababa: Alert Referral Hospital, Menelik II Hospital, Yekatit 12 Hospital, and Zewditu Memorial Hospital. Each of these hospitals has a dedicated chronic illness follow-up clinic that provides services on most weekdays.

4.2 Study design

A facility-based cross-sectional study was conducted using a convergent parallel mixed method.

4.3 Population

4.3.1 Source Population

All type 2 diabetes patients attending public hospitals of Addis Ababa.

4.3.2 Study Population

All type 2 diabetes patients attending in selected public hospital at the time of data collection.

4.4 Eligibility criteria

4.4.1 Inclusion criteria

Patients with type 2 diabetes with age greater than 18 years and who have a minimum of nine months (since we need the average blood sugar level to assess glycemic control status) of regular follow up in outpatient setting during the data collection period.

4.4.2 Exclusion criteria

Pregnant women and patients who were critically or mentally ill were excluded

4.5 Sample size determination and sampling technique

4.5.1 Sample size determination

Sample size determination for the first specific objective

The sample size for the study was determined by using the single population proportion formula

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

Where n = Sample size, $Z_{\alpha/2}$ = Standard normal distribution corresponding to a significance level of alpha (α) of 0.05 = 1.96, P = Percentage of poor glycemic level taken from a previous study conducted at Jimma University Teaching Hospital which is 70.9 % (22) and permissible margin of error 5% was used.

Accordingly,

$$n = \frac{(1.96)^2 \cdot 0.709(0.291)}{0.05^2}$$

$$n = 317$$

After adding a contingency of 10 % for non-respondents the sample size became 349, and a design effect of 1.5 is used and then the final sample size became (n)= 524

Sample size determination for the second specific objective

Table 1: Sample size calculation for the second specific objective with the assumptions of 95% confidence level and 80% power using Epi version 7.2.3.1

Outcome variable	Associated factors	CL	Power	Unexposed %	Exposed %	Sample size	Reference
Glycemic control	Long duration of diabetes	95	80	57.8	74.7	268	(15)
	Poor dietary adherence	95	80	39.7	91	36	(16)
	Having complication	95	80	56.1	81.1	125	(38)
	Older Age	95	80	34.3	58.5	148	(3)

The largest sample size was obtained by the first specific objective so; it was used for the actual study.

Twenty-seven type 2 diabetic patients were recruited to participate in three focus groups for the qualitative data collection

4.5.2 Sampling technique and procedure

A Stratified sampling method followed by a systematic random sampling technique was applied to select the study participants. Three public hospitals from Addis Ababa city and one public hospital from federal were selected by a lottery method among ten public hospitals that have a clinic for Type 2 diabetic patients using the lottery method: Alert Referral Hospital, Menelik II Hospital, Yekatit 12 Hospital and Zewditu Memorial Hospital are the ones. According to their monthly data 625 patients in Alert Hospital, 507 patients in Menelik Hospital, 457 patients in Yekatit 12 Hospital, and 562 patients in Zewditu Memorial Hospital, a total of 2151 patients attended the follow-up. The calculated sample size for each hospital is determined using proportional allocation. Thus, dividing the total monthly visits with the respective sample size in each hospital results in an approximate sampling interval of 4 for all hospitals. The first study participant was selected by lottery method and every fourth patient was selected and invited to participate in the study until it reached the final sample size.

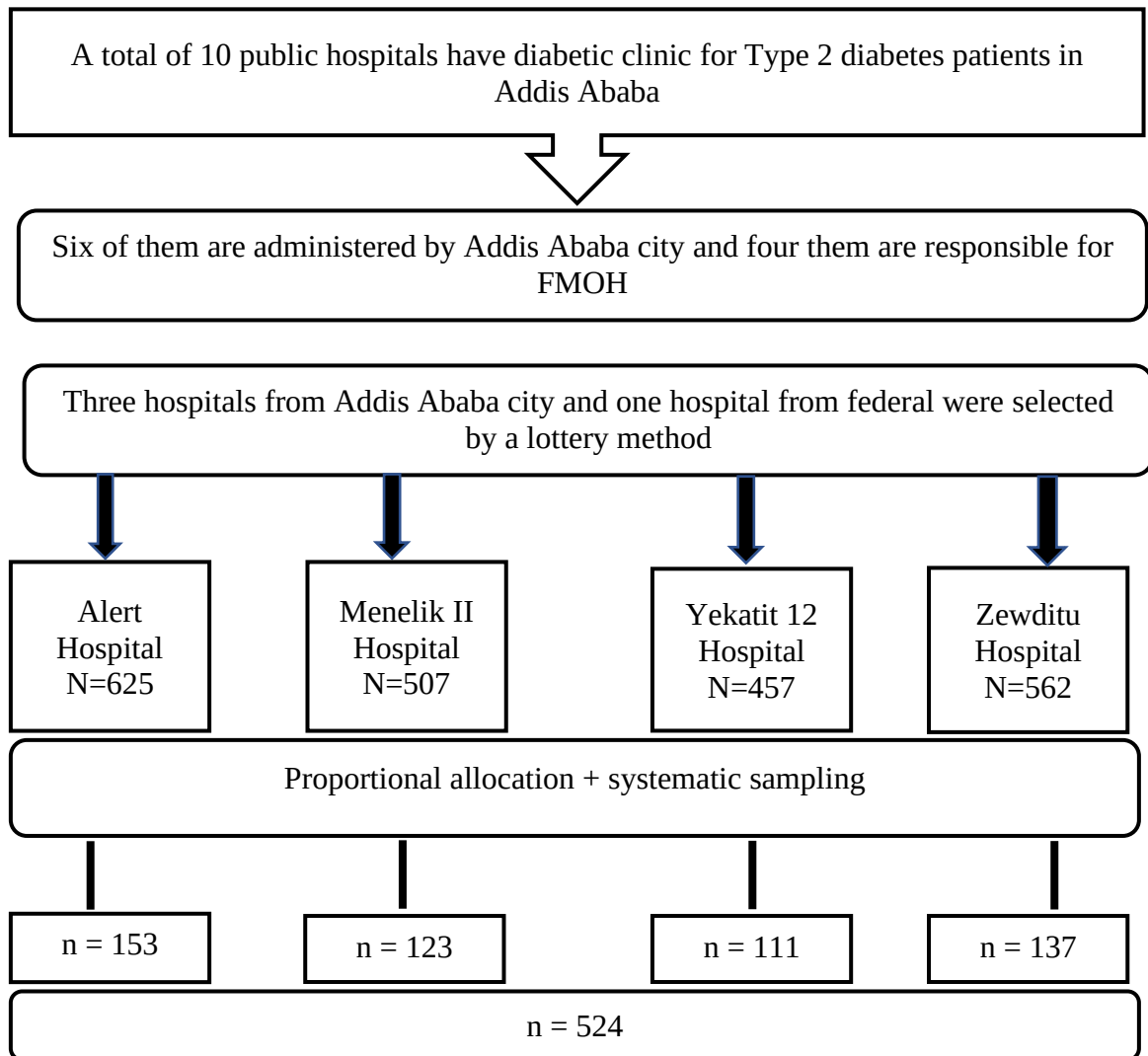


Figure 2: Schematic presentation of the sampling procedure for adult Type 2 diabetic patients at public hospitals of Addis Ababa, Ethiopia, 2023

For the qualitative one, a study participant was selected using a purposive sampling technique. The FGD was conducted in Menelik II Hospital, Yekatit 12 Hospital, and Zewditu Memorial Hospital.

4.6 Study variables

4.6.1 Dependent variables

Glycemic control status

4.6.2 Independent variables

Socio-demographic variables like age, sex, marital status, educational status, income and occupation.

Diabetes self-care factors like SMBG, Treatment adherence, Alcohol consumption, Physical activity, Dietary adherence and smoking status.

Disease related clinical factors like family history of diabetes, Duration of diabetes, Complication and Comorbidity.

Treatment related factors like Type of antidiabetic medication, Number of antidiabetic medication, Cost of the treatment, Availability of the drugs.

4.7 Operational definition

Glycemic control: patients were categorized as

Good glycemic control: if they have average fasting blood glucose of 80–130 mg/dL and

Poor glycemic control: if they have average fasting blood glucose of > 130 mg/dL (21)

Adherence to treatment: Based on Morisky Medication Adherence Scale (MMAS) patients were classified as: -

Highly adherent: if they had a MMAS of 0

Moderately adherent: if they had a MMAS of ≤ 2

Non-Adherent: if they had a MMAS of > 2 (42)

Physical activity: patients were considered as physically active if they perform the recommended physical exercise (like brisk walking, running, jumping rope, swimming or bicycle) for a minimum of 30 minutes per day and five days per week (21)

Dietary Adherence: patients who were taking the recommended diet (like avoiding fatty foods and consuming more of high fiber diets, vegetables and fruit diets) for more than 3 days in the last 7 days considered as adherent (21)

4.8 Data collection tool, methods and procedures

Interviewer administrated structured questionnaire was used to collect data from study subjects. Data collection Instruments were prepared after reviewing previous similar studies (6,30,38,42). The questionnaire has five parts, first part assesses sociodemographic and economic-related questions and the next part focuses on treatment and diabetes related clinical characteristics of the study participant including duration of diagnosis. The third part was used to assess the level of participant medication adherence

using Morisky Medication Adherence Scale (MMAS) (consent via the website and email were asked) (42). The fourth section addresses diabetes self-care activities like physical activity, dietary adherence, alcohol consumption, and smoking status. Data abstraction tool was placed at the end and it was used to review patients' important medical records. The data were collected by six clinical nurses and supervision was done by two health officers. Data collection was carried out after patient completed his/her visit. For the qualitative part semi-structured five open ended questions with probing was used. The data were collected by the principal investigator with one assistant.

4.9 Data quality control

Data quality was assured through careful questionnaire designing and adequate training and follow-up for data collectors and supervisors. The training included a briefing on the general objectives of the study, the approach to accessing study participants, clarity on each item in the instrument, data collecting procedure, including or excluding the target data source, timeliness of data submission, data handling, and time management. The questionnaires were prepared in English and translated to Amharic language and then re-translated back to English to check their consistency. Prior to the actual data collection, a pretest was conducted on 5% of the sample at saint peter specialized hospital. The pretest's findings led to enhancements in the questionnaire's flow, question clarity, and response choices. Every day the collected data was reviewed and necessary measures were taken throughout the data collection period.

4.10 Data processing and analysis

Data were collected electronically using Open data kit (ODK) version 2023.2.2 then exported to SPSS version 25 for processing and analysis through descriptive statistics. Incomplete, and inconsistent data were refined properly to get the maximum quality of data. Percentage, Frequency distribution tables and figures was used to describe the study variable.

Binary logistic regression was used to identify the association between glycemic control and the associated factors. The bi-variable analysis was conducted and variables with $p < 0.25$ were selected as candidate variables for multivariate analysis. The variables that show a $p\text{-value} < 0.05$ was declared as statistically significant variables in multivariate analysis. The fitness of multiple logistic regression models was evaluated using the

Hosmer-Lemeshow test, which yielded 0.258. Additionally, Multi-collinearity was assessed using the variance inflation factor (VIF) and tolerance, resulting in values of 1.18 and 0.842, respectively.

To analyze the qualitative data, the recorded audio was transcribed and, each set of text contents were read repeatedly and carefully until they became familiar and clear. The transcribed data were coded and organized into themes and a thematic analysis was employed manually. Finally, the results were presented in quotation by making triangulation with quantitative findings.

4.11 Ethical consideration

The ethical approval for this study was obtained from the Institutional ethical review board of St. Paul Hospital Millennium Medical College (SPHMMC) with reference number Pm23/795. Then, an ethical clearance was obtained from Addis Ababa Regional Health Bureau public health research and emergency management directorate and permissions for collection of data obtained from the selected public hospitals. Also informed consent was asked from the participants after the necessary explanation was made on the purpose, procedures, benefits, risks of the study and their right on the decision of participating in the study. After getting informed consent from the respondents the right of the respondents to refuse answers for a few to all of the questions was respected.

For focus group discussion consent was asked for participation and audio recording.

4.12 Dissemination of findings

This study will be submitted to SPHMMC, School of Public Health. The finding of the study will be also disseminated to Addis Ababa public health research and emergency management directorate, selected public hospitals and other concerned bodies. Also, it will be disseminated through different journals or scientific publications.

5. RESULTS

5.1 Socio-demographic characteristics of the study participants

A total of 503 Type 2 diabetic patients were included in the study giving a response rate of 96%. The primary reasons for non-response were incomplete or missing charts and participants not completing the interview process. Majority, 284(56.5%) were females. The age of the participants was ranged from 28 to 83. The mean age ($\pm$ SD) was 51.84 $\pm$ 10.21years. Majority of the participants 339(67.4%) were married. Regarding participant educational status, 93(16.5%) of them had no formal education. One hundred fifty-nine (31.6%) were government or private employees and one hundred ninety-two (38.2%) of the respondents had average monthly income $\leq$ 3000 ETB (Table 2).

Table 2: Socio-demographic characteristics of type 2 diabetic patients attending at public hospital of Addis Ababa, Ethiopia, 2023.

Variables	Category	Frequency (n)	Percentage (%)
Sex	Male	219	43.5
	Female	284	56.5
Age, mean $\pm$ SD	51.84 $\pm$ 10.21 years		
Age	25-34 years	9	1.8
	35-44 years	118	23.5
	45-54 years	190	37.8
	55-64 years	123	24.5
	>65 years	63	12.5
Marital status	Married	339	67.4
	Unmarried	36	7.2
	Divorced	47	9.3
	Separated	15	3.0
	Widowed	66	13.1
Educational level	Illiterate	24	4.8
	Can read and write	69	13.7
	Primary	135	26.8
	Secondary	104	20.7

	Diploma	81	16.1
	Degree and above	90	17.9
Occupation	Government/private employee	159	31.6
	Unemployed	28	5.6
	Private business	136	27
	Housewife	93	18.5
	Pension	85	16.9
	Others	2	0.4
Income	<3000 ETB	192	38.2
	3000-7500 ETB	171	34
	>7500 ETB	140	27.8

5.2 clinical characteristics of study subjects

Nearly three-fourth (72.6%) of study participant was diagnosed with diabetes for less than 10 years. A family history of diabetes mellitus was not recorded in 398(79.1%) of the participants. Most of the study participants 340(67.6%) used oral hypoglycemic agents. Two hundred ninety-nine (59.5%) of study participant were on two or more treatments and the remaining patients were on monotherapy. Nearly two-third (64%) of study participant pay for their medications using health insurance scheme. About 354(70.4%) of patients had comorbidity and among them 132(37.2%) of participant had two or more comorbidities. The top common comorbidity was hypertension 122(33.5%), followed by both hypertension and dyslipidemia 94(25.6%) then dyslipidemia 72(19.8%). Furthermore, 147(29.2%) patients had developed at least one diabetes related complications and 28(19.08%) of them were affected by multiple diabetic complications. Diabetic neuropathy was the most common accounting for 39.4 % of all complication (Table 3).

Table 3: Clinical characteristics of type 2 diabetic patients attending at public hospital of Addis Ababa, Ethiopia, 2023.

Variables	Category	Frequency	Percentage(%)
Duration	<6 year	197	39.2
	6-10 year	168	33.4
	>10 year	138	27.4
Family History	Absent	398	79.1
	Present	105	20.9
Type of treatment	Oral anti-diabetic	340	67.6
	Insulin	57	11.3
	Oral + Insulin	106	21.1
Payment Method	Covered by insurance	322	64.0
	Self-sponsor	173	34.4
	Free of charge	8	1.6
Availability of prescribed drugs	No	93	18.5
	Yes	410	81.5
Co-morbidity	Absent	149	29.6
	Present	354	70.4
Common Co-morbidities	Hypertension	122	33.5
	Heart disease	13	3.57
	Dyslipidemia	72	19.78
	HTN + Heart disease	15	4.12
	HTN + Dyslipidemia	94	25.6
	Others*	13	3.57
Complication	Absent	356	70.8
	Present	147	29.2
Common complication	Neuropathy	58	39.4
	Retinopathy	31	21.08
	Nephropathy	15	10.2
	Diabetic foot ulcer	9	6.12
	Cardiovascular	6	4.08
	Neuropathy + Retinopathy	16	10.88

* Include CLD, HIV/AIDS, Cancer, TB

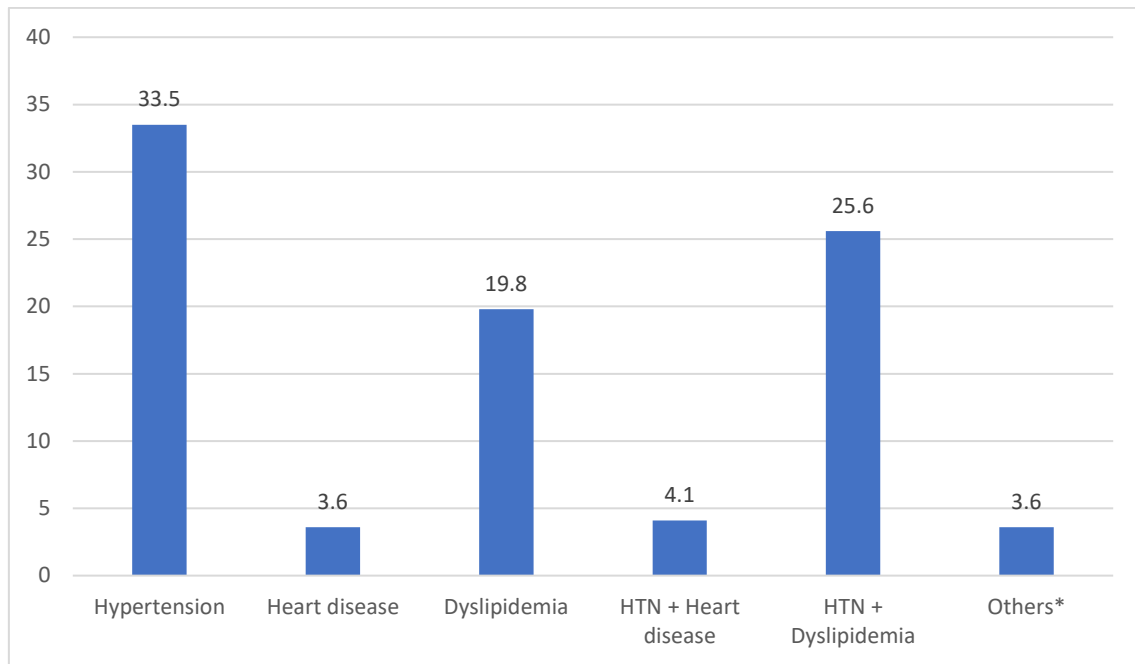


Figure 3: Prevalent comorbidities in type 2 diabetic patients attending at public hospital of Addis Ababa, Ethiopia, 2023

One of the three themes emerged during qualitative data analysis was the impact of comorbidities. A patient tells his experience as “...it's been a long time since I knew I had asthma and blood pressure. The pressure is in good shape but the Asthma puts me in bed, if I smelled something bad or had a cold. At that time, I usually go to a pharmacy near my house to check my blood sugar and it's is usually not good, but when I feel better, it returns to normal.”

Further, the qualitative data analysis identified treatment side effects as a prominent and consistent theme across the participants' experiences. One participant Shares his experiences as “I take 5 pills per day for blood pressure, diabetes, and cholesterol. I take the pills as it was prescribed by the doctors. One pill I had for my blood pressure made my legs swell and it was changed to another one, but the new pill sometimes just sits on my stomach and burns my whole body from my feet to my head, when these symptoms got worsen I am forced to stop taking the medication for some days and my blood sugar levels become higher during that time. I asked the doctors for a better drug, they tell me that this is the best drug they have and send me home with another pill for my symptoms but the pills only helped me for short time.”

5.3 Diabetes self-care practices

Majority of the respondents 450 (80.5%) had the recommended dietary plan in the previous week during the study time. Only 29(5.8%) of the study participant had the recommended physical activity for more than 4 days in the last week earlier the study time. One hundred eighty-six (37%) of participant were highly adherent to the prescribed medications and more than half (52.3%) of participant were moderately adherent and the rest of them (10.7%) were non-adherent to the prescribed medication. majority of the study participant 286(56.9) had access for self-monitoring of blood glucose. Thirty-two (6.4%) patients were active smokers (Table 4).

Table 4: Diabetes self-care practices in type 2 diabetic patients attending at public hospitals of Addis Ababa, Ethiopia, 2023.

Variables	Category	Frequency	Percentage
Dietary Adherence	Not adherent	53	10.5
	Adherent	450	89.5
Exercise Adherence	Not adherent	474	94.2
	Adherent	29	5.8
Medication Adherence	Non adherent	54	10.7
	Moderately Adherent	263	52.3
	Highly Adherent	186	37
SMBG	No	217	43.1
	Yes	286	56.9
Smoking status	Non smoker	377	75
	Smoker	32	6.4
	Quit Smoking	94	18.6

self-care practice was the broader theme emerged in qualitative data analysis.

A 55-years diabetic patient tells “...*although it’s not often sometimes I get busy with my routine work and forget to take my pills according to my doctor prescription and during that time I fill some familiar symptoms of high blood sugar and they got remind me that I didn’t take my pills, so I immediately buy the pills from nearby pharmacy’s and take it right away.*”

And a 44 years old participant tell her practice stating;

“*sometimes I get careless when it comes to diet. For example, when I go to someone’s house, I feel embarrassed to ask them to prepare the food in the way I want, so I eat like*

in the way they serve it. In addition to this, when I am fasting, I usually don't take the pills that I take in the morning and take them after breaking the fast, around 7 or 8 o'clock. I've been told that taking the pills not in time can affect my blood sugar.”

5.4 Glycemic control status

Mean fasting blood glucose measured over the past four visit was 135.89 ± 35.03 mg/dL and the median was 137 mg/dL. The minimum and maximum calculated average fasting blood glucose were 83 and 292 mg/dL respectively. From the study participant 294(58.4%) had uncontrolled glycemic level (Table 5).

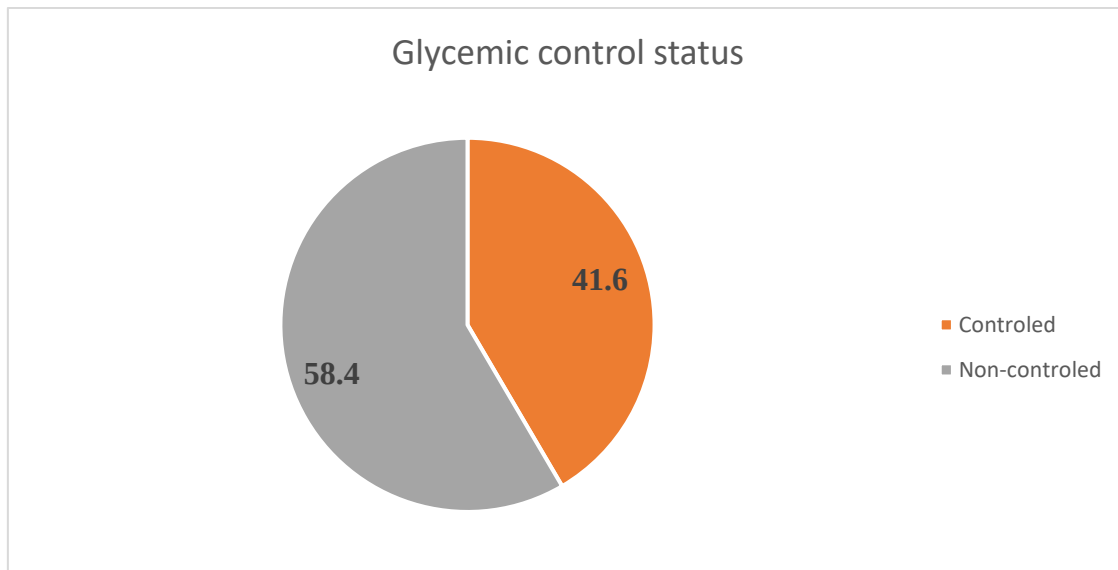


Figure 4: Glycemic control status in type 2 diabetic patients attending at public hospital of Addis Ababa, Ethiopia, 2023.

5.5 Factors associated with glycemic control status

Bivariate and multivariate logistic regression analysis was carried out to identify the association between independent variables and glycemic control status. Hence, in the bivariate analysis, being female, Duration of diagnosis, being user of both oral hypoglycemic agent and insulin, dietary adherence, exercise adherence, SMBG, poor treatment adherence, comorbidity and presence of complication had a p-value of < 0.25 were found to be significantly associated with glycemic control status. These variables further subjected to multi-variable logistic regression analysis.

Before analysis multi-collinearity was checked using tolerance and variance inflation factor and resulted in a value of greater than 0.25 and less than 5 respectively. Model goodness of fit also checked by Hosmer-lemeshow test and it was 0.26. Finally, duration

of diagnosis (>10 years), dietary adherence, drug adherence, comorbidity and presence of complication had a p-value of < 0.05 and were the predictors of glycemic control status.

Participants who were diagnosed for more than 10 years were 1.7 times more likely to have uncontrolled glycemic level [(Adjusted Odds Ratio (AOR) = 1.71, 95% confidence interval (CI) (1.01, 2.91)] compared to diabetic patients with a duration of fewer than 6 years. The likelihood of uncontrolled glycemic level was 0.18 times less among participant's who adequately comply with the recommended diet [(AOR = 0.18, 95 % CI (0.07, 0.47)] compared to their counterpart. The odds of uncontrolled glycemic level among participant who had a moderate or poor adherence to their medication were 3.5 [(AOR = 3.53, 95 % CI (2.26,5.50)] and 8.8 times [(AOR = 8.87, 95 % CI (3.54,22.20)] more than patients who had high adherence level to their medication respectively. Patients who had comorbidity/ies were 1.75 times more likely to have uncontrolled glycemic level compared to those who had no comorbidity/ies [(AOR=1.75, 95% CI (1.08, 2.82)]. Similarly, Patients who had complication were 3.5 times more likely to have uncontrolled glycemic level compared to those who had no complication [(AOR=3.50, 95% CI (2.10, 5.84)].

In qualitative data analysis factors like dietary habit, blood glucose monitoring, treatment adherence, comorbidity, and Side effects of medication were the main factors that was associated with glycemic control

Table 5: Bivariate and multivariate logistic regression analysis result among type 2 diabetic patients attending public hospitals of Addis Ababa, Ethiopia, 2023.

Variables	Category	Glycemic Status		Bivariate Analysis		Multivariate analysis	
		Uncontrolled, n	controlled, n	COR (95% CI)	P value	AOR (95% CI)	P value
Sex	Male	117	102	1		1	
	Female	177	107	1.44(1.09,2.06)	.045*	1.14(.74,1.74)	.548
Duration of DM	<6 year	99	98	1		1	
	6-10 year	107	61	1.73(1.14,2.64)	.010*	1.54(.94,2.51)	.082
	>10 year	88	50	1.74(1.11,2.72)	.015*	1.71(1.01,2.91)	.046*
Type of treatment	Oral anti-diabetic	185	155	1		1	
	Insulin	37	20	1.55(0.86,2.78)	.142	1.86(.95,3.64)	.067
	Oral + insulin	72	34	1.77(1.12,2.81)	.015*	1.15(.67,2.00)	.600
Dietary adherence	Non-Adherent	47	6	1		1	
	Adherent	247	203	0.15(0.06,0.37)	.000*	.18(.07,.47)	.000*
Exercise adherence	Non-Adherent	283	191	1		1	
	Adherent	11	18	0.41(0.19,0.89)	.025*	.56(.23,1.36)	.204
SMBG	No	145	72	1		1	
	Yes	149	137	0.54(0.37,0.77)	.001*	.76(.49,1.17)	.217
Drug Adherence	Highly adherent	75	111	1		1	
	Moderately adherent	172	91	2.79(1.89,4.12)	.000*	3.53(2.26,5.50)	.000*
	Non-Adherent	47	7	9.93(4.26,23.16)	.000*	8.87(3.54,22.20)	.000*
Co-morbidity	No	65	84	1		1	
	Yes	229	125	2.36(1.60,3.49)	.000*	1.75(1.08,2.82)	.021*
Complication	No	178	178	1		1	
	Yes	116	31	3.74(2.39,5.85)	.000*	3.50(2.10,5.84)	.000*

6. DISCUSSION

This study tries to assess magnitude glycemic control and its associated factors among adult type 2 diabetic patients on follow-up at Public hospitals of Addis Ababa, Ethiopia. In our study, the average fasting blood glucose level over the past four measurements was 138.9 ± 35 mg/dL. This level is lower than that found in a study conducted at Tikur Anbesa Specialized Hospital, where the mean fasting blood glucose was 174.1 ± 89.6 mg/dL(16). However, it is higher than the mean fasting blood glucose reported in a study conducted at Shanan Gibe Hospital (130.3 ± 30.7 mg/dL) (23) and exceeds the recommended target set by the American Diabetes Association (21). This elevated mean fasting blood glucose indicates that glycemic control in this study population is suboptimal and does not meet the recommended guidelines. This may be attributed to factors such as poor medication adherence, unhealthy lifestyle habits, and inadequate adherence to regular follow-up appointments.

The overall magnitude of uncontrolled glycemic level was 58.4% (95%CI: 54.0, 62.8) which was in line with studies done in south India 58.1% (43), Shanan Gibe hospital, 59.2% (23), Jima university specialized hospital 59.4% (17), Ayder hospital 61.9% (7).

However, the prevalence in this funding was higher than other studies conducted in Spain 45% (28) , Nigeria 50.1% (44) and china 50.3 (45).The possible explanation for this could be difference in socioeconomic status of the participants, lacking of technology advancements, non-usage of new more effective anti-diabetic drugs, poor dietary and treatment compliance and high illiteracy rate which in turn affect diabetes knowledge and self-management practices.

In the other side this study is lower than from the studies conducted in Jima university specialized hospital 70.9% (22) and Tekur Anbesa Specialized Hospital 68.3(16). The disagreement in individual studies might be described by the fact that our study used FBS for determining glycemic level, while other studies used hemoglobin A1c (HbA1c) test for determining the glycemic level. Furthermore, difference may arise from the expertise involved in the management of the case. Also having different study populations and sample sizes may contribute for the discrepancy.

In this study nearly two-third (60.2%) of females have uncontrolled glycemic level compared their male counterpart. Several factors could contribute to females having poorer glycemic control compared to males. These factors can have related with their biological and behavioral differences. Females tend to have a higher percentage of body fat compared to males. This can lead to increased insulin resistance, making it harder for the body to use insulin effectively. Hormonal Fluctuations throughout the menstrual cycle can also affect glucose metabolism.

The study has shown that 65.6% of patients who regularly monitor their blood glucose levels are able to control their glycemic levels, compared to those who do not monitor their blood glucose levels. One participant tells the importance of having SMBG as *“...knowing your sugar level gives you a sense of peace. previously, my blood sugar dropped so low that I fainted and was admitted to the hospital. After that, my doctor advised me to have my own measurement to monitor my blood sugar and my kids bought the measurement from the pharmacy. Now I can tell when my sugar is going down or up.”*

This suggests that regular blood glucose monitoring is an important part of diabetes management and can help to keep blood sugar levels under control. By tracking blood glucose fluctuations, people with diabetes can learn how their bodies respond to different factors, such as diet, exercise, and medication. This information can then be used to make informed decisions about treatment plans, which can lead to better glycemic control.

The finding showed that duration of diagnosis (> 10 years), dietary adherence, drug adherence, comorbidity, and complication were significantly associated with glycemic control status. In this study, the odds of having uncontrolled glycemic level was higher among patients who were diagnosed for more than 10 years compared to diabetic patients with a duration of fewer than six years. Similarly, a study conducted in Northeast Ethiopia revealed that diabetic patients with a longer duration of diabetes were associated with uncontrolled glycemic levels (18). Mamo et al. also find out that patients who had been diagnosed with diabetes for more than ten years were about three times more likely to have uncontrolled glycemic levels than those who had been diagnosed for less than seven years (19). A longer duration of diabetes adversely affects glycemic status, probably because of insulin resistance and progressive impairment of insulin secretion over the

period as a result of β -cell failure. Due to this patient with a longer duration of diabetes may finally find it challenging to keep a good glycemic level. This finding was in line with the studies conducted previously in Tekur anbesa specialized hospital (30), Shanan gibe hospital (23), and Tanzania (29).

The study also revealed that Good compliance with recommended diet negatively associated with uncontrolled glycemic level. Diabetic patients who had adequately adhere with a recommended diet for more than 3 days a week less likely to had a poor glycemic level compared to those patient who don't adhere to the recommended diet. The result was parallel with a previously conducted studies in Ethiopia (6,30). Dietary habit also raised as a reason for poor glycemic control by FGD participant. *"I usually eat what is available at home, I don't have enough money to adjust the diet as it was recommended. I often have bread and tea for breakfast; even though I know both tea and bread are not allowed for us I am still taking these foods to survive."* (a reason forward by a 48-years old participant about his poor glycemic level)."

The rate of non-adherence to anti-diabetic medications in this study was found to be 10.1 % according to the eight element of MMAS, it is better than what was reported from Jima university teaching hospital, 18.1% (22). Adherence to anti-diabetic regimens is a key for achieving a good glycemic level. The result of this study showed that Patients who were poorly or moderately adhered to the prescribed medications had significantly high prevalence of uncontrolled glycemic level when compared with those who were highly adherent to their treatment. Demoz et.al also find out that patients who had been poorly adherent for the treatment were about 4.5 times more likely to have uncontrolled glycemic level than their counterpart (16).

This finding is consistent with the result obtained from studies conducted in Jima university teaching hospital (22). This result also supported by the qualitative finding. A patient attendant said *"...my mother blood sugar is always above 150 and it's because she isn't good with her pills, always having difficulty remembering them, and often takes her morning medication late when fasting. On occasion, she even falls asleep on the couch and misses a dose. We do not live with our mother but before heading to work we usually paid her a visit in the morning to make breakfast for her, after making breakfast we put the meal with her pills where she can easily find them. However, when we return*

for lunch, we find that both the pills and her breakfast remain untouched, and she gives us many excuses when we ask about it.” Poor patient knowledge regarding severity of the disease, lack of adequate counseling by health professionals, taking too many pills may contribute for this outcome.

The prevalence of uncontrolled blood glucose among patients with comorbidities was high, with over three-quarters (77.9%) of these patients having uncontrolled blood glucose levels. In line with a study conducted in west Shewa zone this study also revealed that patients with comorbidities had higher odds of uncontrolled glycemic level (3). Similarly, a study conducted in south west Ethiopia shows diabetic patients with comorbidities have higher rate of uncontrolled glycemic level compared to those who don't have one (19). The association can be explained by the potential consequence of co-morbidities in causing hyper glycemic state, it is also can be explained by comorbidities associated with increase medication burden to the patient which in turn affect treatment adherence for anti-diabetic regimens, leading to poor glycemic control state.

Finally, the study showed that patients with one or more complication also had higher odds of uncontrolled glycemic level. This result was in line with the studies conducted previously in public hospitals found in western Ethiopia and West Shewa zone public hospitals (3,38). These similar findings can be explained by the fact that diabetes complications are associated with a change in patient attention from diabetes self-care practice to dealing with newly developed diabetic complications. It can also indirectly affect glycemic level due to its adverse physical, psychological, and economic impacts on patients.

Limitation

Although patients were explicitly assured of confidentiality and encouraged to provide accurate information, most self-care practices in diabetes management were assessed based on patient recall, which could introduce recall bias. We attempted to mitigate this bias by providing comprehensive explanations of the practices and allowing adequate time for participants to reflect on the events.

The study's setting might introduce social desirability bias because of the study setting is in hospital. However, every effort was made to assure participants that their responses would be kept anonymous and confidential.

The study was cross-sectional study design, where a causal relationship between the dependent and independent variables cannot be established.

The study employed FBS instead of the preferred diagnostic tool, HbA1c. To overcome this limitation, the average of the last four consecutive FBS measurements was used.

7. CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The study found that more than half (58.4%) of study participant had poor glycemic control, which is far below the recommended standards. Based on the finding of this study the glycemic control in diabetic patient is generally poor. And this was found to be associated with factors such as duration of diagnosis, dietary adherence, drug adherence, comorbidity, and complication.

7.2 Recommendations

From the findings of the study, the following recommendations are given below for concerning bodies.

Federal Ministry of Health and Addis Ababa city health bureau

- ❖ The FMOH and the Addis Ababa City Health Bureau should develop strategies to prevent complications and associated comorbidities.

Hospitals

- ❖ It was a well-known fact that HbA1c is the best investigation modality to monitor patients' glycaemic status so Hospitals need to be equipped with such important diagnostic tools.

Health professionals

- ❖ The findings of the study have shown that poor treatment adherence and dietary habits are one of the factors that contribute to poor glycaemic control in patients with diabetes. Health professionals should advise patients to strictly adhere to their treatments and to have a healthy eating practice.
- ❖ Based on this study, healthcare professionals should give more attention to diabetes patients with a longer diagnosis duration, particularly those who have been diagnosed for over ten years. This can be achieved by increasing the frequency of their visits to monitor their glycaemic levels.
- ❖ Again based on the findings health professionals should emphasize the early identification and management of co-morbidities, also should focus on preventing and managing diabetes complications to improve patients' glycaemic control

Researchers

- ❖ Researchers should perform further mixed studies by addressing the limitation observed in this study.

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Annexes

Annex 1: Information Sheet

St. Paul Hospital Millennium Medical College

Department of Public health specialty in Epidemiology

Name of Principal investigator: -Fasika Mega

Tell phone: +251938087744

E-mail: fasilsmiga80@gmail.com

Introduction: this information sheet is prepared to make things clear about the purpose of research, data collection procedures and get permission to conduct the research.

The study title: Assessment of glycemic control status and its associated factors among adults with type 2 diabetes at selected public hospital of Addis Ababa, Ethiopia, 2023.

Purpose of the study: The main aim of this study is to prepare a thesis as a partial requirement for the fulfillment of a master's degree in Epidemiology for the principal investigator. Furthermore, the result of the study will be used as evidence and input for different stakeholders working on the Health sector.

Procedure: The data collectors will collect the necessary information from the participant using structured questionnaire and by reviewing patients card to have pertinent data that is helpful for the study.

Risk: No harm will come to you by participating in this research project.

Benefit: This research has no incentive or direct benefit for you. However, it will have indirect benefit for you and in general for the Health sector in identifying important factors for intervention.

Confidentiality: Participants name will not be stated and confidentiality is reserved.

Rights to refusal or Withdrawal: Permitting this study is fully voluntary. You have the right to permit or not this study. If you decide to permit the study, you have the right to terminate the study at any time if you consider something related to the study is wrong.

Contact address: This research project will be reviewed and approved by the institutional review board of St. Paul Hospital Millennium Medical College. If in any

case, you want to know more information about the research and its undertakings, you can contact the committee through the following address

1. Mr. Kinfе Haile (MPH)

Mobile phone: +251965134142

E-mail: kinfe.haile@sphmmc.edu.et

2. Mr. Simegnew Handebo (MPH, Assistant professor)

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3. Mr. Fasika Mega (BSc)

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Amharic version information sheet

ቅዱስ ጳውሎስ ሆስፒታል ሚሊንየም ሚዲካል ኮሌጅ

የህብረተሰብ ጤና ትምህርት ክፍል ኢፕዲዮሎጂ ዘርፍ

የመርማሪ ስም: ፋሲካ ሚጋ

ስልክ ቁጥር: +251938087744

ኢሜል: fasilsmiga80@gmail.com

መግቢያ: ይህ የመረጃ የተዘጋጀው ስለ ምርምሩ ዓላማ ፣ ስለ መረጃ አሰባሰብ አሰራሮች ዓላማ ግልፅ ለማድረግ እና ምርምር ለማካሄድ ፈቃድ ማግኘት ነው ፡

የምርምር ርዕስ- በአዲስ አበባ ውስጥ ባሉ ሆስፒታሎች ውስጥ ያሉ የአይነት_2 ስኳር ታካሚዎችን የስኳር ቁጥጥር ሁኔታ እና ለስኳር ቁጥጥር ወሳኝ የሆኑ ምክንያቶችን መለየት

የምርምሩ ዋና አላማ: ምርምሩ በዋነኛነት መርማሪው የማስትርስ ትምህርቱን ለማጠናቀቅ የሚረዳ ሲሆን በተጨማሪም ክፍሉ የሚገኙ ግኝቶች ለጤናው ዘርፍ ግብአትና መረጃ ሆነው ያገለግላሉ፡፡

የጥናቱ ሂደት- መረጃ ሰብሳቢዎቹ ቀድመው በተዘጋጁ መጠይቆችና የታካሚዎችን ካርድ በማገላበጥ ከተሳታፊዎች ለጥናቱ አስፈላጊ የሆኑ መረጃዎችን የሚሰብስቡ ይሆናል፡፡

ስጋት: በዚህ ጥናት ውስጥ በመሳተፍ የሚመጣ ምንም አይነት ጉዳት የለም፡፡

ጥቅም: ይሄ ጥናት ለተሳታፊው የሚያቅርበው ምንም አይነት ጥቅማጥቅም አይኖረውም ሆኖም በተዘዋዋሪ ለተሳታፊውና ለጤናው ዘርፍ መፍትሄ የሚሆኑ ግባቶችን ለማቅረብ ይጠቅማል፡፡

ምስጢራዊነት: የተሳታፊው ስም አይገለጥም እንዲሁም ምስጢራዊነት የተጠበቀ ይሆናል፡፡

በጥናቱ ያለመሳተፍ ወይም የማቋረጥ መብት: በዚህ ጥናት መሳተፍ ሙሉ በሙሉ ፍቃድ ላይ የተመሰረተ ይሆናል፤ በጥናት ውስጥ ፈቅደው ገብተው በሂደት ውስጥ ያላስድሰቶት ነገር ካለ ጥናቱን የማቋረጥ መብት የተጠበቀ ነው፡፡

የሚያነጋግሩት ሰው አድራሻ: ይህ የምርምር ፕሮጀክት በቅዱስ ጳውሎስ ሆስፒታል ሚሊንየም ሚዲካል ኮሌጅ በተቋማዊ የግምገማ ቦርድ ተገምግሞ ፀድቁዋል፡፡ ስለ ምርምሩ እና ስለ ሥራው አፈፃፀም የበለጠ መረጃ ለማወቅ ከፈለጉ ከዚህ በታች ባለው አድራሻ ኮሚቴውን ማነጋገር ይችላሉ ፡፡

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Annex II: English version consent sheet

Good morning/good afternoon!

My name is _____. I am collecting data on the topic of Assessment of glycemic control status and its associated factors among outpatients with type 2 diabetes at public hospital of Addis Ababa, Ethiopia, 2023 The study is being conducted by Fasika Mega from St. Paul Hospital Millennium Medical College, School of Public Health. He has got permission from the St. Paul Hospital Millennium Medical College. The purpose of this study is to assess glycemic control status and associated factors in Type 2 diabetic patients. You will be facing no harm by participating and you are also not obliged to answer any question you don't wish to answer. To fill the questionnaire 15_20 minutes will be required. If you have further questions or would like to know the results of this study, please feel free to contact the principal investigator.

Are you willing to participate in the study? Yes ☐ No ☐

Data collector: Name _____ Signature _____ Date _____

Result: -

Questionnaire completed _____

Questionnaire partially completed _____

Participant refused _____

Checked by: Supervisor name _____ Signature _____

Amharic version consent sheet

አንደኛውን አደሩ/ አንድኛውን አረፈዱ

ስሜ _____ ይባላል። በአዱስ አበባ ሆስፒታሎች የስኳር መድሃኒቶችን እየወሰደ ከትትሌ በሚያደርጉ ታካሚዎች ላይ የአይነት_2 ስኳር ቁጥጥር ላይ መሰረቱን ያደረገ መረጃ እየሰበሰቡበት ነው። ይህ ጥናት የቅዱስ ጳውሎስ ሆስፒታል ሚሊንየም ሚዲካል ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል ተማሪ በሆነው አቶ ፋሲካ ሜጋ የሚሰራ ነው፤ ጥናቱን ለማድረግ ከኮሌጁ ፍቃድን አግኝቷል። የጥናቱ አላማ የአይነት_2 ስኳር ታካሚዎችን የስኳር ቁጥጥር ሁኔታ እና ለስኳር ቁጥጥር ወሳኝ የሆኑ ምክንያቶችን መለየት ይሆናል። በዚህ ጥናት በመሳተፍ ምንም ዓይነት ጉዳት አይገጥሙዎትም እንዲሁም መመለስ የሚፈልጉትን ማንኛውንም ጥያቄ የመመለስ ግዴታ የለብዎትም። መጠይቁን ለመሙላት ከ 15 እስከ 20 ደቂቃዎች የሚወስድ ይሆናል ። ተጨማሪ ጥያቄ ካለዎት ወይም ስልጥናቱ ውጤት ማወቅ የሚፈልጉ ከሆን እባክዎን የጥናቱን መርማሪ በአድራሻው ያግኙ።

በጥናቱ ለመሳተፍ ፍቃደኛ ኖት? አዎ ☐ አይደለም ☐

መረጃ _____ ሰብሳቢ፡ _____ ስም _____
ፊርማ _____ ቀን _____

ውጤት፡-

መጠይቁ ሙሉ-በሙሉ ተጠናቋል _____

መጠይቁ በከፊል ተጠናቋል _____

ተሳታፊው ፍቃደኛ አይደለም _____

መረጃውን ያጣራው፡ የተቆጣጣሪው ስም _____ ፊርማ _____

Annex III: English version questionnaires

General Instructions

In all cases where answer options are available please circle the number provided if have not option write short word

Part I: Demographic and socio-economic Information

S.no	Question	Response
101	Age in year	-----year
102	Sex	1. Male 2. Female
103	Marital status	1. Single 2. Married 3. Divorced 4. Separated 5. Widowed
104	Education level	1. Illiterate 2. Can read and write (informal) 3. Primary (grade 1 - 8) 4. Secondary (grade 9 - 12) 5. Diploma 6. Degree and above
105	Employment	1. Government/Private Employee 2. Unemployed 3. Self-employed 4. Housewife 5. Retired/Pension 6. Student 7. Other (specify)_____
106	Estimated average monthly income (ETB)	_____ birr

Part II: Question to assess treatment and disease related clinical characteristics of study subjects

S.no	Question	Response
201	How many years since you diagnose ?	1. ≤ 5 year 2. 6 - ≤ 10 years 4. > 10 years
202	Do you have Family history of DM?	1. Yes 2. No
203	Current treatment	1. Oral anti-diabetic 2. Insulin 3. Oral anti-diabetic + Insulin
204	Number of anti-diabetic medication	-----
205	How do you pay for your medications?	1. Covered by health insurance 2. Self-sponsored 3. Free of charge
206	Does the prescribed medication available in pharmacy?	1.Yes 2. No

Part III: Diabetes self-care activities related questions

S.no	Self-care activities	0	1	2	3	4	5	6	7
301	How many days in the last 7 days you adhere to the recommended diet? (like limiting fatty foods and cereals, avoiding sweet foods and consuming more of vegetables and fruit diets)								
302	How many days in the last 7 days for a minimum of 30 minute you engage in physical activities? (like brisk walking, running, jumping rope, swimming or bicycle)								
303	Do You have easy access to monitor your blood sugar level?	1. Yes 2. No							
304	How often do you drink an alcohol ?	1. Never/rarely 2. Once in a while 3. Sometimes 4. Usually 5. All the time							
305	Smoking status	1. Non-smoker 2. Current smoker 3. Quit smoking							

Part IV: Questions to assess antidiabetic medication adherence using MMAS

S.no	Questions	Yes	No
401	Do you sometimes forget to take your pills?		
402	People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?		
403	Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?		
404	When you travel or leave home, do you sometimes forget to bring along your medicine?		
405	Did you take all your medicine yesterday?		
406	When you feel like your symptoms are under control, do you sometimes stop taking your medicine?		
407	Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?		
408	How often do you have difficulty remembering to take all your medicine? 1. Never/rarely 2. Once in a while 3. Sometimes 4. Usually 5. All the time		

Part V: Chart review Questionnaire

S.no	Question	Coding Categories	Skip
501	Any co-morbid disease	1. yes 2. No	If no go to 503
502	If yes to question the above question, Type of co-morbidity (more than one tick is possible)	Hypertension ☐ Heart Disease ☐ Asthma ☐ Dyslipidemia ☐ Others, Specify _____	
503	Any diabetes related complication?	1. Yes 2. No	If no go to 505
504	If yes for above question, Name the complication? (more than one tick is possible)	Neuropathy ☐ Retinopathy ☐ Nephropathy ☐ Diabetic foot ulcer ☐ Cardiovascular disease ☐ Others, Specify _____	
505	Patient last four consecutive FBS measure	1. _____mg/dl. 2. _____ mg/dl. 3. _____ mg/dl. 4. _____ mg/dl. Average_____	

Annex IV: Amharic version questioner

ጠቅላላ መመሪያ

ክተሰጦት ምርጫ ውስጥ መካከል መልሶትን ካላገኙ እባክዎትን አጭር መልስ ከጎን ያስቀምጡ፡፡

ክፍል 1: ማህበራዊ ፣ ኢኮኖሚያዊ ፣ ስነ ሕዝብ አወቃቀርና ተያያዥ መረጃዎች

ተ.ቁ	ጥያቄዎች	ምላሽ
101	እድሜ በአመት	----- አመት
102	ፆታ	1. ወንድ 2. ሴት
103	የጋብቻ ሁኔታ?	1. ያላገባ 2. ያገባ 3. አግብተው የፈቱ 4. አግብተው የተለያዩ 5. የትዳር አጋራቸው የሞተባቸው
104	የመጨረሻው የትምህርት ደረጃ?	1. ማንበብና መፃፍ የማይችሉ 2. ማንበብና መፃፍ የሚችሉ 3. የመጀመሪያ ደረጃ (1-8) 4. ሁለተኛ ደረጃ (9 - 12) 5. ዲፕሎማ 6. ድግሪ እና ከዚያ በላይ
105	የሥራ ሁኔታ?	1. የመንግስት/የግል መስሪያ ቤት ተቀጣሪ 2. ስራ የሌለው 3. የግል ስራ 4. የቤት እመቤት 5. ጡረታ 6. ተማሪ 7. ሌላ ካለ ይግለጹ _____
106	አማካኝ ወርሃዊ ገቢ(በብር)	_____ብር

ክፍል 2: ከህክምና እና ከሰኳር በሽታ ጋር የተዛመዱ የጥናቱን ተሳታፊ ሰዎችን ባህሪ ለመረዳት የሚረዱ ጥያቄዎች

ተ.ቁ	ጥያቄዎች	ምላሽ
201	ሰኳር እንዳለበት ካወቁ ሰንት ጊዜ ሆንዎት?	1. ከ6 አመት በታች 2. ከ6_10 አመት 4. ከ 10 አመት በላይ
202	በቤተሰብዎ ውስጥ የሰኳር ህመምተኛ አለ?	1 አለ 2. የለም
203	በአሁኑ ጊዜ ምን ዓይነት መድሃኒት እየወሰዱ ነው?	1. የሚዋጥ መድኃኒት 2. ኢንሱሊን 3. የሚዋጥ መድኃኒትና ኢንሱሊን
204	ሰንት ዓይነት መድሃኒት እየወሰዱ ነው?	-----
205	የሚወስደዎቸውን መድሃኒቶች የሚያገኙት እንዴት ነው?	1. በጤና መድን 2. እየገዛሁ 3. በነጻ
206	የሚታዘዝሎትን መድሃኒቶች በቀላሉ ከመድሃኒት ቤት ማግኘት ይችላሉ?	1. አዎ 2. አይ

ክፍል 3: ስኳር ህመም የግል እንክብካቤ ተግባራት መጠይቅ

ተ.ቁ	የግል እንክብካቤ ተግባራት	0	1	2	3	4	5	6	7
301	ባለፉት 7 ቀናት ውስጥ ምን ያህል ቀን/ናት ነው ጤነኛ አመጋገብ መመሪያዎችን ተከትለዋል? (ለምሳሌ ቅባት ምግቦችንና የእህል ዘሮችን መቀነስ፤ ጣፋጭ ምግቦችን መተው፤ አትክልትና ፍርፍሬዎችን ይበልጥ በመመገብ)								
302	ባለፉት 7 ቀናት ውስጥ ምን ያህል ቀን/ናት ለ30 ደቂቃ ያክል የአካል እንቅስቃሴ ተሳትፈዋል (ፈጣን እርምጃ፣ ሩጫ፣ ገመድ ዝላይ፣ ዋና እና ብስክሌትና የመሳሰሉት)								
303	የስኳር መጠኖችን ለመከታተል የሚችሉበት ቀላል መንገድ አለ?	1. አዎ የራሴ 2. የለም							
304	በምን ያህል ጊዜ የአልኮል መጠጥ ይጠጣሉ?	1. በጭራሽ 2. አልፎ አልፎ 3. አንዳንድ ጊዜ 4. አብዛኛውን ጊዜ 5. ሁልጊዜ							
305	ሲጋራ ያጨሳሉ?	1. አላጨሰም 2. አጨሳለሁ 3. ማጨስ አቁምያለሁ							

ክፍል 4: የሞርሰኪ መለኪያ በመጠቀም ስለመድሃኒት አጠቃቀም የተመለከተ መጠይቅ

ተ.ቁ	ጥያቄዎች	አዎ	አይ
401	አንዳንድ ጊዜ መድሃኒትዎን መውሰድ ይዘነጋሉ?		
402	አንዳንድ ጊዜ ሰዎች ከመዘንጋት ባሻገር በሆነ ምክንያት መድኃኒታቸውን ሳይወስዱ ይቀራሉ፡፡ ያለፏትን ሁለት ሳምንታት ሲያስቧቸው መድሃኒትዎን ያልወሰዱባቸው ቀናት ነበሩ?		
403	መድሃኒትዎን በሚወስደበት ወቅት የበሽታው ምልክቶች የባሰብዎ መስሎ ሲሰማዎ መድሃኒትዎን መውሰድ አቋርጠው ወይም አቁመው ያውቃሉ?		
404	ጉዞ ሲጓዙ ወይም ከቤትዎ ርቀው ሲሄደ መድሃኒትዎን ከእርስዎ ጋር መውሰድ ዘንግተው ያውቃሉ?		
405	ትናንትና ሁሉንም መድኃኒትዎን ወስደዋል?		
406	የበሽታዎ ምልክቶች የጠፋ ሲመስሉው፤ መድኃኒትዎን መውሰድ አቁመው ያውቃሉ?		
407	መድኃኒቶችን ቀን በቀን መውሰድ ለአንዳንድ ሰዎች አስቸጋሪ ነው፡፡ መድኃኒትዎን በፕሮግራም መሰረት መውሰድ አስቸጋሪ ሆኖብዎት ያውቃል?		
408	መድሃኒትዎን መውሰድ እንዳለብብዎት ማስታወስ ምን ያህል ጊዜ አስቸግርዎት ያውቃሉ 1. በጭራሽ 2. አልፎ አልፎ 3. አንዳንድ ጊዜ 4. አብዛኛውን ጊዜ 5. ሁልጊዜ		

ክፍል 5: የታካሚውን ካርድ በማየት እና በመጠይቅ የሚሞላ መጠይቅ

ተ.ቁ	ጥያቄዎች	ምላሽ	የሚታለፉ
501	ከስኳር ተጨማሪ ሌላ ተጓዳኝ በሽታ አለቦት	1. አዎ 2. የለም	መልሱ የለም ከሆነ ወደ 503 ሂድ
502	ከላይ ላለው ጥያቄ መልሶ አዎን ከሆነ፣ ምን ዓይነት ተጓዳኝ በሽታ (ከአንድ በላይ መልስ ይቻላል)	የደም ግፊት የልብ በሽታ አስም ኮሌስትሮል ሌላ ካለ ይገለጽ _____	
503	በህክምና የተረጋገጠ በስኳር ህመም ምክንያት የመጣ የተወሳሰበ ችግር አለብዎት? (ስኳር ህመም ኮምፕሊኬሽን)	1. አዎ 2. የለም	መልሱ የለም ከሆነ ወደ 505 ሂድ
504	ከላይ ላለው ጥያቄ መልሶ አዎን ከሆነ፣ ምን ዓይነት የተወሳሰበ ችግር አመጣቦት? (ከአንድ በላይ መልስ ይቻላል)	የነርቭ ችግር የአይን ችግር የኩላሊት ችግር የእግር መቁሰል የልብና የደም ዝውውር ስርአት ችግር ሌላ ካለ ይገለጽ _____	
505	ከጾም በኋላ የደም ስኳር መጠን; አራት ጉብኝት	1. _____ ሚ.ግ/ዴሲ. 2. _____ ሚ.ግ/ዴሲ. 3. _____ ሚ.ግ/ዴሲ. 4. _____ ሚ.ግ/ዴሲ. አማካይ _____	

Annex V: English version guideline for Focus-group Discussions

Good morning/good afternoon! Thank you all for coming to this discussion. My name is Fasika Mega; I am a postgraduate student at saint Paul's hospital millennium medical college. We gather here today to discuss about factors that influence glycemic control among Type 2 diabetic patients. you are free to talk any kind of information you believed based on the topic asked. For us not to miss any opinions of the discussion, we will use a tape recorder. However, we can assure you that any opinion that you will make be confidential and will not cause any harm toward yourself. Whatever information that you give us will be very useful for the study and helps in developing interventions to improve glycemic control for diabetic patients. The discussion will take us around 1 hour 30 minutes. We want this session to be a group discussion, so don't wait for us to call someone's name. Please speak one at a time so that the recorder can pick up everything what you are said. Finally, we would like to confirm your willingness to participate in this discussion. If yes, continue.

Questions for Focus Group Discussion.

1, First of all tell us something about yourself.

Probe:

- Name
- How old are you?
- Educational status?
- Occupational status
- Marital status?

2, Now, tell us what does it look like living with diabetes?

Probe:

- Duration since diagnosis?
- Diet restriction?
- Taking medications daily?

3, What kind of measures do you need to do to control your blood sugar level?

Probe:

- How important is monitoring blood glucose in controlling diabetes?
- How important is taking the medication daily?
- What effect does drinking alcohol and smoking have on blood sugar?
- How important is having a routine physical activity in controlling diabetes?
- How important is taking the recommended diet by a physician in controlling diabetes?

4, Tell us how your experience has been in accessing and using antidiabetic medications?

Probe:

- Adherence level?
- Affordability of the medicines?
- Types of drugs used?
- Number of the drugs taken in one day?
- Availability of the drugs in the market?
- Side effects related to taking the medication?

5, Before we finish, is there anything else you'd like to say about the topics we've discussed?

We have come to the end of our discussion.

We thank you all for your time and participation!

Annex VI: Amharic version guideline for Focus-group Discussions

እንደምን አደራችሁ/ እንደምን አረፈዳችሁ! ሁላችንም ወደዚህ ውይይት ስለመጣችሁ አመሰግናለው። ስሜ ፋሲካ ሜጋ ይባላል፤ በቅዱስ ጳውሎስ ሆስፒታል ሚሊንዩም ሚዲካል ኮሌጅ የህብረተሰብ ጤና ትምህርት ክፍል የድህረ ምረቃ ተማሪ ነኝ። የዓይነት 2 ስኳር ህመምተኞች የስኳር ቁጥጥር ላይ ተጽእኖ ስለሚያሳድሩ ነገሮች ለመወያየት ዛሬ እዚህ ተሰብስበናል። በተጠየቀው ርዕስ ላይ በመመስረት ያመኑትን ማንኛውንም ዓይነት መረጃ ለመናገር ነፃ ነዎት። ስለ ውይይቱ ምንም አይነት አስተያየት እንዳያመልጠን፣ በቴፕ መቅጃ እንጠቀማለን። ሆኖም፣ እርስዎ የሚሰጡት ማንኛውም አስተያየት ሚስጥራዊ እንደሚሆን እና በእራስዎ ላይ ምንም አይነት ጉዳት እንደሌለው ልናረጋግጥልዎ እንችላለን። ምንም አይነት መረጃ ቢሰጡን ለጥናቱ በጣም ጠቃሚ እና ለስኳር ህመምተኞች የስኳር ቁጥጥርን ለማሻሻል የሚረዱ ስራዎችን ለማዘጋጀት ይረዳል። ውይይቱ 1 ሰአት ከ30 ደቂቃ አካባቢ ይወስዳል። ይህ ክፍለ ጊዜ የቡድን ውይይት እንዲሆን እንፈልጋለን፤ ስለዚህ የአንዳችሁን ስም እስክምንጠራ ድረስ ሳትጠብቁ መናገር ትችላላችሁ። መቅረቡ የተናገራችሁትን ሁሉ ማንሳት ይችል ዘንድ እባካችሁን አንድ በአንድ ተናገሩ። በመጨረሻም፣ በዚህ ውይይት ላይ ለመሳተፍ ፈቃደኛ ስለመሆንዎ ማረጋገጥ እንፈልጋለን? አዎ ከሆነ ቀጥል።

የትኩረት ቡድን ውይይት ጥያቄዎች

1, በመጀመሪያ ደረጃ እስቲ ስለራሳችሁ አንዳንድ ነገሮችን ንገሩኝ?

ምርመራ፡

- ስም?
- እድሜህ/ሽ ስንት ነው?
- የትምህርት ደረጃ?
- የስራ ሁኔታ?
- የጋብቻ ሁኔታ?

2, እስቲ አሁን ደሞ ከስኳር ህመም ጋር መኖር ምን እንደሚመስል ንገሩኝ?

ምርመራ፡

- ከታወቀ ምን ያህል ጊዜ ሆነ?
- የአመጋገብ ገደብ ከማድረግ አኳያ?
- በየቀኑ መድሃኒት ከመውሰድ አስፈላጊነት ጋር?

3, በደማችሁ ውስጥ ያለውን የስኳር መጠን ለመቆጣጠር ምን ዓይነት እርምጃዎችን መውሰድ ያስፈልጋቸዋል?

ምርመራ፡

- የስኳር በሽታን ለመቆጣጠር የደም ስኳር መጠን መከታተል ምን ያህል አስፈላጊ ነው?
- መድሃኒቱን በየቀኑ መውሰድ ምን ያህል አስፈላጊ ነው?
- አልኮል መጠጣትና ሲጋራ ማጨስ በደም የስኳር መጠን ላይ ምን ዓይነት ተጽእኖ ይኖረዋል?
- የስኳር በሽታን ለመቆጣጠር መደበኛ የአካል ብቃት እንቅስቃሴ ማድረግ ምን ያህል አስፈላጊ ነው?
- የስኳር በሽታን ለመቆጣጠር በሀኪም የታዘዘውን አመጋገብ መውሰድ ምን ያህል አስፈላጊ ነው?

4, የስኳር በሽታ መድሃኒቶችን በማግኘት እና በመጠቀም ረገድ ልምድዎ እንዴት እንደነበረ ይንገሩን?

ምርመራ፡

- መድሃኒቶቹን በአግባቡ የመውሰድ ደረጃ?
- የመድሃኒቶቹ ዋጋ ተመጣጣኝነት?
- የመድሃኒቱ አይነት?
- በቀን የሚወሰደው የመድሃኒት መጠን?
- መድሃኒቶቹ በገበያ ላይ የማግየት ሁኔታ?
- መድሃኒቱን ከመውሰድ ጋር የተያያዙ የጎንዮሽ ጉዳዮች?

5, ከመጨረሻችን በፊት በተነጋገርናቸው ርዕሶች ላይ መጨመር የሚፈልግ ሰው ካለ እድሉን ልስጥ?

የውይይታችን መጨረሻ ላይ ደርሰናል።

ጊዜያችሁን ስለሰጣችሁ እና ስለተሳተፋችሁ ሁላችሁንም እናመሰግናለን!