PREVALENCE AND FACTORS ASSOCIATED WITH POOR GLYCEMIC CONTROL AMONG ADULT TYPE 2 DIABETIC OUT-PATIENTS AT PUBLIC HOSPITALS IN HADIYA ZONE, SOUTHERN ETHIOPIA

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ABSTRACT

Background: Diabetes is one of the largest global health emergencies of the 21st century. A major concern in management of diabetes is to prevent diabetic complications that occur as a result of poor glycemic control. Identification of factors associated with poor glycemic control is important in order to institute appropriate interventions for the purpose of glycemic control and prevention of chronic complications.

Objectives: To assess the prevalence and factors associated with poor glycemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia, 2019.

Methods: A hospital based cross-sectional study was conducted among 311 adult type 2 diabetic out patients at public hospitals in Hadiya zone from March 1-30, 2019. Systematic sampling technique was used to select study participants. Data were collected using pretested structured questionnaire and patients chart review; anthropometric and blood pressure measurements were taken. Data were entered in Epi Data Version 3.1 and analyzed using SPSS Version 20. Descriptive statistics was used to describe the study variables. Bivariate was done to select candidate variables and multivariable logistic regression analysis was used to identify factors associated with poor glycemic control. Adjusted odds ratio (AOR) with respective 95% CI and $p < 0.05$ were used to set statistically significant variables.

Results: Out of 305 diabetic patients, 222 (72.8%) were found to have poor glycemic control. Longer duration of diabetes (5-10 years) [AOR=2.24, 95% CI: 1.17-4.27], lack regular follow up [AOR=2.89, 95% CI: 1.08-7.71], low treatment adherence [AOR=4.12, 95% CI: 1.20-8.70], use of other alternative treatments [AOR=3.58, 95% CI: 1.24-10.36], unsatisfactory patient physician relation [AOR=2.27, 95% CI: 1.27-4.04] and insufficient physical activity [AOR=4.14, 95% CI: 2.07-8.28] were found to be independent predictors of poor glycemic control among type two diabetes patients.

Conclusion: a significant proportion of diabetic patients in this study area had poor glycemic control. Therefore, appropriate management of patients focusing on longer duration of diabetes, irregular follow up, low treatment adherence, use of other alternative treatments, unsatisfactory patient provider relation and insufficient physical exercise is needed in order to maintain optimal glycemic control and prevent development of the life treating complications in the study setting.

Key words: Prevalence, glycemic control, type 2 diabetes mellitus, Hadiya zone

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ABBREVIATIONS AND ACRONYMS

ADA	American Diabetes Association
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
BP	Blood Pressure
BSc	Buchelor of Science
CI	Confidence in Interval
COR	Crude Odds Ratio
CVD	Cardiovascular Disease
DKA	Diabetic Ketoacidosis
DM	Diabetes Mellitus
ESRD	End-stage Renal Disease
ETB	Ethiopian Birr
FBG	Fasting Blood Glucose
FPG	Fasting Plasma Glucose
GDP	Gross Domestic Product
HbA1c	Glycoslated Hemoglobin
HHS	Heyperosmolar Hyperglycemic State
IDF	International Diabetes Federation
IGT	Impaired Glucose tolerance
IQR	Interquartile Range
Km	Kilometer
mg/dL	milligram per deciliter
MMAS	Morisky Medication Adherence Scale
mmHg	millimeter of mercury

mmlo/L	mill mol per Liter
MPH	Masters of Public Health
NCDs	Non Communicable Diseases
NEMmH	Nigist Ellen Mohammed memorial Hospital
NGOs	Non Governmental Organizations
OGTT	Oral Glucose Tolerance Test
OR	Odds Ratio
PPS	Proportion to Population Size
RBG	Random Blood Glucose
SD	Standard Deviation
SDSCA	Summary of Diabetes Self Care Activities
SMBG	Self-Monitoring of Blood Glucose
SNNPR	Southern Nations Nationalities and peoples Region
SPSS	Statistical Package for Social Science
SSA	Sub Saharan Africa
TASH	Tikur Anbesa Specialized Hospital
T1 DM	Type One Diabetes Mellitus
T2 DM	Type Two Diabetes Mellitus
WHO	World Health Organization

CHAPTER 1: INTRODUTION

1.1. Background

Diabetes Mellitus (DM) refers to a group of common metabolic disorders that has a main characteristic feature of hyperglycemia (1). It is a chronic condition that occurs when the body cannot produce enough insulin or cannot use insulin or both (2). Diabetes has three main types designated as type 1, type 2 and Gestational diabetes (3). Type 1 diabetes (T1DM) is caused by an autoimmune reaction, in which the body's defense system attacks the insulin-producing beta cells in the pancreas. It accounts for only 5-10% of those with DM. Type 2 diabetes (T2DM) is the most common type of diabetes. It usually occurs in adults, but is increasingly seen in children and adolescents. In T2DM, the body is able to produce insulin but becomes resistant so that the insulin is ineffective. It accounts for 90-95% of those with DM. Gestational diabetes is a elevated level of blood glucose that is first detected during pregnancy (2,4).

Diabetes is one of the largest global health emergencies of the 21st century. According to the World Health Organization (WHO) and the International Diabetes Federation (IDF), diabetes has become the primary global healthcare challenge (2,5). It is also an important public health problem, one of four priority non communicable diseases (NCDs) targeted for action by world leaders (5).

Globally, an estimated 422 million adults were living with diabetes in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of diabetes has nearly doubled since 1980,rising from 4.7% to 8.5% in the adult population.(5) .According to global estimate of diabetes in 2015, the number of people live with diabetes aged 20-70 years was predicted to rise to 642 million by 2040 (6). Diabetes accounted for 14.5% of global all-cause mortality among people in this age group (2).

The African Region, where diabetes once rare, has witnessed in a surge in the condition. T2DM prevalence among 20-70 year olds is 4.9% (7). In 2015 there were around 321,000 deaths attributed to diabetes, with 79% of these deaths occurring in a person aged 60 years or less, which was higher in proportion from any of other region in the world (2).

In Ethiopia, Diabetes prevalence is increasing among adult population. The WHO diabetes country profile of 2016 reported that the overall prevalence of DM was 3.8% (8). It is becoming a growing public health problem along with other non communicable diseases in Ethiopia. Its prevalence is also reported increasingly across different localities of the country, which is 0.3% for lowest and 7.0% for highest prevalence (9).

Diabetes imposes a large economic burden on the global health-care system and the wider global economy. This burden can be measured through direct medical costs on diabetes which include expenditures for preventing and treating diabetes and its complications; and indirect costs in terms of productivity loss, premature mortality and the negative impact of diabetes on the nations' gross domestic product (GDP) (5).

Glycemic control is a term which refers to the optimal levels of blood glucose in a person living with diabetes (1). It is one of the strategies for management of DM as recommended by American Diabetic Association (ADA). The ADA determined glycosylated hemoglobin (A1c) as best measure of glycemic control, level less than 7% as a goal of optimal blood glucose control to prevent complications and reduce the overall disease managemnt cost (4).

For a successful control of risks resulting to long-term diabetic complications, optimal glycemic control is paramount. Thus, controlling of blood glucose levels, blood pressure, lipids including cholesterol and triglycerides and regular exercises is necessary (10). Sub-optimal glycemic control may lead to irreversible diabetes complications which include retinopathy leading to blindness , nephropathy leading to renal failure, peripheral neuropathy with risk of foot ulcer, amputations and autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction (3).

1.2. Statement of the problem

Despite the evidence from large randomized controlled trials establishing the benefits of intensive diabetes management in reducing micro vascular and macro vascular complications, high proportion of patients remain poorly controlled (11). The UK prospective study showed 34% of type 2 DM patients achieving the recommended target (12). Evidences showed that the magnitude of poor glycemic control in DM patients in different parts of the world is high. For instance, study conducted in seven European countries showed 74% (13), in United kingdom (UK) 76% (14), in Mexico 65.1% (15) and in Saudi Arabia 74% (16). It was also revealed that there was high prevalence of poor glycemic control among T2DM patients in middle income countries like in Turkey (67.5%), Egypt (76%) and Brazil (60%) (17–19).

In Africa , study in Cameron and Guinea repoted 74% and in Tanzania 69.7% of DM patients had poor glycemic control (20,21). In Ethiopia, a study conducted in Tikur Anbesa Specialized and Jimma university specialized hospitals reported 80% and 70.9% of DM patients had poor glycemic control respectively (22,23).

Poor and inadequate glycemic control among patients with type 2 diabetes consititutes a major public health problem and major risk for the development of diabetic complications. Uncontrolled diabetes mellitus leads to microvascular and macrovascular complications (1). Evidences showed that diabetic complications are common among patients with poor glycemic control. For instance, a study done in Turkey identified complications in patients who had poor glycemic control (HbA1c≥ 7%), of which nephropathy (85.1%), neuropathy (88%), retinopathy (89%), cardiovascular (86.1%), cerebrovascular (83.3%) and foot amputation (66.7%) (17). In addition, diabetic complications such as coronary heart disease (14.9%), retinopathy(36.6%), peripheral neuropathy (47,1%), macroalbuminuria (25.8%), peripheral arterial disease (15.2%) and cataract(13.15) were common in those with poorly controlled than well controlled patients (24).

Evidences in Ethiopia also revealed that diabetic complications were common in those with poorly controlled glycemic status (25–27). Patients with poor glycemic control had complications (68% had HbA1c over 10%) and the common complications were Cataract (12%), retinopathy (21%), neuropathy (41%) and microalbuminuria (51%) (28).

Furthermore, these complications due to poorly controlled diabetes are major causes of disability, premature death and reduce quality of life (2). Atherosclerosis, the most common macro-vascular complication accounts for 75% of diabetes related death (29). Diabetic retinopathy which occurs in 60% of T2DM is the leading cause of blindness and visual impairment in adults. It cause 1.9% of moderate or severe visual impairment globally and 2.6% of blindness in 2010. Likewise, diabetic nephropathy is a major cause of premature death in diabetic patients and 12-55% of end-stage renal disease (ESRD) attributed to uncontrolled diabetes. Lower limb amputation rates are 10 to 20 times higher among people with diabetes who had poor glycemic control (5,29).

According to the studies contributing factors for poor glycemic control among T2DM patients were age of patient, income, educational level of patients (30–33) and clinical factors like longer duration of diabetes, prolonged use of treatment, lack of adherence to medication, higher body mass index (BMI) and presence of co morbidity (20,32–35). In addition to this lack of family support, use of other alternative treatments, poor patient health care provider relationship and lack of counseling have influence on glycemic control (16,36–39). Lack of patient compliance to self care activities (diet, physical exercise, blood glucose monitoring, smoking and foot care) is also another reason for poor glycemic control (16,17,34,40–42). Moreover, patients knowledge about the DM and their attitude toward DM care also influence glycemic control (43,44).

With good self management and health professional support, people with diabetes can live a long , healthy life (2). Effectiveness of diabetes management ultimately depends on patients' compliance with recommendations and treatment. So patients education about DM, nutrition, and exercise is important for glycemic control (1,5) .

Studies in Ethiopia reported that with increasing prevalence and related complications, diabetes is becoming a pressing public health problem (9). Despite this alarming growth of prevalence of diabetes, little has been studied regarding glycemic control. Even if there are few studies, apart from their much strengths, most of them gave attention to sociodemographic and clinical aspects of patients that contribute to poor glycemic control (22,23,45–51). However patients knowledge about DM, their attitude towards DM care, use of other alternative treatments, family support, adherence to diabetic self-care activities, patient provider relationship and barriers to them have influence on glycemic control. There is gap and little information was available on these

conditions in Ethiopia, particularly in this study area. Therefore, the aim of this study was to assess the prevalence and factors associated with poor gylcemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, southern Ethiopia.

CHAPTER 2: LITERATURE REVIEW

2.1. Diabetes Mellitus

Diabetes is becoming public health problem with its prevalence steadily rising globally due to population growth, the increase in the average age of the population, and the rise in prevalence of diabetes at each age (5). People with diabetes are at higher risk of developing a number of disabling and life threatening health problems than people without diabetes. Consistently high blood glucose levels can lead to serious diseases affecting the heart and blood vessels, eyes, kidneys and nerves. People with diabetes are also at increased risk of developing infections (2). Diabetes complications can be prevented or delayed by maintaining blood glucose, blood pressure and cholesterol levels as close to normal as possible (10).

2.2. Prevalence of poor glycemic control

Prior studies done in Saudi Arabia, Egypt and Tanzania have provided evidence of high prevalence of poor glycemic control among type 2 diabetic patients (16,18,21). A study conducted among type 2 diabetes patients in Kuwaiti reported that 78.8% of tha patients had poor glycemic control (52). Other studies also reported high prevalence of poor glycemic control like 91.8% in India, 83% in Indonesia and 73.2% in palastine (39,41,53).

Evidences also showed that there was high prevalence of poor glycemic control among diabetes ptients in African countries. Studies conducted in Kenya and Eastern Sudan revealed that 90.6% and 71.9% of the diabetes patients had poor glycemic control respectively (40,43). In Ethiopia, studies conducted in Dessie hospital 70.8%, in Gondar university hospital 64.7% and in Shanan Gibe hospital 59.2 % reported high prevalence of poor glycemic control (45,47,49).

2.3. Factors associated with glycemic control

For effective glycemic control in diabetic patients identifying factors that have influence on poor glycemic control is very important. According to different studies conducted in different part of the world the common possible factors associated with glycemic control were sociodemographic and economic characteristics of the diabetic patients, clinical or disease related factors, drug

adherence, compliance to diabetes self care activities and patients knowledge about diabetes and attitude toward DM care (17,33–35,42,43).

2.3.1. Sociodemographic and economic factors

A number of sociodemographic characteristics of the individual affect the diabetic patients to attain optimal glycemic control. A study conducted in Kenya indicated that gender as one of sociodemographic factor associated with poor glycemic control in T2 DM patients (43). According to a study done in Malaysia male diabetic patients were more likely to had poor glycemic control compared to females (30). Another recent studies showed that being male was independent association with poor glycemic control (18,33). In contrast to these, another study in India showed a significant higher risk of poor glycemic control in females compared to males (54). But none of the recent studies in Ethiopia found association of gender with poor glycemic control (23,46,49,50).

Another sociodemographic factor is age of diabetic patients. A study done in Egypt showed that age of greater than 50 years was significantly associated with poor glycemic control among diabetes patients (18). Another study in Malaysia also reported that patients whose age was 60 or less years old were more likely have poor glycemic control (30). While other study conducted in Brazil indicated that age of less than 65 years was independently associated with poor glycemic control (31). Furthermore a study among type 2 diabetic patients done in Sub-Saharan Africa including Guinea and Cameron also revealed that age less than 65 years was independently associated with poor glycemic control (20). In Ethiopia, a study done in Ambo hospital showed that diabetic patients in age 51-70 years are more likely to have uncontrolled blood glucose (46).

With regard to the marital status being unmarried was illustrated as associated factor with poor glycemic control in study conducted in Turkey (17). There is also one study done in Saudi Arabia which reported that divorced patients were more likely to have higher blood glucose level while the married subjects had a lower (16).

Individual's educational status was considered as one of strongest factor for attaining optimal glycemic control. Studies showed that no formal education or lower education status (less than grade 4) has significant association with poor glycemic control (16,17,33,55). According to

studies conducted in Jimma University specialized hospital and Dessie referral hospital, in Ethiopia illiterate individuals were more likely to had poor glycemic control (23,49). One study done in Shanan Gibe hospital, in Southwest Ethiopia also reported that significant difference of poor glycemic control was observed among illiterates than college and above graduates,with lower educational level is more likely correlated with poor glycemic control (47).

Study done in Malaysia mentioned that among subjects with poorly controlled glycemic level 52.1% of them had low monthly income (33). A study conducted in Southwest part of Ethiopia also reported that about 41.4% of participants who had poor glycemic control earned low monthly income (446-1200 ETB) which indicated that there was association between income and poor glycemic control (47). Concerning to employment there are studies that showed individuals who were unemployed or not working were less likely to have good glycemic control (17,33). But a study conducted in Dessie referral hospital, in Northeast part of Ethiopia found that merchants were more likely to have poor glycemic control compared to government employee (49). The same study also showed that rural residence was significantly associated with poor glycemic control (49).

2.3.2. clinical or diabetes related factors

Another important factor for attaining optimal glycemic control is clinical factors which includes family history of diabetes, duration of illness, presence or absence of co-morbidity and/or complications, type of treatment, overweight/obesity, medication adherence, family support, extra medication, use of alternative treatment, patient provider interaction, counseling, and regular follow up.

A study among type 2 diabetic patients done in Saudi Arabia showed that participants who had family history of diabetes (87%) have poor glycemic control (34). In addition to that studies done in Brazil (62.67%) and turkey (71.2%) reported the same findings that diabetic patients who had family history of the disease had suboptimal glycemic control (17,31). In contrast to these none of the previous studies conducted in Ethiopia revealed that having family history of diabetes as a associated factor for poorly control blood glucose (23,45).

A lot of studies conducted in different part of the world reported that individuals with long duration of disease (5-10years) are more likely to have poor glycemic control compared to those

with short duration of disease (33–35,44). A study in SSA which was done in Cameron and Guinea also indicated that duration of disease for three or more years was independently associated with poor glycemic control (20). A study conducted in Tikur Anbessa specialized Hospital in Ethiopia, showed that participants with long duration of the disease (5-10 years) were more likely to have poor glycemic control compared to that of short duration of the disease (22). Another study done in Dessie Referral Hospital, Northeast Ethiopia, also mentioned that long duration with disease (≥ 10 years) was a significant associated factor with poor glycemic control (49).

Studies done in Turkey and India showed that individuals with hypertension co morbidity were more likely to have poor glycemic control (17,32). And having diabetic complications (nephropathy, retinopathy, neuropathy and cardiovascular) was also mentioned as a significant associated factor for poor glycemic control in that of study done in Turkey (17).

Previous studies reported that individuals who are taking only insulin are more likely to have poor glycemic control (17,33,42,54,56). Though taking insulin combined with oral anti hypoglycemic agents was also mentioned as a significant factor for uncontrolled blood glucose level (17,22,31–33). Furthermore, taking oral anti diabetics alone is also independently associated with suboptimal glycemic control (20,32,57). Being on insulin treatment was identified as independently associated with poor glycemic control in studies conducted in Tikur Anbesa and Gondar hospitals in Ethiopia (22,45). A study done in Southwest part of Ethiopia showed that receiving combined insulin and oral anti diabetic medication was independently associated with poor glycemic control (23). While study done in Dessie hospital reported that diabetic patients receiving oral anti-diabetics and insulin were more likely have poorly controlled blood glucose level (49).

In addition, recent studies reported that lack of adherence to anti diabetic medication was significantly associated with poor glycemic control (42,56,58). Studies done in Jimma and Gondar hospitals, in Ethiopia also showed that lack of adherence to medication was significantly associated with poor glycemic control (23,45). previous studies also reported that being overweight or obesity as a significant factor for poorly controlled glycemic level in diabetic

patients (17,34,53,54). Nevertheless of the studies in Ethiopia did not reported overweight or obesity as significant factor for poor glycemic control(23,45,49).

A study among T2 DM patients done in Brazil reported that less frequent follow up to diabetic clinic was significantly associated with poor glycemic control (19). In Ethiopia, a study in Limmu Genet hospital showed that lack of regular follow up was independently associated with poor glycemic control (47). Furthermore, study in Shanan gibe hospital also found that adherence of patients to regular follow up was independent predictor of glycemic control among type 2 diabetes patients (51).

A study conducted in Jazan city, Kingdom of Saudi Arabia revealed that patients who had family support and had close relation with their health care provider had lower HbA1c level (16). Another study done among T2DM in Indonesia also mentioned that family support was independently associated with poor glycemic control (39). Furthermore, a study conducted in Mexico reported non-satisfactory patient-physician relation had significant association with poor glycemic control (35).

A study conducted among T2DM patients in Northern Ethiopia showed that 62% of the participants were herbal medicine users and most of them (87.1%) did not consult their physician about their herbal medicine use (38). A study done in Ethiopia revealed that using traditional medicine was significantly associated with low medication adherence which leads to poor glycemic control (36).

2.3.3. Diabetic Self care activities

Furthermore, dietary compliance, physical exercises, blood glucose monitoring at home, foot care and non-smoking are self care management activities of diabetic patients which were considered as contributing factors to have optimal gylcemic control (59).

Studies done in India and Saudi Arabia reported that not following diet plan as per recommended was associated with poor glycemic control (32,34). Another study done in Egypt also mentioned that being no dietary compliance was significantly associated with increased odds of being poorly controlled glycemic level (18). While study done in East Sudan found that adding sugar to drinks was independent predictor of poor glycemic control (40).

According to the study conducted in Saudi Arabia insufficient physical activity was identified as independent associated factor for poor glycemic control among T2 DM patients (34). While exercise contributed to glycaemic control status as a protective factor in a study done in Tripoli, Libya (56).

A study conducted in Ayder Comprehensive Specialized Hospital, in Ethiopia reported that poor glycemic control was significantly higher in glucometer non-users (71.4%) compared to glucometer users (52.4%), which indicates that self blood glucose monitoring is as one of good activities to control glycemic level (50). A study conducted among patients with type 2 diabetes mellitus in Saudi Arabia revealed that smoking was significantly associated with poor glycemic control (16).

2.3.4. Patients knowledge and attitude related factors

A study done in Nigeria reported that patients who have relatively good knowledge about the diabetes were more likely attain optimal glycemic control. Patients' knowledge about diabetes is considred as an important factor for following their management plan but should not be seen as an end in it (44). In contrast to this, a study conducted among type 2 diabetes patients in Kenya revealed that patients knowledge about diabetes risk factors, symptoms and complications was not statistical association with glycemic control (43).

A study conducted in Jordan revealed that patients having negative attitude towards diabetes care are more likely to have poor glycemic control (11).

2.4. Conceptual framework of the study

To address the associated factors of poor glycemic control, a conceptual framework was developed based on review of different literatures (17,43,45–47,60). The relationship between sociodemographic and socio-economic, clinical or diabetes related, knowledge and attitude related factors, and diabetes self care activities with each others'; and their influence on poor glycemic control is depicted in the following figure.

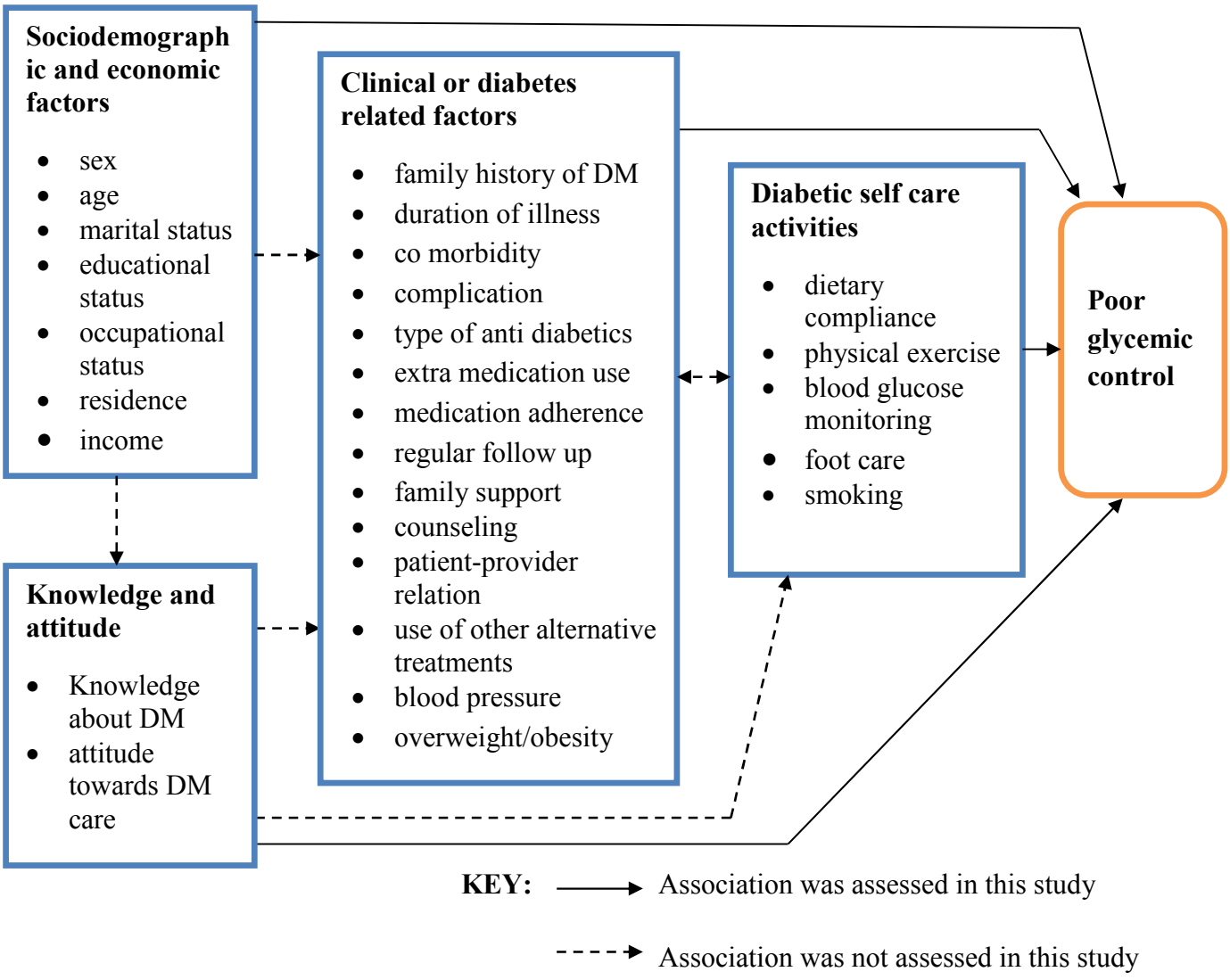

Figure 1: Conceptual framework developed by the researcher for factors associated with poor glycemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia, 2019**.**

2.5. Significance of the study

Diabetes prevalence was reported rising in all regions of the world (5).Although the importance of glycemic control is well established in diabetes management, it is often not achieved by many patients (11). High prevalence of diabetes was also reported in Hadiya zone with annual average increase of 5.4%, which was greater than the disease projection made by the international diabetes mellitus federations in 2012 (3.32%) (61). Currently, there are 1,185 T2DM patients in public hospitals with an average of 5-10 new patients a month and its prevalence was also increasing in Hadiya zone (62). In spite of this information about glycemic control status and its contributing factors has not been investigated, though it remains a challenge among diabetic patients. For that reason, this study attempted to provide locally available evidensces on prevalence of poor glycemic control and its associated factors among T2DM patients in this study area.

Accordingly the findings of this study will help the health facilities to improve the diabetic care in order to get better quality of life, prevent complications and premature death of patients. The findings may guide different stakeholders to develop evidence-based strategies for successful implementation of diabetic care. It may also contribute as an input for further studies for researchers.

CHAPTER 3: OBJECTIVES

3.1. General objective

To assess poor glycemic control and its associated factors among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia, 2019.

3.2. Specific objectives

1. To determine the prevalence of poor glycemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia, 2019.
2. To identify factors associated with poor glycemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia, 2019.

CHAPTER 4: METHODS AND MATERIALS

4.1. Study area and study period

The study was conducted at public hospitals in Hadiya zone. Hadiya zone is one of the administrative zones in Southern Nations, Nationalities, and peoples' Regional State (SNNPR). Hossana is administrative center of the Hadiya zone, which is located 232 Km away from Addis Ababa and 194 Km far from regional city, Hawassa. Hadiya zone is bordered by Guraghe zone in North, Kambata Tembaro zone in South, Dawro zone in Southwest, Halaba special woreda in East, Silte zone in Northeast, and Omo River and Yem special woreda in West. It has 10 administrative woredas and two town administrations. The total population of the zone is about 1.6 million with 817,265(49.7%) males and 826,201(50.3%) females. There are four public hospitals (one teaching hospital and three primary hospitals), 61 health centers and 305 health posts in the zone. From these public hospitals two of them provide chronic illness care for diabetic patients and there are 1,241 diabetic patients (56 type 1 and 1,185 type 2 DM). The hospitals do not have glycated hemoglobin (HbA1c) test, but fasting blood glucose of patients measured based their follow up appointment (62). The study was conducted from March 1- 30, 2019.

Figure 2: Map of Hadiya zone, Southern Ethiopia, 2019.

Source: - Hadiya zone health departement bureau (62).

4.2. Study design

Hospital based cross sectional study design was conducted.

4.3. Population

Source population

All type 2 diabetic patients age ≥ 18 years old on follow up at public hospitals in Hadiya zone.

Study population

Type 2 diabetic patients age ≥ 18 years old on follow up in selected public hospitals during the study period and who fulfilled the eligibility criteria.

Eligibility criteria

Inclusion criteria

Type 2 diabetic patients on anti-diabetic(s) treatment for at least six months and patients who had at least three consecutive blood glucose measurements of three months were included in the study.

Exclusion criteria

Patients with critical illness who unable to communicate at the time of data collection, patients with hearing problem and previously diagnosed psychiatric illness, and pregnant women with diabetes were excluded.

4.4. Sample size and Sampling technique

4.4.1. Sample size

For Objective One: sample size for the first objective was determined by using single population proportion estimation formula considering the following assumptions: 59.2% prevalence of poor glycemic control from study done in Shanan Gibe hospital, Southwest Ethiopia (51), 95% confidence level (CI) and 5% margin of error (d).

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

Where

n= sufficient sample size

$\mathbf{Z_{a/2}}$= 1.96 (value for standard normal variable at 1-α % confidense level)

p = 59.2% (estimate of prevalence of poor glycemic control)

d = 0.05 (Level of precision at 5%)

$$n = \frac{(1.96)^2(0.592)(1-0.592)}{(0.05)^2} = 371$$

For Objective Two: sample size for the second objective was determined by using Epi Info 7, by taking variables that have significant association with poor glycemic control in different studies and considering the assumptions as indicated in the following table.

Table 1: Sample size for factors associated with poor glycemic control among type 2 DM adult out patients in public hospitals, Hadiya Zone, southern Ethiopia 2019.

S. No	Variables	Assumptions					Sample size	References
		Confidence level (%)	Power (%)	Ratio (Unexposed : Exposed)	% outcome in unexposed group	OR		
1	Not follow dietary plan	95	80	1	32.7	2.98	124	(11)
2	Non adherence to anti-diabetic medication	95	80	1	54.80	3.19	128	(45)

OR, Odds Ratio

The maximum sample size from the calculated for objective one and two above was 371. Then, since the source population was less than 10,000 a finite population correction formula was applied to get a working sample size.

$$n_f = \frac{n}{1+\frac{n}{N}} \qquad \mathrm{n_f} = \frac{371}{1+\frac{371}{1185}} \qquad =283$$

Where n_f = the final sample size,

n= initial sample size (371) and

N = total number of type 2 DM patients (1,185)

Finally, by adding 10% for non-response, the final working sample size was 311.

4.4.2. Sampling technique

A systematic random sampling technique was applied to recruit the study participants. According to Hadiya zone health department report there are four public Hospitals (one teaching and three primary hospitals) in the zone. From these public hospitals, two of the primary hospitals did not provide diabetic follow up service. The diabetic clinic provide service three days per week and on average 92 type 2 diabetic patients served per day in Nigist Ellen Mohammed memorial hospital. In Shone primary hospital diabetic patients had two days per month for follow up and on average 40 patients were served per day. The study participants were allocated for both hospitals by proportional to population size allocation (PPS). By dividing total type 2 DM patients eligible (1,185) to sample size required (311), which yields sampling interval of four. The first participant was selected by lottery method. Thus, every fourth patient coming to the clinics for a follow-up service was interviewed until the total sample size reached.

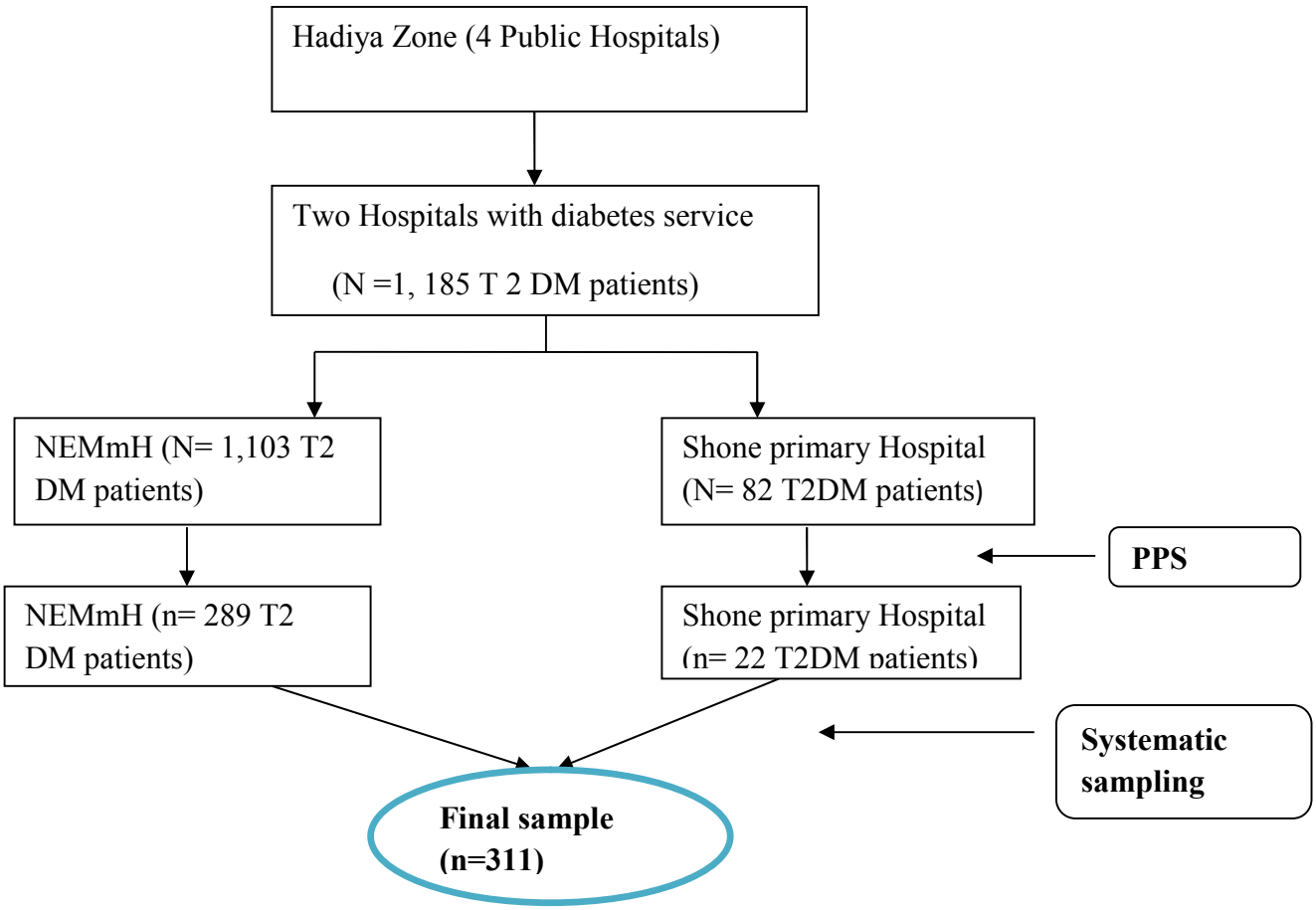

Figure 3: Sampling procedure for selecting study participants at public hospitals in Hadiya zone, Southern Ethiopia 2019.

4.5. Data collection procedures (Instruments, personnel and technique)

4.5.1. Data collection Instruments

Data were collected by using pretested structured questionnaire to capture information on sociodemographic and economic characteristics, clinical or diabetes related factors, knowledge about diabetes and attitude toward DM care; and adherence to diabetic self care activities (Annex II). Checklist was used to abstract data from medical record. Sphygmomanometer, weight scale and stadiometer were used to measure blood pressure, weight and height respectively.

4.5.2. Personnel for data collection

Data were collected by three trained BSc nurses and one health officer who served as a supervisor.

4.5.3. Data collection technique

Data were collected by face to face interview using structured questionnaire. Patient's medical record was reviewed to abstract data on type of current treatment, presence or absence of other chronic diseases and diabetic complications, extra medications taken by patients, regular follow up and fasting blood sugar.

Participants glycemic status was assessed by taking the average of three consecutive months fasting blood glucose measurements and an individual was considered as having poor glycemic control if his/her mean FBS is greater than 130mg/dl according to National guideline on major NCDs management (63).

4.6. Study variables

4.6.1. Dependent variable

- Poor glycemic control

4.6.2. Independent variables

Independent variables of the study were sociodemographic and economic variables (sex, age, marital status, educational status, occupation, residence and income) and clinical or diabetes related variables (family history of diabetes, duration of illness, type of treatment, co morbidity, complications, adherence to anti diabetic medication, extra medication use, regular follow up, family support, counseling, patient provider relation, use of other alternative treatment, blood pressure and overweight/obesity). The other independent variables were diabetic self care activities variables (diet, physical exercise, blood glucose test, smoking and foot care), knowledge about diabetes and their attitude toward diabetic care.

4.7. Measurements

Adherence to anti diabetic medications was measured by using Morisky Medication Adherence Scale (MMAS 8-item) (64). The scale contains questions asking the patients to respond "Yes" or "No" to a set of eight quetions. A positive response indicated a problem with medication adherence. Therefore, higher scores indicate that a patient has least adherence to medications. For all questions, responses were coded 1 if patients responded "Yes" otherwise 0 if not, except one

question (Did you take all your medicine yesterday?) that was coded reverse. The total score was computed and adherence was categorized as high, medium and low adherence to medications.

Patient-provider relation was measured by using Patient Doctor Relationship Questionnaire (PDRQ_9) consisting of nine questions with a five point likert-type scale, where 1= very inappropriate and 5= very appropriate (65). The total score was computed and participants were categorized as having satisfactory and unsatisfactory patient provider relation.

Diabetic self- care activities were assessed by using Summary of Diabetic Self-care Activity measure (SDSCA), which contains 11 items on diet, exercise, self- monitoring of blood glucose, foot care and cigarette smoking (59). Each question measures self-care activity during last seven days on a continuous scale from 0 to 7 days. If the participants were sick during the last seven days, they were asked to think back to the last seven days they were not sick. Diatary adequacy (general and specific dietary adequacy) was measured based on response to four diet questions and calculated out of 7. General dietary adequacy was measure based on response to first two diet questions and spesfic dietary adequacy was measured based on response to third and fourth diet questions after reverse coding of question four. Then dietary adherence was categorized as adequate and inadequate. Exercise was measured based on response to item five and six, then it was categorized as adequate and inadequate adherence to exercise. Self-monitoring of blood glucose was measured based on response to item seven and eight, then categorized as adequate and inadequate adherence. Foot care was measured based on response to item nine and ten, then considered as adequate and inadequate adherence to foot care. Smoking status was coded as 0 if the participant was not smoked and 1 if he/she smoked during last seven days.

Knowledge of patients about diabetes was assessed by using eight knowledge questions. Percentage out of total score was computed and patients were categorized as having good and poor knowledge about diabetes. Attitude of patients towards diabetic care was assessed by using seven questions with a five point likert- type scale, where 1= strongly disagree and 5= strongly agree. Three items have been negatively worded which requires reverse coding. Its internal consistency was checked by using reliability statistics with crombach's α =0.81 during pretest. The total score was computed and patients were categorized as having positive and negative attitude towards diabetic care.

Blood pressure was measured after the patient sat and rested for a few minutes with the arm held at a position that is around the heart. Blood pressure was measured twice and recorded from a mean of two measurements as per ADA recommendation (3). Anthropometric measurements were measured using standardized techniques and calibrated equipment. Weight of participants was measured to the nearest 0.1 kg. The scale was placed on hard surface and the participants were measured by wearing light clothing and bare feet. Height of the participants was measured to the nearest 0.5 cm using standing weight scale. Then, BMI of the participants was calculated as weight in kg divided by height in meters squared and subjects were considered as normal (BMI=18.5-24.9 kg/m²) , overweight (BMI= 25- 29 kg/m²) and obese (BMI ≥ 30 kg/m²) (3).

4.8. Operational definition of variables

Glycemic control: recommended or optimal body glucose level that a person living with diabetes should maintain at any given point in time. For the purpose of this study the study participants are categorized into two groups based on Ethiopian National guideline on major NCDs 2016 recommendation (63).

1). Good glycemic control: mean fasting blood glucose 80-130 mg/dL

2). Poor glycemic control: mean fasting blood glucose >130 mg/dL or < 80 mg/dL

Fasting blood glucose: blood glucose measured from venous after eight hours of overnight fasting or longer.

Adult: diabetic patient whose age was greater than 18 years or above was considered as adult.

Adherence to medication: participants were considered as high adherent when the score was 0, medium adherent when the score was 1-2 and low adherent when the score was 3-8 by using morisky medication adherence scale (MMAS 8-item) (64).

Adherence to diet: those study participants who had followed diet plan on average of 3 or more days in last seven days were categorized as having adequate adherence to diet while those followed for < 3 days were categorized as having inadequate adherence to diet.

Adherence to exercise: participants who participated in at least 30 minutes of physical activity for 3 or more days or participated in specific exercise session during last seven days were categorized as having adequate adherence to exercise otherwise inadequate adherence to exercise.

Adherence to self blood glucose monitoring: Participants who were performed self-blood glucose monitoring on average of 3-7 days were categorized as having adequate adherence to self-blood glucose monitoring practice otherwise inadequate adherence to self-blood glucose monitoring practice.

Adherence to foot care: participants who have an average of 3-7 days for foot care questions were categorized as having adequate adhrence to foot care and those who have < 3 days were categorized as inadequate adherence to foot care (59).

Regular follow up: a diabetic patient who visits the diabetic clinic based on appointment regulary within previous six months was considered as having regular follow up to diabetic clinic, otherwise not regular follow up.

Knowledge about DM: the study participants who answered six (75%) questions out of total knowledge questions correctly were categorized as had good knowledge about diabetes, otherwise poor knowledge.

Attitude toward DM care: participants those scored mean and above for questions of attitude were considered as had positive attitude and those scored less than mean were considered as had negative attitude toward diabetes care.

Patient-provider relation: participants who scored mean and above for patient-provider relation questions were considered as had satisfactory patient-provider relation, otherwise unsatisfactory patient-provider relation.

Extra medication: medication that are taken by a diabetic patient for treatment of other chronic diseases.

Use of other alternative treatments: those participants who used other non medical treatment options like traditional or herbal medicines and religious healing practices for treatment of diabetes were considered as used other alternative treatments, otherwise not used.

Hypertension: patients whose systolic BP ≥ 140 mmHg and/ or diastolic BP ≥ 90 mmHg or use of antihypertensive medication irrespective of the current BP were considered as hypertensive.

Co morbidity: patients who had other chronic non-communicable disease/s that was previously diagnosed.

Complications: patients who had at least one diabetes complication that was previously diagnosed.

4.9. Data processing and analysis procedures

Data were checked for completeness manually, coded and entered into a computer and cleaned using Epi data software version 3.1. Then it was exported to Statistical Package for Social Science (SPSS) software version 20 for the further analysis. Univariate analysis like measures of central tendency and measures of dispersion for continuous variables were computed. Frequency distribution was employed for categorical variables. Normality assumption was checked for continuous variables.

Bivariate analysis was employed to determine presence of association between poor glycemic control and each independent variables using binary logistic regression. Variables that were found significant at p-value less than 0.25 in bivariate analysis were selected as candidate variables for multivariable analysis. Multicollinearity diagnosis was done by checking variance inflation factor (VIF) greater than 10 percent and there were no problems with multicollinearity identified (no VIF > 10%).

Multivariable analysis was carried out to identify independent predictors of poor glycemic control and to control confounders. Backward stepwise logistic regression was used to determine independent predictors with P-value less than 0.05 with their respective AOR and 95% of CI. The model fitness was tested by using Hosmer and Lamshow goodness of fit test and the model was declared fit (P=0.426). Finally, the results were presented by text and tables.

4.10. Data management and quality assurance

The questionnaire and checklist were translated from English language to Amharic and Hadiyissa (local language) and translated back to English language to check its consistency. One day training was given for data collectors and supervisor on the objective, process of data collection and how to take anthropometric measurements. Pretest was done on 5% of sample size in Durame general hospital to check clarity and internal consistency of the questionnaire and checklist prior to the actual data collection. Discussion on the result of the pre-test and some modifications was made.

The equipments for measuring weight, height and blood pressure were calibrated to the standard before measuring each participant. Completeness, accuracy, clarity and consistency of data were checked daily after data collection time by supervisor. The overall activities were monitored by principal investigator.

4.11. Ethical consideration

Ethical issues of the study was reviewed and approved by the Research Ethical Review committee of Jimma University. The written official letter from Jimma University was given to Nigist Ellen Mohammed memorial Hospital and Shone Primary Hospital. Permission to conduct the study was obtained from both hospitals administrative offices. The respondents were informed about the objectives of the study and their right of not to participate in the study or stop at the middle (Annex I). Informed verbal consent was taken from each respondents and confidentiality of the information was assured by not including their name.

CHAPTER 5: RESULTS

5.1. Sociodemographic and economic characteristics

A total of three hundred and five type two diabetes patients were participated in this study with response rate of 98%. Out of total participants, 182(59.7%) were males and the median (± IQR) age of the respondents was 44 ± 19 years, ranging from 19 to 78 years. Nearly half (47.5%) of them were within age category of 40-60 years. Majority (60%) of the participants were Protestant followed by Orthodox (25.9%) and 256 (83.9%) of them were married. Out of the total, 217(71.1%) were Hadiya, 96(31.5%) had completed college and above, 105(34.4%) were government employee, 212 (69.5%) were urban residents and 208(68.2%) had family monthly income of greater than 3500 birr (ETB) **(table 2)**.

Among sociodemographic and economic factors sex, marital status, educational status, residence and family income showed association with poor glycemic control in bivariate analysis and considered as candidate variables for multivariable analysis **(table 2)**.

Table 2: Bivariate analysis of sociodemographic and economic factors among type 2 diabetes adult out patients at Public hospitals in Hadiya Zone, Southern Ethiopia, 2019.

Characteristics	**Categories**	**Number (%)**	**Glycemic control**		**Crude OR (95% CI)**	**P-value**
			Poor (n=222)	**Good (83)**		
Sex	male	182(59.7)	127	55	1	
	female	123(40.3)	95	28	1.47[0.87-2.49]	0.152*
Age	< 40	111(36.4)	78	33	1	
	40-60	145(47.5)	106	39	1.15[0.67-1.20]	0.617
	> 60	49(16.1)	38	11	1.46[0.67-3.20]	0.343
Marital status	single	21(6.9)	13	8	1	
	Married	256(83.9)	186	70	1.64[0.65-4.14]	0.296
	Divorced/widowed	28(9.2)	23	5	2.83[0.77-10.47]	0.119*
Educational status	Unable to read and write	72(23.6)	63	9	3.34[1.47-7.57]	0.004*
	Able to read and write	81(26.6)	60	21	1.36[0.71-2.63]	0.355
	Primary school (1-8 grade)	27(8.9)	16	11	0.69[0.29-1.67]	0.415
	Secondary school (9-12 grade)	29(9.5)	18	11	0.78[0.33-1.85]	0.574
	College & above	96(31.5)	65	31	1	
Occupational status	Government employee	105(34.4)	77	28	1	
	Merchant	71(23.3)	48	23	0.76[0.39-1.47]	0.412
	Housewife	59(19.3)	47	12	1.42[0.66-3.07]	0.366
	Farmer	52(17.0)	38	14	0.98[0.47-2.09]	0.973
	Others[a]	18(5.9)	12	6	0.73[0.25-2.12]	0.560
Residence	Urban	212(69.5)	146	66	1	
	Rural	93(30.5)	76	17	2.02[1.11-3.69]	0.022*
Family income	< 3500(ETB)	97(31.8)	78	19	1.83[1.02-3.26]	0.043*
	≥ 3500(ETB)	208(68.2)	144	64	1	

[a] student, retired; OR, Odds Ratio; * Statistically significant at P -value < 0.25

5.2. Glycemic control status

Mean fasting blood glucose (FBG) measurements of the last three months diabetic clinic visits were used to determine glycemic control. The mean (±SD) FBG level of the participants was 167.49 (±58.183) mg/dL. The minimum and maximum FBG measurements were 90 mg/dL and 478 mg/dL respectively. The prevalence of poor glycemic control was 72.8% (95% CI: 67.8% - 78.1%).

5.3. Clinical or diabetes related characteristics

The median (±IQR) diabetes duration of the participants was 5±5 years and 43.6% of the participants had a duration of less than five years. Among total respondents, 28.5% of them had other chronic diseases and 34.4% had diabetes related complications that were previously diagnosed. The common types of diabetes complications among the respondents were: retinopathy (73.3%), foot gangrene or amputation (17.1%), nephropathy (14.3%) and neuropathy (10.5%) **(Table 3).**

Of total respondents, 16.4% of them use other alternative treatments for diabetes, of which 88% use traditional medicine and 12% use religious healing practices. More than half (61.3%) of the participants had unsatisfactory patient provider relation and 15.1% of them did not had regular follow up to the diabetic clinic within the previous six months. Regarding to the medication adherence 34.4% of the respondents had low adherence **(Table 3)**.

The mean (± SD) BMI of the respondents was 24.18 (± 2.76) Kg/m^2 and 36.4% of them had overweight. The mean (± SD) systolic and diastolic BP was 131.92 (± 16.42) and 84.72 (± 7.76) mmHg respectively. And about 31.5% of the respondents were hypertensive.

In bivariate analysis from all clinical or diabetes related factors duration of diabetes, having other chronic diseases and diabetes complications, regular follow up, use of other alternative treatments, patient provider interaction, medication adherence, body mass index and blood pressure had shown association with poor glycemic control and considered as candidate variables for multivariable analysis **(Table 3)**.

Table 3: Bivariate analysis of clinical or diabetes related factors among T2 DM adult out patients at public Hospitals in Hadiya Zone, Southern Ethiopia, 2019.

Variables	Categories	Number (%)	Glycemic control		COR (95% CI)	P-value
			Poor (n=222)	Good (n=83)		
Family history of DM	No	196(64.3)	143	53	1	
	Yes	109(35.7)	79	30	0.98[0.58-1.65]	0.928
Family support	No	53(17.4)	38	15	0.94[0.48-1.81]	0.845
	Yes	152(82.6)	184	68	1	
Duration of diabetes	<5 years	133(43.6)	86	47	1	
	5-10 years	108(35.4)	86	22	2.14[1.19-3.85]	0.011*
	≥ 10 years	64(21.0)	50	14	1.95[0.98-3.90]	0.058*
Co morbidity	No	218(71.5)	153	65	1	
	Yes	87(28.5)	69	18	1.63[0.90-2.95]	0.108*
Complications	No	200(65.6)	135	65	1	
	Yes	105(34.4)	87	18	2.33[1.29-4.19]	0.004*
Type of anti diabetics	Insulin only	103(33.8)	77	26	1	
	Oral medication	179(58.7)	130	49	0.90[0.52-1.56]	0.697
	Insulin and oral	23(7.5)	15	8	0.63[0.24-1.66]	0.354
Regular follow up	No	46(15.1)	40	6	2.82[1.15-6.93]	0.024*
	Yes	259(84.9)	182	77	1	
Counseling	No	95(31.1)	72	23	1.25[0.72-2.19]	0.429
	Yes	210(68.9)	150	60	1	
use of other alternative treatments	No	255(83.6)	177	78	1	
	Yes	50(16.4)	45	5	3.97[1.52-10.37]	0.005*
Patient provider relation	Satisfactory	118(38.7)	76	42	1	
	Unsatisfactory	187(61.3)	146	41	1.97[1.18-3.28]	0.009*
Body mass index	Normal	194(63.6)	146	48	1	
	Overweight	111(36.4)	76	35	0.71[0.43-1.20]	0.200*
Blood pressure	Normal	210(68.5)	145	64	1	
	Hypertensive	95(31.5)	77	19	1.79[1.00-3.20]	0.048*
Medication adherence	High adherence	141(46.2)	88	53	1	
	Moderate adherence	59(19.3)	41	18	1.37[0.72-2.63]	0.341
	Low adherence	105(34.4)	93	12	4.67[2.34-9.32]	<0.001*

COR, Crude Odds Ratio; * statistically significant at P -value < 0.25

5.4. Knowledge and Attitude towards diabetic care

Of total participants, 139 (45.6%) had poor knowledge about diabetes and the rest had good knowledge. The mean score for attitude is 28.21(±3.079) with a minimum score 17 and maximum score 35. From total participants, about half (48.9%) had negative attitude towards diabetic care **(Table 4)**.

In bivariate analysis both knowledge about diabetes and attitude towards diabetes care had shown association with poor glycemic control **(Table 4)**.

5.5. Diabetic self acre activities

Two hundred and sixty five (86.9%) of the respondents were following their general dietary program adequately and majority (99.3%) were following their specific dietary plan correctly. With regard to physical activity and self-monitoring of blood glucose level, 82.3% of the participants had insufficient physical exercise and 95.4% were not monitoring their blood glucose level adequately. Majority (68.2%) of the participants had foot care adequately and majorities (98.4%) of the participants were non-smokers **(Table 4)**.

In bivariate analysis from all diabetes self care activities physical exercise and foot care were identified as having association with poor glycemic control and considered as candidate variables for multivariable analysis **(Table 4)**.

Table 4: Bivariate analysis of Knowledge, attitude and diabetes self care activities among T2 DM adult out patients at Public Hospitals in Hadiya zone, Southern Ethiopia, 2019.

Variables	**Categories**	**Number (%)**	**Glycemic control**		**Crude OR (95% CI)**	**P-value**
			Poor (n=222)	**Good (n=83)**		
Knowledge about diabetes	Good	166(54.4)	110	56	1	
	poor	139(45.6)	112	27	2.11[1.24-3.59]	0.005*
Attitude towards diabetic care	Positive	156(51.1)	99	57	1	
	Negative	149(48.9)	123	26	2.72[1.60-4.65]	<0.001*
Compliance to general diet plan	≥ 3 days (adequate)	265(86.9)	191	74	1	
	0-3 days (inadequate)	40(13.1)	31	9	1.33[0.61-2.94]	0.472
Physical exercise	≥ 3 days (adequate)	54(17.7)	28	26	1	
	0-3 days (inadequate)	251(82.3)	194	57	3.16[1.72-5.82]	<0.001*
Compliance to foot care	≥ 3 days (adequate)	208(68.9	140	68	1	
	0-3 days (inadequate)	97(31.8)	82	15	2.66[1.43-4.95]	0.002*

OR, Odds Ratio; * statistically significant at P -value < 0.25

5.6. Independent predictors for poor glycemic control

Bivariate analysis was done to see association between each independent variables and poor glycemic control. According to bivariate analysis sex, educational status, marital status, residence, income, duration of diabetes, having DM complications and chronic diseases, regular follow up, use of other alternative treatments, patient provider relation, medication adherence, knowledge, attitude, blood pressure, body mass index, physical exercise and foot care showed association with poor glycemic control at P-value less than 0.25. These variables were entered into multivariable analysis in order to determine independent predictors of poor glycemic control **(Table 5)**.

Accordingly, the odds of poor glycemic control among patients with longer duration of diabetes (5-10 years) was around two times (AOR=2.24, 95% CI: 1.17-4.27) higher than those with duration of diabetes less than five years. The odds of poor glycemic control was about three times (AOR=2.89, 95% CI: 1.08-7.71) higher among patients who did not have regular follow up compared to those who had regular follow up. The odds of poor glycemic control was four times (AOR=4.12, 95% CI: 1.20-8.70) higher among individuals who had low medication adherence compared with high medication adherence.

The odds of poor glycemic control among patients who used other alternative treatments was about four times (AOR=3.58, 95% CI: 1.24-10.36) higher when compared with those did not used other alternative treatments. The odds of poor glycemic control was around two times (AOR=2.27, 95% CI: 1.27-4.04) higher among individuals who had unsatisfactory patient provider relation compared with those who had satisfactory patient provider relation. Furthermore, the odds of poor glycemic control among individuals who had inadequate physical activity was four times (AOR=4.14, 95% CI: 2.07-8.28) higher when compared with those had adequate physical activity **(Table 5)**.

Table 5: Multivariable analysis of factors associated with poor glycemic control among T2 DM adult out Patients at Public hospital in Hadiya Zone, Southern Ethiopia, 2019.

Variables	**Category**	**Glycemic control**		**Adjusted OR**	**P -value**
		Poor(n=222)	**Good(n=83)**		
Duration of diabetes	< 5 years	86(38.7)	47(56.6)	1	
	5-10 years	86(38.7)	22(26.5)	2.24(1.17-4.27)	0.014*
	>=10 years	50(22.5)	14(16.9)	1.40(0.64-3.06)	0.395
Regular follow up	No	40(18.1)	6(7.2)	2.89(1.08-7.71)	0.035*
	Yes	182((81.9)	77(92.8)	1	
Medication adherence	High	88(39.6)	53(63.9)	1	
	Moderate	41(18.5)	18(21.7)	1.57(0.77-3.21)	0.220
	Low	93(41.9)	12(14.5)	4.12(1.20-8.70)	<0.001*
Use of other Alternative treatments	No	177(79.7)	78(94.0)	1	
	Yes	45(20.3)	5(6.0)	3.58(1.24-10.36)	0.018*
Patient provider relation	satisfactory	76(34.2)	42(50.6)	1	
	Unsatisfactory	146(65.8)	41(49.4)	2.27(1.27-4.04)	0.005*
Physical exercise	Adequate	28(12.6)	26(31.3)	1	
	Inadequate	194(87.4)	57(68.7)	4.14(2.07-8.28)	<0.001*

* Statistically significant at P-value < 0.05

CHAPTER 6: DISCUSSION

Diabetes mellitus is a chronic disease significantly affecting the quality of life of many people (4). It is an established fact that diabetes can cause complications in those patients whose blood glucose level is not controlled (1). The main goal of diabetes management is to ensure optimal glycemic control in order to delay and prevent complications. This study assessed the prevalence of poor glycemic control and its associated factors among type two diabetic patients. The findings of the study revealed that the prevalence of poor glycemic control is considerable and the identified factors significantly associated with poor glycemic control were duration of diabetes, regular follow up, medication adherence, use of other alternative treatments, patient provider relation and physical exercise.

The findings of this study showed that nearly three-fourth (72.8%) of diabetic patients in the study area had poor glycemic control. This finding was comparable with the previous similar studies done in Suadi Arabia (74.9%), in Tanzania (69.7%), in Dessei Northeast Ethiopia (70.8%) and Jimma, Southwest Ethiopia (70.9%) (21,23,34,49). But it is higher prevalence than that of studies which reported 65% in Egypt and 59.2% in Shanan Gibe hospital, Southwest Ethiopia (18,51). The possible reason for this high prevalence of poor glycemic control could be clinical characteristics of the patients, low medication adherence and insufficient physical activity of the patients in current study. This finding was lower than study done in Tikur Anbesa specialized Hospital(TASH) which reported 80% (22) of the study participants had poor glycemic control. The possible explanation for this difference could be that patients seeking advanced management were referred to TASH and patients from the whole regions of the country were referred to TASH (22). The results of the current study highlight the need to work more on optimal management of diabetes, since maintaining the recommended glycemic level is the main therapeutic goal for all patients with diabetes.

The study found that longer duration of diabetes is significantly associated with poor glycemic control. Patients who had longer duration of diabetes were more likely had poor glycemic control. This finding is consistent with the other similar studies (22,33,34,44,49). But this finding is slightly lower in strength of association than the finding from a study done in Shanan Gibe hospital (51). The possible reason for this difference could be majority of the patients in current study had short duration of diabetes while in that one had long duration of diabetes. The possible

explanation for this finding could be due to progressive impairment of insulin secretion over time because of the failure of β-cells and increased insulin resistance to control blood sugar (66). Also it might be explained by adherence of patients with short duration of diabetes to medication and diet (67,68).

The current study also found that lack of regular follow up is significantly associated with poor glycemic control. Those patients who had no regular follow up to diabetic clinic were more likely to have poor glycemic control. This finding is in agreement with previous similar studies done in Brazil and Southwest Ethiopia (19,51). The possible reason for this could be that patients who are not regularly following the diabetic clinic might be non-compliant to diabetic self care activities and treatment (69,70). In addition, those patients who are not regularly following the diabetic clinic might not know their blood sugar level and they might not get counseling about their disease condition.

In this study, poor glycemic control is appeared to be greater among patients who had low medication adherence compared with high adherence. This finding is comparable with other studies conducted in Jimma and Gondar hospitals (23,45). But the current finding is higher in strength of association than the finding from a study done in Tripoli, Libya (56). The reason for this difference might be due to different measurement score in these two studies. The possible explanation for this finding is that low adherence to treatment is one of the barriers that prevents many diabetic patients from achieving optimal glycemic level (36).

This study also found that using other alternative treatments (traditional medicines and religious healing practices) is significantly associated with poor glycemic control. Patients who used other alternative treatments were more likely to have poor glycemic control. This finding is supported by a systematic review of literatures in Sub-Sahara African countries in which use of herbal medicines and traditional healers was frequently mentioned, although it is not part of the ADA self-managemant guidlines (71). It is also supported by the finding from the study done in Northern Ethiopia showed that majority (62%) of patients were users of herbal medicine and most (87.1%) of them did not consult their physicians about their herbal medicine use (38). The possible reason for this could be patients who used other alternative treatments might be low medication adherent and this might be lead to poor glycemic control (36).

Having unsatisfactory patient-provider relation showed significantly associated with poor glycemic control. Patients who had unsatisfactory patient-provider relation were more likely to have poor glycemic control. This finding is similar to the study conducted in Mexico (35). The possible reason could be those patients who have satisfactory patient-physician relation might be well encourage to act in accordance with self care activities.

This current study also revealed that patients with insufficient physical activities had poor glycemic control, which is consistent with prior studies done in Tripoli, Libya and Jimma, Southwest Ethiopia (56,72). But it is lower than finding from the study done in Saudi Arabia (34). The variation could be due to that study measured physical activity at least 30 minutes for three days per week while the current study measured physical activity by mean score for physical exercise done in last seven days using SDSCA tool. The possible explanation for this finding might be due to having inadequate knowledge about benefits of regular physical exercise and fear of hypoglycemia. This implies that encouraging diabetic patients to do physical exercise is crucial part of diabetes education for optimal glycemic control. Furthermore, physical exercise has not only been reported to raise glycemic control, but also to improve a patient's insulin sensitivity and to repair some of the damage caused by diabetes associated complications, such as impaired cardiovascular health, one of the most common complications (73).

The lack of a relationship between educational status and poor glycemic control in this study is not consistent with the findings of previous studies (17,23,33,47,49,55), which reported that no formal education was associated with poor glycemic control. The reason for this difference could be that majority of patients in previous studies had no formal education while in current study, majority of the patients had attained college and above. In addition to this type of treatment (being on insulin treatment) does not showed significant association with poor glycemic. This finding is not in line with studies done previously elsewhere (22,42,45,54,56). This might be due to majority of the patients in current study were taking oral anti diabetics. The other reason could be that type 2 diabetes patients are treated by insulin when their blood glucose level was not controlled by oral anti diabetics.

Limitations of the study

The current study has its own limitations that should be acknowledged. The use of FBG over HbA1c is one limitation, thus possibly under estimate the prevalence of poor glycemic control. In addition, incompleteness of the patients chart is one of the shortcomings of this study since some items like comorbidity and complications were abstracted from patient chart. Furthermore, the subjective nature of self-reported response for some items might be limited by recall bias and since data collectors were health professionals social desirability bias may also occur for some items.

CHAPTER 7: CONCLUSION AND RECOMMENDATION

7.1. Conclusion

In this study, it was observed that significant proportion of type 2 diabetic patients had poor glycemic control. The study identified that a substantial proportion of DM patients in this study area did not achieved the recommended glucose level. The study found that the most important factors associated with poor glycemic control in this population were longer duration of diabetes, lack of regular follow up, low adherence to treatment, use of alternative treatments, unsatisfactory patient physician relation, and insufficient physical exercise.

7.2. Recommendation

Based on the findings from the current study the following recommendations are forwarded:

For public hospitals in Hadiya zone

- To consider developing educational programs that emphasizes life style modification with importance of adherence to treatment would be of great benefit in poor glycemic control.
- Measures should be put in place education for diabetes patients, emphasize more on self care activities especially to patients with long duration of diabetes.
- The hospitals should be equiped with adequate and sustainable diagnostic tools including the HbA1c test for proper monitoring of glycemic level.

For health care providers

- Develop effective patient provider relation and communication skills when counseling diabetic patients.
- Encouraging patients' adherence to physical activity and regular follow up should be emphasized to diabetic patients at every appointment.
- Health care providers should discuss barriers of treatment adherence when counseling patients and solutions should be tailored toward individual needs.
- Health care providers should consult the patients regarding use of other alternative treatments.

For researchers

- Further qualitative studies are needed to identify barriers to glycemic control.

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ANNEXES

Annex I: English Version Participant Informed Consent Form

This form has two parts: Informed sheet and informed consent form

Read and give a copy of the full informed consent form to the respondent.

Part I – Participant's Informed Sheet

Greeting: Good morning/afternoon

My name is _____and I am working on behalf of research conducted by Abraham Lomboro student of Jimma University. You are selected to be participant of this study if you give me consent after you have understood the following information:

Project title: prevalence and factors associated with poor glycemic control among adult type 2 diabetic out patients at public hospitals in Hadiya zone, Southern Ethiopia.

Purpose of the study

The purpose of this study is to determine the prevalence and factors associated with poor glycemic control among adult type 2 diabetes patients attending public hospitals in Hadiya zone. The study will provide important information on the circumstances surrounding blood sugar control among patients. The study findings will help in informing strategies and programs to facilitate better management, control and implementation of the set guidelines for diabetes patient

Study Procedures

We invite you to help us with the study by taking part in this survey as the information you provide us will contribute a lot in preventing diabetic complications and premature death due to complications. If you are willing to participate in the study, I will proceed with the interview and administer questions that help to answer the study questions. If you do not wish to answer any of the questions included in the study, you may skip them and move to next question.

Risks, stress or Discomfort

There might be slight discomfort to share some personal information. However, we do not wish this to happen and you may refuse to answer any of the questions if you feel uncomfortable.

Benefits

Your participation will help us to find out more about glycemic control in diabetes patients. Our study may help the diabetes patients, health professionals and the hospital for better improvement of diabetes care.

Incentives

We will not pay you for taking part in this study. However, we will thank you for your participation.

Right to refuse or withdraw:

Your participation is voluntary. You may withdraw from this study at any time without any penalty.

Confidentiality

The information that we collect in this study will be kept confidential and will not be given to anyone except the investigator.

Voluntary nature of the study

Participation in this study is voluntary. If anything is not clear or if you need further information, we shall provide it to you. Your decision whether or not to participate in this study will not affect your current or future relations with this facility or other institutions.

Contacts and Questions

The researcher conducting this study is Abraham Lomboro. You may ask any questions you have now, or if you have questions later, kindly contact him through this number: 0920991831 e-mail abrish4466@gmail.com.

Part II: Informed Consent form

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

1. No (Say Thank you)

2. Yes □ continue your interview

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

Signature of interviewer _____ Date _____

Annex II: English Version Questionnaire

This questionnaire was used to collect data for type 2 diabetes patients at the study site. The information (data) from the respondent was handled confidently without discrimination of any participants.

Participant Code……/2019

Venue: Nigist Ellen Mohammed memorial hospital and Shone primary hospital, Hadiya zone, Southern Ethiopia

Date.....Time.....

Part I: Sociodemographic and Economic characteristics

Ser. No	Questions	Response	skip
1	Age in complete years	_____ Years	
2	Sex	1. Male 2. Female	
3	What is your religion	1.protestant 2.Orthodox 3.Catholic 4.Muslim 5.Other (specify) _____	
4	What is your marital status?	1. Single 2. Married 3.Divorced 4.Separated 5.Widowed	
5	What is your ethnicity?	1.Hadiya 2.Kambata 3. Guraghe 4. Silte 5.Other(specify)_____	
6	What is the highest education level you have attained?	1. Unable to read and write 2. Able to read and write 3. _____grade	

		4. Certificate and above	
7	What is your occupation?	1. Government employee 2. Merchant 3. Housewife 4. Farmer 5. Other (specify)_____	
8	Where is your residence?	1. Urban 2. Rural	
9	Participant income per month (ETB)	_____birr	
10	Monthly income of the family (ETB)	_____birr	
Part II: Clinical or diabetes related factors			
Ser. No	**Questions**	**Response**	**Skip**
11	Does anyone else in your family (Mother, Father and siblings) have diabetes?	1. Yes 2. No	
12	Duration since the disease diagnoses (in years) (observe the record)	_____year/s	
13	Do you have family support related to your disease?	1. Yes 2. No	If no skip to Q15
14	If yes, to Q13 what type of support? (more than one answers are possible)	1.Remembering to take medication 2. Financial support 3. Physical support 4. Psychosocial support 5. Others(specify)_____	
15	Did you receive counseling from your health care provider at least once in your previous three visits?	1. Yes 2. No	If no skip to Q17
16	If yes, for Q15 on which of the following item/s you were been counseled	1. Follow diet plan 2. regular exercise 3.self blood glucose measuring	

		4.foot care 5. medication adherence 6. others (specify)_____	
17	Do you have glucometer to measure your blood glucose at home?	1. Yes 2. No	
18	Do you use other alternative treatment options for diabetes treatment?	1. Yes 2. No	If no skip to Q20
19	If yes, to Q18 which following alternative treatment options you use? (more than one answers are possible)	1. Traditional/herbal medicine 2.Religious/spritual healing(like Tsebal) 3.Others(specify)_____	

20. Medication adherence			
20.1	Do you sometimes forget to take your medicine?	0. No 1. Yes	
20.2	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?	0. No 1. Yes	
20.3	Have you ever cut back or stopped taking you medication without telling your doctor, because you felt worse when you took it?	0. No 1. Yes	
20.4	When you travel or leave home, do you sometimes forget to bring along your medications?	0. No 1. Yes	
20.5	Did you take all your medicine yesterday?	0. No 1. Yes	
20.6	When you feel like your symptoms are under control, do you sometimes stop taking your medicine?	0. No 1. Yes	
20.7	Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	0. No 1. Yes	
20.8	Do you have difficulty remembering to take all your	0. No 1. Yes	

	medicine?		

Part III. Checklist for abstracting clinical information of the DM patients.

Instruction: Review the diabetes patient's medical record and fill the following questions. For FBS take the last three consecutive months result **(**including this month)

Ser. No	**Questions**	**Response**	**Skip**
21	Specify the type of anti diabetic medication regimen the participant taking currently.	1. Insulin Only 2. Oral Anti Diabetic/s 3. Combined (Insulin +Oral)	
22	Does the participant has any chronic diseases other than DM?	1. Yes 2. No	If No, skip to Q 24
23	If yes, for Q22 specify co morbidity disease the participant has?	_____ _____	
24	If yes, for Q22 does s/he take medication for this disease?	1. Yes 2. No	
25	Does the participant has any of the following diabetes-related complication that was previously diagnosed? more than one answers are possible	1. Retinopathy 2. Neuropathy 3. Nephropathy 4. Foot Gangrene/Amputation 5. Others specify _____	
26	Does the participant had regular follow to the diabetic clinic as per schedule within the previous 6 months?	1. Yes 2. No	
27	List FBG of the last three consecutive months	1. _____mg/dl 2._____ mg/dl 3._____mg/dl	
28	Weight and height	1.weight_____kg 2.height_____cm	

29	Blood pressure measurement	1. SBP_____ mmHg 2. DBP_____ mmHg	

Part IV: Knowledge about Diabetes and Attitude towards diabetic care

Do you consider the following statements true or false?

Ser. No	**Questions**	**Response**
30	A person with diabetes has a greater chance of having other health problems than a person who does not have diabetes	1. True 2. False 3. I don't know
31	It is necessary to control the amount of food I eat when taking diabetes medication or insulin.	1. True 2. False 3. I don't know
32	Fasting plasma glucose is a blood test that shows the average blood glucose level over eight hours fasting.	1. True 2. False 3. I don't know
33	Eating foods lower in fat decreases your risk for heart disease.	1. True 2. False 3. I don't know
34	For a person in good control, exercising has no effect on blood sugar levels.	1. True 2. False 3. I don't know
35	Infection is likely to cause an increase in blood sugar levels.	1. True 2. False 3. I don't know
36	Wearing shoes a size bigger than usual helps prevent foot ulcers.	1. True 2. False 3. I don't know
37	Having regular check-ups with your doctor can help spot the early signs of diabetes complications	1. True 2. False 3. I don't know

Please place (√) in the box closest to you situation in front of each statement

S. No	Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
38	Diabetes mellitus is treatable					
39	Medication can be discontinued in case of increasing blood glucose and symptoms release.					
40	Proper diabetes treatment could prevent renal failure and blindness					
41	Lipid and blood pressure control is					

	necessary in diabetic patients.					
42	Herbal medications have less complication than physicians' medications					
43	Initiating insulin exacerbates diabetes and its complications					
44	Regular exercise helps in controlling diabetes					

Part V: Patient-provider Interaction

Instruction: There are nine statements that a person can make about his/her primary care provider (PCP). Please choose the appropriateness of each statement for your primary care provider (PCP) by marking one number per statement and place (√) in the box. The meaning of the numbers is as follows:1 = not at all appropriate, 2 =somewhat appropriate, 3 =appropriate, 4 =mostly appropriate and 5 =totally appropriate PCP=primary care provider

S. No	Statement	not at all appropriate	somewhat appropriate	appropriate	mostly appropriate	totally appropriate
45	My PCP helps me					
46	My PCP has enough time for me					
47	I trust my PCP					
48	My PCP understands me					
49	My PCP is dedicated to help me					
50	My PCP and I agree on the nature of my medical symptoms					
51	I can talk to my PCP					
52	I feel content with my PCP's treatment					
53	I find my PCP easily accessible					

Part VI: Assessment of Diabetes self care activities

Instruction: The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

	How many of the last SEVEN DAYS have you followed a healthful eating plan?

54	0 1 2 3 4 5 6 7
55	On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?
	0 1 2 3 4 5 6 7
56	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?
	0 1 2 3 4 5 6 7
57	On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?
	0 1 2 3 4 5 6 7
58	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking).
	0 1 2 3 4 5 6 7
59	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?
	0 1 2 3 4 5 6 7
60	On how many of the last SEVEN DAYS did you test your blood sugar?
	0 1 2 3 4 5 6 7
61	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?
	0 1 2 3 4 5 6 7
62	On how many of the last SEVEN DAYS did you check your feet?
	0 1 2 3 4 5 6 7
63	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?
	0 1 2 3 4 5 6 7
64	Have you smoked a cigarette—even one puff—during the past SEVEN DAYS? 0. No 1. Yes.
65	If yes to Q 64, how many cigarettes did you smoke on an average day? Number of cigarettes: _____

THANK YOU

Annex III: Amharic version Participant Informed Consent Form

በጅማ ዩኒቨርስቲ

የጤና ኢንሲቲቱይት የህብረተሰብ ጤና ፋኩልቲ

የኤፒዲሚዮሎጂ ትምህርት ክፍል

የጥናቱ ማብራሪያ የፍቃደኝነት መጠየቂያ እና መተማመኛ ቅጽ

ክፍል ነ - የጥናቱ ማብራሪያ እና የፍቃደኝነት ቅጽ

ሰላምታ: ደህና አደሩ/ዋሉ

ስሜ.....እባላለሁ:: አሁን እየሰራሁ ያለሁት በጅማ ዩኒቨርስቲ ተማሪ የሆነው አብርሃም ሎምቦሮ በሚሰራዉ ጥናታዊ ምርምርን በመወከል መረጃ ሰብሳቢ ሆኜ ነው። የሚከተሉትን መረጃዎች ካስተዋሉኝ በኋላ በዚህ ጥናት ውስጥ ተሳታፊ እንድሆኑ ተመርጠዋል።

የፕሮጀክት ርእሰ- የዓይነት ሁለት ስኳር ቁጥጥር መጠን እና ለዝቅታኛ ቁጥጥር የሚያጋልጡ ሁኔታዎችን በደቡብ ክልል በሀዲያ ዞን ባሉ የህዝብ ሆስፒታሎች ውስጥ ዓይነት ሁለት ስኳር ባላቸዉ አወቂዎች ለማጥናት::

የጥናቱ ዓላማ

የዚህ ጥናት ዓላማ በሀዲያ ዞን በሚገኙ የህዝብ ሆስፒታሎች ውስጥ በአዋቂዎች ዓይነት 2 የስኳር ህመምተኞች ዝቅተኛ የግላይሴሚክ ቁጥጥር መጠን እና ለዝቅተኛ የግላይሴሚክ ቁጥጥር የሚያጋለጡ ሁኔታዎችን ለመለየት ነው:: ጥናቱ በህመምተኞች ውስጥ የደም ስኳር መቆጣጠር ዙሪያ ስላለው ሁኔታ ጠቃሚ መረጃ ይሰጣል:: የጥናቱ ግኝቶች ለስኳር ህመምተኛ የተሻሉ መመሪያዎችን, ቁጥጥር እና አፈፃፀምን ለማመቻቸት ስልቶችን እና ፕሮግራሞችን ለማስታወቅ ወይም ለማቀድ ይረዳሉ::

የማጥኛ ደንቦች

እርስዎ የሚሰጡን መረጃ የስኳር ህመምተኞችን እና ተያይዞ ሊመጡ የሚችሉ ችግሮችን እንድሁም በህመምተኞችን የሚደርሰዉን ሞት ለመከላከል አስተዋፅኦ ስለሚያደርግ በዚህ ጥናት ውስጥ በመሳተፍ ጥናቱን እንዲያግዙን እንጋብዝዎታለን። በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ በቃለ-መጠይቁ ሂደት እቀጥላለሁ እናም ለጥናት ጥያቄዎች መልስ ለመስጠት የሚረዱ ጥያቄዎችን እጠይቃለሁ:: በጥናቱ ውስጥ ከተካተቱት ጥያቄዎች ውስጥ አንዳቸውንም ለመመለስ የማይፈልጉ ከሆነ ይዘለላሉ እና ወደሚቀጥለው ጥያቄ ይለፉ።

ስጋት፤ውጥረት ወይም አለመረጋጋት

አንዳንድ የግል መረጃዎችን ለማጋራት ትንሽ ሊያስቸግር ይችላል፤ ይሁን እንጂ ይህ እንዲከሰት አንፈልግም እና የማይስማሙ ከሆኑ መልስዎን አለመስጠት ይችለሉ::

የጥናቱ ጥቅሞች

ተሳትፎዎ በስኳር በሽተኞች ላይ ስላለው የስኳር በሽታ የበለጠ ለማወቅ ይረዳናል፡፡ ጥናታችን የስኳር ህመምተኞችን የጤና ባለሙያዎችን እና የሆስፒታሉን የስኳር ህክምና አገልግሎት ለማሻሻል ሊያደርግ ይችላል፡፡

ማትጊያዎች

በዚህ ጥናት ተሳታፊ ስለሆኑ ክፍያ አይከፈልም፤ሆኖም ስለተሳትፎዎን እናመሰግናለን።

የመተው ወይም የማቋረጥ መብት

ተሳትፎዎ በፈቃደኝነት ነው፡፡በማንኛውም ጊዜ ያለምንም ቅጣት ከዚህ ጥናት ሊቋረጡ ይችላሉ፡፡

ሚስጢራዊነት

በዚህ ጥናት ውስጥ የምንሰበስበው መረጃ በሚስጢር ይጠበቃል እና ጥናቱን ከሚሰራ ሰዉ በስተቀር ለማንም አይሰጥም.

የጥናቱ ፈቃደኝነት ተፈጥሮ

በዚህ ጥናት መሳተፍ በፈቃደኝነት ነው። ግልጽ ካልሆነ ወይም ተጨማሪ መረጃ ከፈለጉ እኛ እንሰጥዎታለን። በዚህ ጥናት ውስጥ መሳተፍ ወይም ያለመሳተፍ ውሳኔዎ ከዚህ ሆስፒታል ወይም ከሌሎች የጤና ተቋማት ጋር አሁን ወይም የወደፊት ግንኙነትዎን አይጎዳም።

እውቂያዎች እና ጥያቄዎች

ይህን ጥናት የሚመራው ተመራማሪው አብርሃም ሎምቦሮ ነው።አሁን ያለዎትን ጥያቄ ሊጠይቁ ይችላሉ፤ወይም ጥያቄ ካሎት በዚህ ቁጥር: 0920991831, ኢሜል abrish4466@gmail.com በደግነት ሊያነጋግሩት ይችላሉ፡፡

ክፍል ሁለት፡- የመረጃ ፍቃድ ቅጽ

ይህን ቅጽ አንብቤዋለሁ ወይም እኔ ሊረዳዉ በሚችል ቋንቋ ተነቦልኛል እና ከላይ የተዘረዘሩትን ሁሉንም ሁኔታዎች በሚገባ አውቀዋለሁ።

በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት?

1. አይ አመሰግናለሁ

2. አዎ ☐ ቃለ መጠይቅዎን ይቀጥሉ

በዚህ ጥናት ውስጥ ከመሳተፍ ጋር የተያያዘው ተፈጥሮና ዓላማ, ጥቅሞች እና ሊያስከትሉ የሚችሉ አደጋዎች ለተሳታፊዉ ገልጬአለሁ፡፡

የመረጃ ሰብሳቢ ፊርማ _____ ቀን _____

Annex IV: Amharic Version Questionnaire

በጅማ ዩኒቨርስቲ

የጤና ኢንሲቲቱይት የህብረተሰብ ጤና ፋኩልቲ

የኤፒዲሚዮሎጂ ትምህርት ክፍል

ጥያቄዎች

ይህ ጥያቄ ዓይነት ሁለት የስኳር በሽታ ካለባቸዉ ታማሚዎች መረጃ ለማሰባሰብ የሚዉል ነዉ፡፡ ከተጠያቅዎቹ የሚሰበሰበዉ መረጃ የሁሉን ሳይለይ ምስጥራዊ በሆነ መልኩ ይያዛል፡፡

የተጠያቂዉ መለያ ቁጥር ...../2019

ቦታ: ንግስት ኢሌን መሀመድ መታሰቢያ ሆስፒታል እና ሾኔ የመጀመሪያ ሆስፒታል ሀዲያ ዞን፤ ደቡብ ኢትዮጵያ

ቀን---------- ሰዓት----------

ክፍል አንድ: የተሳታፊ የማህበራዊ /የዝንባሌ እና ኢኮኖሚያዊ ሁኔታ			
ተ.ቁ	**ጥያቄ**	**መልስ**	**ዝለል**
1	ዕድሜ በሙሉ ዓመት	_____ ዓመት	
2	ጾታ	1. ወንድ 2. ሴት	
3	ሐይማኖት	1.ፕሮቴስታንት 2.ኦርቶዶክስ 3.ካቶልክ 4. ሙስሊም 5.ሌሎች _____	
4	የትዳር ሁኔታ	1.ያላገባ/ች 2. ያገባ /ች 3. ፊች የፈጸመ/ች 4. ተለያይቶ የሚኖር/የሚትኖር 5. ሚስት የሞተችበት ወይም ባል የሞተባት	
5	ብሔር	1. ሀዲያ 2. ካምባታ 3. ጉራጌ 4. ስልጤ 5. ሌሎች(ይጠቀስ)_____	
6	የተጠያቂዉ/ዋ ትምህርት ደረጃ	1.ማንበብ እና መጻፍ የማይችል/የማትችል 2..ማንበብ እና መጻፍ የሚችል/የሚትችል 3.----------ክፍል 4. ሴርትፍኬት እና ከዚያ በላይ	
7	የተጠያቂዉ/ዋ ስራ ሁኔታ	1. የመንግስት ሰራተኛ 2. ነጋዴ	

		3. የቤት እመቤት 4. አርሶአደር 5. ሌሎች (ይጠቀሱ)----------	
8	የመኖሪያ ቦታ	1. ከተማ 2. ገጠር	
9	በአማካይ የእርሶ የወር ገቢ ስንት የኢትዮጵያ ብር ነዉ ?	_____ ብር	
10	በአማካይ የቤተሰብዎ የወር ገቢ ስንት የኢትዮጵያ ብር ነዉ ?	_____ ብር	
ክፍል ሁለት፡ ክሊንካል ወይም ከስኳር ህመም ጋር የተያያዙ ጥያቄዎች			
ተ.ቁ	**ጥያቄ**	**መልስ**	**ዝለል**
11	ከቤተሰብዎ (አባት ወይም እናት ወይም ወንድም/እህት) ዉስጥ የስኳር በሽታ የነበረበት ሰዉ አለ?	1 . አዎ 2. አይደለም	
12	የስኳር በሽታ ከተገኘብዎት ወዲህ ስንት ዓመት ነዉ? (መዝገቡን ተመልከት/ች)	_____ዓመት	
13	ህመሙን በተመለከተ ከቤተሰብዎ ድጋፍ አለ ወይም ይደረጋል?	1. አዎ 2. አይደለም	2 ከሆነ ወደ 15ኛ ጥያቄ ዝለል
14	ለ13ኛ ጥያቄ መልሱ አዎ ከሆነ ምን ዓይነት ድጋፍ ነዉ?	1. መድኃኒት እንድወስድ ማስታወስ 2. የገንዘብ ድጋፍ 3. አካላዊ ድጋፍ (ለምሳሌ ሲታመሙ ተሸክሞ ለህክምና መዉሰድ) 4. የስነ-ልቦና ድጋፍ 5.ሌሎች ካሉ ይጠቀስ_____	
15	ለህመሙ ክትትል ባደረጉበት በባለፉት ሶስት ክትትል ቢያንስ አንድ ጊዜ ከእርስዎ ጤና ባለሙያ የምክር አገልግሎት አገኝተዋሉ?	1. አዎ 2. አይደለም	2 ከሆነ ወደ 17ኛ ጥያቄ ዝለል
16	ለጥያቄ 15 መልሱ አዎ ከሆነ የምክር አገልግሎቱን ያገኙት ከሚከተሉት ለየትኞቹ ነዉ?(ከአንድ በላይ መልስ መመለስ ይቻላል)	1. የምግብ ዕቅድ በአግባቡ ስለመከታተል 2. የአካል ብቃት እንቅስቃሴ ስለማድረግ 3. የስኳር መጠንን በግል ስለመለካት 4. የእግር ጤናን ስለመጠበቅ 5. መድኃኒትን በአግባቡ ስለመከታተል 6. ሌሎችም ካሉ ይጠቀሱ ----------	
17	በግል የደም ስኳር መጠን መለኪያ መሣሪያ(ግሉኮሜትር) አለዎት?	1. አዎ 2. አይደለም	

18	ለስኳር ህመምዎ አሁን ከሚወስዱት መድኃኒት ሌላ መድኃኒት እንደ አማራጭ ይጠቀማሉ?	1. አዎ 2. አይደለም	2 ከሆነ ወደ 20ኛ ጥያቄ ዝለል
19	ለ18ኛ ጥያቄ መልሱ አዎ ከሆነ የምትጠቀሙት መድኃኒት ዓይነት ከሚከተሉት የትኛዉን ነዉ? (ከአንድ በላይ መልስ ይቻላል)	1. ባህላዊ መድኃኒት/ህክምና 2.ኃይማኖታዊ/መንፈሳዊ ህክምና (ለምሳሌ ጸበል) 3.ሌሎች ካሉ ይጠቀስ_____	

20. የስኳር ህመም መድኃኒትን በጥብቅ ተከታትሎ መዉሰድን በተመለከተ

20.1	አንድ አንዴ መድኃኒት መዉሰድ ትረሳለህ/ሽ ?	0. አይደለም 1. አዎ	
20.2	ሰዎች አንድ አንዴ ረስተዉ ሳይሆን በሌላ ምክንያት መድኃኒታቸዉን አይወስዱም፡፡በባለፉት ሁለት ሣምንታት መድኃኒትህን/ሽን ያልወሰድክበት/ሽበት ቀናት አሉ?	0. አይደለም 1. አዎ	
20.3	መድኃኒቱን መዉሰድ ስለከበደህ/ሽ ለህክሙ ሳትናገር/ሪ መድኃኒት መዉሰድ አቁመህ/ሽ የጀመርከበት/ሽት ወይም ያቆምክበት/ሽበት ጊዜ አለ?	0. አይደለም 1. አዎ	
20.4	ጉዞ ሲኖርዎት ወይም ከቤት ለተወሰነ ጊዜ ስርቁ መድኃኒቱን ይዘዉ መሄድን ረስተዉ ያዉቃሉ?	0. አይደለም 1. አዎ	
20.5	ትናንትና ሁሉንም መድኃኒትዎን ወስደዋሉ?	0. አይደለም 1. አዎ	
20.6	የህመም ስሜቱ የተቆጣጠሩ ስመስልዎት አንድ አንዴ መድኃኒት መዉሰድን አቁመዉ ያዉቃሉ?	0. አይደለም 1. አዎ	
20.7	መድኃኒትን በየቀኑ መዉሰድ ለተወሰኑ ሰዎች አስቸጋር ነዉ፡፡ የህክምና ዕቅድህን በአግባቡ መከታተል አስቸግዎት ያዉቃሉ?	0. አይደለም 1. አዎ	
20.8	መድኃኒቱን ለመዉሰድ ማስታወስ አስቸግረዎት ያዉቃሉ?	0. አይደለም 1. አዎ	

ክፍል ሦስት፡ የታማሚዎ ችን የህክምና መዝገብ በመየት የሚሞሉ መጠይቆችን ለመሙላት የተዘጋጀ ቼክ ሊስት

ማሳሰቢያ ፡ የታማምዉን የህክምና መከታተያ መዝገብ በማየት የሚከተሉትን ጥያቄዎች ሙላ/ይ፡፡ ለስኳር መጠን መጠይቆች የመጨራሻዉን ተከታታይ ሶስት ወራት ዉጤታቸዉን ሙላ/ይ (የዛሬዉንም ጨምሮ)፡፡

ተ.ቁ	ጥያቄ	መልስ	ዝለል
21	ተሳታፊዉ/ዋ አሁን እየወሰደ/ች ያለዉን የስኳር መድኃኒት ዓይነት ምንድነዉ?	1 ኢንሱሊን ብቻ 2. በአፍ የሚወሰድ መድኃኒት 3. ሁለቱንም (ኢንሱሊን እና በአፍ የሚወሰድ)	
	ከስኳር በሽታ ዉጭ ሌላ ተላላፊ ያልሆነ ወይም ስር		2 ከሆነ ወደ

22	የሰደደ በሽታዎች አብዎት?	1. አዎ 2. አይደለም	24ኛ ጥያቄ ዝለል
23	ለ13ኛ ጥያቄ መልሱ አዎ ከሆነ የበሽታዉን ዓይነት ይግለጹ	_____ _____	
24	ለ23ኛ ጥያቄ መልሱ አዎ ከሆነ ለህመሙ መድኃኒት ይወስዳል/ትወስዳለች?	1. አዎ 2. አይደለም	
25	ተሳታፊው ከዚህ ቀደም ተመርምሮ የነበረ ከተዘረዘሩት የስኳር በሽታ ጋር የተያያዙ ችግሮች አለው ወይ? ከአንድ በላይ መልስ ይቻላል	1. የዓይን ህመም 2. ኒውሮፓቲ 3. ኒፊሮፓቲ 4. የእግር ህመም/መቆረጥ 5. ሌሎቹን ይግለጹ _____	
26	ተሳታፊዉ/ዋ በባለፉት ስድስት ወራት በተከታታይ ወደ ክሊኒኩ ሳያቋርጡ መጥቷል/ታለች	1. አዎ 2. አይደለም	
27	የተሳታፊዉን/ዋን የሦስት ተከታታይ ወራት ስኳር (FBS) መጠን ጻፍ/ፊ(የዛሬዉንም ጨምሮ)	1. _____ሚግ/ዴሊ 2._____ ሚግ/ዴሊ 3._____ ሚግ/ዴሊ	
28	የተሳታፊዉ/ዋ ዛሬ የተለካዉን ክደት እና ቁመት ጻፍ/ፊ	1.ክብደት _____ኪ.ግ 2. ቁመት_____ሴ.ሜ	
29	የተሳታፊዉ/ዋ ዛሬ የተለካዉን የደም መጠን ጻፍ/ፊ	1.የመጀመሪያዉ(SBP)_____ሚሚ.ሜ 2.የሁተኛዉ(DBP)_____ ሚሚ.ሜ	

ክፍል አራት፡ ስለ ስኳር ህመም ያላቸዉን እዉቀት በተመለከተ እና የስኳር ህክምናን በተመለከተ ያለው የአመለካከት ጥያቄዎች

የሚከተሉትን ጥያቄዎች ትክክል ናቸዉ ካሉ እዉነት ትክክል አይደሉም ካሉ ሐሰት ወይም አላዉቅም ብለዉ ይመልሱ፡፡

ተ.ቁ	ጥያቄ	መልስ	ዝለል
30	የስኳር በሽታ ያለበት ሰው የስኳር ህመም ከሌለበት ሰው ይልቅ በሌሎች የጤና ችግሮች የመያዝ እድሉ ከፍተኛ ነው፡፡	1. እዉነት 2. ሐሰት 3. አላዉቅም	
31	የስኳር ህመም መድሃኒት ወይም ኢንሱሊን ሲወስዱ የምበላውን የምግብ መጠን መቆጣጠር አስፈላግ ነዉ፡፡	1. እዉነት 2. ሐሰት 3. አላዉቅም	
32	የፕላዝ ማ ግሉኮስ (FBS) ከ 8 ሰዓት በላይ መጾምን ወይም ምግብ ሳይወሰድ በደም ውስጥ ያለዉን የግሉኮስ መጠን ያሳያል።	1. እዉነት 2. ሐሰት 3. አላዉቅም	
33	የቅባትነት ወይም የስብነት መጠናቸዉ ዝቅተኛ የሆኑ ምግቦችን መብላት ለልብ ህመም የመጋለጥን ዕድልን ይቀንሳል፡፡	1. እዉነት 2. ሐሰት 3. አላዉቅም	
34	የስኳር መጠኑን በጥሩ ሁኔታ ለተቆጣጠረ ሰዉ የሰዉነት እንቅስቃሴ ማድረግ በደም ዉስጥ ባለዉ የስኳር መጠን ላይ ምንም ዓይነት ለዉጥ አያመጣም፡፡	1. እዉነት 2. ሐሰት 3. አላዉቅም	

35	የኢንፌክሽን መኖር የስኳር መጠን እንድጨምር ያደርጋል፡፡	ነ. እዉነት 2. ሐሰት 3. አላዉቅም	
36	ከእግርዎ መጠን ትልቅ የሆነ ጫማ መጫማት ወይም ማድረግ የእግር መቁሰልን ይከላከላል፡፡	ነ. እዉነት 2. ሐሰት 3. አላዉቅም	
37	ቀጠሮን ጠብቆ ሀኪም ጋር ክትትል ማድረግ ከስኳር ህመም ጋር ተያይዞ የሚመጡ ችግሮች ምልክቶችን አስቀድሞ ለመለየት ይረዳል፡፡	ነ. እዉነት 2. ሐሰት 3. አላዉቅም	

እባክዎን ተሳታፊዉ/ዋ በሚስማሙበት መልስ (√) ምልክት ከዐረፍተ ነገሩ ፊት ለፊት ከሚገኘዉ ሳጥን ውስጥ ያስቀምጡ

ተ.ቁ	ዐረፍተ ነገር	በጣም እስማማለሁ	እስማማለሁ	መልስ የለኝም	አልስማማም	በጣም አልስማማም
38	የስኳር በሽታ መታከም የሚቻል በሽታ ነዉ፡፡					
39	በደምዎ ውስጥ ያለው የግሉኮስ መጠን ከፍ ስልና ምልክቶቹ ስለቁ መድሃኒቱን ማቋረጥ ይችላል።					
40	የስኳር በሽታ ህክምና በተገቢ መልኩ መከታተል የኩላልት ህመም እና ዓይነ ሥውርነትን ይከላከላል፡፡					
41	የሊፒድ እና የደም መጠንን መቆጣጠር ለስኳር ህሙማን እስፈላጊ ነዉ፡፡					
42	ባህላዊ ህክምና ዘመናዊ መድኃኒት ከመወሰድ ይልቅ ያልተወሳሰበ ወይም የተሻለ ነዉ፡፡					
43	ኢንሱልን መጀመር የስኳር ህመምንና ከርሱ ጋር ተያይዞ የሚመጡ ችግሮችን ያባብሳል፡፡					
44	የሰውነት እንቅስቃሴ አዘውትሮ ማድረግ የስኳር በሽታን ለመቆጣጠር ይረዳል።					

ክፍል አምስት፡ የታካም እና የጤና ባለሙያ ግኑኝነትን በተመለከተ ያሉ ጥያቄዎች

ማሳሰቢያ፡ ከዚህ በታች ታካምዉ ስለ መጀመሪያ አገልግሎት ሰጪ ወይም የጤና ባለሙያ ሊሰጡ የሚችሉ ዘጠኝ ዐረፍተ ነገሮች አሉ፡፡ እባክዎን ለእያንዳንዱ ዐረፍተ ነገር ተሳታፊዉ/ዋ ትክክል ነዉ ብለዉ በሚስማሙበት መልስ (√)ምልክት ከዐረፍተ ነገሩ ፊት ለፊት ከሚገኘዉ ሳጥን ውስጥ ያስቀምጡ

ተ.ቁ	ዐረፍተ ነገር	በፍጹም ትክክል አይደለም	በተወሰነ መልኩ ትክክል ነዉ	ትክክል ነዉ	በአብዛኛዉ ትክክል ነዉ	ሙሉ በሙሉ ትክክል ነዉ
45	የጤና አገግሎት ሰጪዬ እኔን ይረዳኛል ወይም ያግዘኛል፡፡					
46	የጤና አገግሎት ሰጪዬ ለእኔ በቂ ሰዓት ሰጥቶ ያክመኛል ፡፡					
47	የጤና አገግሎት ሰጪዬን እኔ አምነወለሁ፡፡					
48	የጤና አገግሎት ሰጪዬ የእኔን ሀሳብ ይረዳል፡፡					
49	የጤና አገግሎት ሰጪዬ እኔን ለመርዳት ቆራጥ ነዉ፡፡					
50	የጤና አገግሎት ሰጪዬ እና እኔ ስለበሽታዉ ምልክቶች ተግባብተናል ወይም ተስማምተናል ፡፡					
51	እኔ የጤና አገግሎት ሰጪዬን ማናገር እችላለሁ፡፡					
52	እኔ የጤና አገግሎት ሰጪዬ በምሰጠዉ ህክምና ደስታኛ ነኝ፡፡					
53	የጤና አገግሎት ሰጪዬ በቀላሉ ማግኘት እችላለሁ፡፡					

ክፍል ስድስት፡ የስኳር በሽታን በተመለከተ ታካሚዎች ስለግል የጤና አጠባበቅ የሚጠየቁ ጥያቄዎች

ከዚህ በታች ያሉ ጥያቄዎች የስኳር በሽታዎን በተመለከተ በባለፉት ሰባት ቀናት ዉስጥ ያደረጉትን የጤና አጠባበቂ ጥንቃቄን

በተመለከተ ነዉ:: በባለፉት ሰባት ቀናት ታመዉ ከሆኑ ከእርሱ በፊት የነበረዉን ሰባት ቀናት ወይም ሣምንት የነበረዉን ሁኔታ በማስታዎስ ይመልሱ::	
54	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት ጤናማ የሆነ የአመጋገብ ዕቅድዎን ተከትለዋሉ?
	0 1 2 3 4 5 6 7
55	በአማካይ በባለፈዉ ወር ዉስጥ በሣምንት ለስንት ቀናት የአመጋገብ ዕቅድዎን ተከትለዋሉ?
	0 1 2 3 4 5 6 7
56	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት አምስትና ከዚያ በላይ ፍራፍሬ ወይም አትክልት ተመግበዋሉ?
	0 1 2 3 4 5 6 7
57	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት ጮማ የበዛበትን ምግብ ለምስሌ ቀይ ስጋ ወይም በጣም ስብ የበዛበትን ምግብ ወይም የወተት ተዋፅጾ ተመግበዋሉ?
	0 1 2 3 4 5 6 7
58	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት ቢያንስ ለ30 ደቂቃ የሰዉነት እንቅስቃሴ አድርገዋሉ? (አጠቃላይ ተከታታይ የሆነ የሰዉነት እንቅስቃሴ፤ የእግር ጉዞንም ጨምሮ)
	0 1 2 3 4 5 6 7
59	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት ከተለመደዉ የተለዩ የሰዉነት እንቅስቃሴ(ለምሳሌ ዋና፤የእግር ጉዞ፤ ሳይክል መንዳት) አድርገዋሉ?
	0 1 2 3 4 5 6 7
60	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት የደም ስኳር መጠንዎን ለክተዋሉ?
	0 1 2 3 4 5 6 7
61	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት የደም ስኳር መጠንዎን በህክምና ባለሙያዎ በታዘዘዉ መሠረት ለክተዋሉ?
	0 1 2 3 4 5 6 7
62	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት እግሮችዎን አይተዋሉ?
	0 1 2 3 4 5 6 7
63	በባለፉት ሰባት ቀናት ዉስጥ በስንት ቀናት የጫማዎን ዉስጥ ከመጫማትዎ በፊት አይተዋሉ?
	0 1 2 3 4 5 6 7
64	በባለፉት ሰባት ቀናት ዉስጥ ስጋራ (ቢያንስ አንድም ቢሆን) አጨሰዋሉ? 0. አይደለም 1. አዎ
65	ለ64ኛ ጥያቄ መልሱ አዎ ከሆነ በአማካይ በቀን ስንት ስጋራ አጨሰዋሉ? የስጋራ ቁጥር ወይም ብዛት----------

ስለትብብርዎ እናመሰግናለን

Annex V: Hadiyissa Version Participant Informed Consent Form

Jimmi yuuniberssitte'i

Fayyaa'omi Instituux Minaadaphi Fayyaa'omi Fakkalitte'i

Epidimiloje'i Lossan Baxxancha

Saarayaxxi la'ishsha amananichi Forima

Baxanichi Mato: Saarayaxxi La'ishsha

Xumato: Xuma gatakka'ahinehe/Hossakka'ahinihee

Anni_____yamamommo. Kaba baxxumuyyi yoomokki jimmi yuuniberessitte'i lossanichi ihukki Abraaham Lomiboro baxukkuyyi yoo saarayatonne beyamamma sawwitte wixaa'anichi ihatette. Awonna yoo sawittuwwa danaamisa maceesakka'a lasonne ka saarayatonne baxanitakonna dollanitakko'okkoo.

Projekitti Horrori sawitte: Lami hagaa'l suukkaa'l qaxxomma egerimmaa hoffi sukkaa'l qaxxomma egerimminna higisso mashikka'uwwa Hadiyyi Zonanne yoo Minaadaphi Hosiphitaaluwwanne yoo qoori lami hagaa'l sukkaa'l jabbanonne la'iminattee.

Saarayaxxi horrori sawitte: Ku saarayatti hadiyyi zoonane sidammo minadaaphi hosiphitalluwwane yoo lami hagaar sukkaa'l jabbi yoo qoori manane sukkaa'l qaxommaa hoffi sukka'l qaxomina higissa uwwo mashikka'uwwa la'iminatte. Saarayaxxi lasanichchi mishimmi ka jabbi bikkina harammo sawitte uwwokko.Odim annani annani ihaakko jabbanina harammo qoddo'uwwa qoddimina harammokko.

Saarayaxxi seelluwwa: Kinni uwwitakkami sawitti sukkaa'l jabbi bikkina ixene amaxamma waaro muuli fayya'ommi hawuwwa odim leho gaasakka'aa horimina araqa harammo bikkina ka saarayatonne baxanixakkona hayidimine xaminimmo. Baxanitakenne itantakko'ilas xammichchuwwa xamimma asheerommo. Saarayaxxi worronne yoo xamichuwinse dabarima hasakkami bee'ekki he'uulas awonno xamichchane higimma xanitakkammo. Hasakkolas ayyi amanenemmi ulisimma xanixakkammo. Wixo sawitte saarayatto awonisso manichinse muuli mani la'enna xanoyyo.

Badimma tee'imi heeke'anicha: mati mati gaqi sawituwwa baxanisimmi hoffokkami keemena xanokko.Ihona bagaani okki ihona hanisommoyyo odimi hasakko'i bee'ilas dabaacha uwimma sabakenna xanitakammo.

Saarayaxxi awaaddo: Kinni baxanichchi sukkaa'l jabbi bikkina la'iminna lobbakkata haramookko. Saarayaxxi awwadimi sukkaa'l jabbanni bikkina fayya'oommi baxaani bikkina odimi hosiphitalli uwwo awwado axisiminna harammena xanokko.

Uwwakkami luwwa: Kaa saarayatonne baxanitakko'i bikkina uwwinomi luwwi be'ee. Ihuutani galaxxinino higimma hanisommoyyo.

Ulisimmi tee'imi Sabbimma: Kinni baxanichi itinette. Ayyi amanemi sabakkolasi ulisimma xanixakkammo

Maxxaqomma: Kaba wixo sawitti maxaqisinne amadammo bikkina ayyimmi la'eena xanoyyoo.

Saarayaxxi doo'l qacaanicha: ka saarayatone baxanichi tee'imi baxanicha sabbimmi ka hosiphitaalinse tee'mi muuli fayya'ommi mininse sidakkami awwadone hawwoja afissoyyo.

Xaamichuwwi yoolas: Ka saarayato awonsokkoki saarayanchii Abraahami Lomborotte. Ee bikkina ayyi xammichimi yoolas kaba xamimma tee'im kanni worronni yoo silki xiginnee: 0920991831 e-mailinnnee abrish4466@gmail.com hayidimmine xamimma xanitakammo.

Baxanichi Lammo: sawwixxi doo'l forima

Ka forimmanne yoo sawwitte qannana'ammo tee'imi anni la'oommi sagaarinne qannana'akko'okko. Ee bikkina kanni hananni kittabamukki sawwittuwwa danaamisa qoosa la'ammo.

Ka saarayatonne baxanixakeenna doo'l yoohonihee?

1. Hassommoyyo Galaxxommo
2. Ooyya ☐ Xamichcha xamimma asheere

Ka saarayattonne baxamimmi qoocanchaa awwadoo odim awonisenna xano hawwo baxamanichinna kurrammo.

Sawwitti wixaa'anich furma'aa_____ Bala_____

Annex VI: Hadiyissa Version Questionnaire Hadiyissa Version

Jimmi yuuniberssitte'i

Fayyaa'omi Instituux Minaadaphi Fayyaa'omi Fakkalitte'i

Epidimiloje'i Lossan Baxxancha

Xammichuwwa

Ku xammichi lam hagaa'l sukkaa'l jabbi yoo jabbanisse sawite wixaa'imina gudakkohanne. Xammamanisse wixxo sawitti ayyekkam annanisoni maxamisinne amadamokkoo.

Xammamanichi annanaxxi xigo……/2019

Beyyo: Nigissiti Ellene'i tisishi Hosipittalla Shonne'i luxxi Hospittalla

Balla---------- saa'atta----------

Baxxanch mato : Xammamanni gaqi Xammichuwwa			
Xigo	**Xammicha**	**Dabbacha**	**Hige**
1	Umur wommi hiinchi mee'o?	_____ hiinicho	
2	Alibacha	1. Gonicho 2. Meniticho	
3	Ammannatto	1. Protesittanitta 2. Ooritodokisa 3. Kaatolikka 4. Muusilimma 5.kakeenni mulann _____	
4	Mine isimmi bikkina	1. Minne issu bee'anne 2. minne issakko'hanne 3. minne issa annani'ihakkohanne 4. annani iha he'ohanne 5. Menticho/manich lehakkohanne	
5	gicho	1. Hadiyya 2. Kammibaata 3. Guurage'e 4. Silixxe'e 5. mullikeno _____	
6	Lossanni ssa	1.Qannana'imma kittabimma xanobee'anne /Xanitamibee'anne 2.Qannana'imma kittabimma xanohanne /Xanitamanne 3.---------- Baxxanicha 4. Saritifiketta ixxe hannanette	
7	Xammamanich baaxxi	1. Adil baxxanicho 2. Daddaranicho 3. Mini amatte/baxi bee'e 4. Abbulanicho	

		5. mullikeno_____	
8	Heechi beyyo	1. Beerro'o 2. Gaxxara	
9	Agganna hikkani birra sidotto?	_____ birra	
10	Kii abbarosi agganna hikkani birra sidokkoo?	_____ birra	
Baxxanich lamo : killikinikkaa'l tee'imi sukkaa'l jabbi amaxxama yoo xammichuwwa			
Xigo	**Xammicha**	**Dabbacha**	**Hige**
11	Kii abbarosinisse (anni tee'imi amanisse/abayyi/ayya) sukkaa'l jabbi yoo manichi hee'ukkonihe?	3. Oyya 4. Bee'anne	
12	Sukkaa'l jabbi sidammukkani mee'i hiinicho ihaatte (mazigabba mo'ee)	_____ hiinicho	
13	kaa jabbina kii abbarosinise harramatto sidohonihhe?	1. Oyya 2. Sidommoyyo	2ihullasi 15 xammichane hige
14	13 xammichina dabbachi oyyatti ihulasi kanni worronni yoo keeninise hinikkido'i harramatto sidottokki? matinise hanaan ihaakko dabbachi xanammokko	1. Qarrare massomisinna tisisha 2. Sanittiphi harramatto 3. Xisommi amanne iyakka'a hakimmi mine masimma 4. Sawixxi haramatto 5.Muu'l kenimmi yolasi kullehe _____	
15	ka jabbina qaxarro'i wattakko'i higukki sasemmi amanemi fayya'omi baxanichinise hoffe'uu beyyo matkorem ihukka sogitanno sidaakka'innihe?	1. Oyya 2. Sidummoyyo	2 ihullasi 17 xammichane hige
16	15 xammichi dabbaci oyyate ihulasi kanni worronni yoo keninise hinikka kennina sogittano sidakko'okki? matinise hanaan ihaakko dabbachi xanammokko.	1. Huuribaxxi qooddo'o seeramissa awoonimma 2. Orrachi xoxxolisha baximmi bikkina 3. Sukkaa'r afuqaxa kenammimmi bikkina 4. Lokki fayya'omma egeelimmi bikkina 5.Qarrare seerammisa massimmi bikkina 6.Muu'l kenimmi yolasi kullehe _____	
17	Gaqqi xiqi sukkaara kennakkami mutti he'ahinnihe?	1. Oyya 2. Bee'anne	
18	Sukka'l jabbina dollabbi qarrarinse muuli qarrare masittakamonihee?	1. Oyya 2. Massommibee'ane	2ihullasi 20 xammichane hige
19	18 xammichina dabbachi oyyatti ihullasi hinkidoni'ii qarrare masittakammokki?	1. Las gati/habashshi qarrarre 2.Amanaxane/ayyanni	

	(matinise hanaan ihaakko dabbachi xanammokko)	fayya'omma(kobbilishina Tsabala awaaximma Muu'l kenimmi yolasi kullehe _____	
20. Sukkaa'l jabbi qarrarre qokkodo'o eggerakka'aa masimmi bikkina yoo xammichuwa			
20.1	Mati mati amanne qarrarre masimma xadakammonihee?	0. Bee'ee 1. Ooyya	
20.2	Manni mati mati amanne xadatteti ihoni muli mashikaa'inne qarrarrre masimma xadokko. Higukki lam saanti worronne qarrarre masitakko'ii bee'ii balluwwi yoohonnihee?	0. Bee'ee 1. Ooyya	
20.3	Qarrarre masimmi keemmu bikkinna hakimmichina kuttakoni masimma uulisakka'aa ashetakko'i amanni te'imi uulisakko'i amani yoohonihee ?	0. Bee'ee 1. Ooyya	
20.4	Goggo taakki hee'ooharre tee'imi minninse qee'l beyyo taakkelakkam amanne qarrarre amadakka'aa marimma xadakkamonihee?	0. Bee'ee 1. Ooyya	
20.5	Beeballa huunidemi qarrarremi masitakka'ahinee?	0. Bee'ee 1. Ooyya	
20.6	Xissi marre'uwwa eegilitakko'oo laboharree mati mati amane qarrarre masimma uulissakka'a laqakkammonihee?	0. Bee'ee 1. Ooyya	
20.7	Qarrarre balli huunidami masimmi mati mati mannina hawwisohannee. Kinne qarrarre qoddo'o eggetakka'a masimmi hawwissohonihhee?	0. Bee'ee 1. Ooyya	
20.8	Qarrarre masimmina saawimmma hoogakkammi amani yoohonihee?	0. Bee'ee 1. Ooyya	

Baxxanichi saso: Jabbanni maziggaba moo'iminne woommo xammichuwwa wonishiminna guddukki checkilista

Tissisha : Jabbanekka maziggaba moo'iminne awwonna yoo xammichchuwwa wonishe. Laaborrattorre'ii xammichuwwinna abbisi amanni akkekka wonishe (yoolasi kabalikka)

Xigo	**Xammicha**	**Dabbacha**	**Hige**
21	xammamanichi kaba masso sukkaa'l qarralli hagaari hikkannee	1. Inisulini xalle'ee 2. Suummi massakkammi qarrarre 3. Lamomme (Inisulinna suummi massakkamannee)	
22	Sukkaa'l jabbi muu'l daballammo bee'i jabbi yohonihe? (mazigabba mo'ee)	1. Oyya 2. Bee'anne	2 ihullasi 25 xammichane hige
23	22 xammichi dabbachi oyya yakkolasi yoo jabbika hagaara xammitta kitaabbe	_____ _____	
24	22 xammichi dabbachi oyya yakkolasi ee jabbina qarrare masitakamullanihe?	1. Oyya 2. masommibee'ane	
25	Xammamanichi kaani worroni yoo kinnenisse illageni maramara la'amakko	1.Illi jabbo 2.Niwurrophatte	

	sukkaa'l jabbinne amaxamma wareena xano hawwi yoohonihe?matinise hanaan ihaakko dabbachi xanammokko ((mazigabba mo'ee)	3. Nifirrophatte'e 4.Lokki jabbo/muranicha 5.Muu'l kenimmi yolasi kullehe _____	
26	Xammamanichi hiigukki lohhi agaani worronne mati korremmi gattoni qooo'o eggerrara killinikka warrahinihhee	1. Ooyya 2. waarrukkoyyo	
27	Xammamanichikka sasi agaani sukka'l akekka kitaabbee (kabalikkammi edaatte)	1. _____mg/dL 2._____mg/dL 3._____mg/dL	
28	Xammamanichikka kaballa kennammukki keematto Uulichcha kitaabbee	1. keematto _____Kg 2. Uulichcha _____Cm	
29	Xammamanichikka kaballa kennammukki xiigga kitaabbee	1 Luuxekki SBP)_____ mmHg 2. Laamekki (DBP)___ mmHg	

Baxxanichchi Soro: Sukkaa'l jabbi bikkina yoo lachchaa keenno xammichuwwa. kanni worronni yoo sawwituwwa labbokko yitaakkolas hanqa yitaakka'aa, ihubeelasi qophano te'imi la'oommoyyo yitaakka'aa dabalehee

Xigo	**Xammicha**	**Dabbacha**	
30	Sukkaa'l jabbi yoo mannichi sukkaa'l jabbi bee'ii manichinisse lobbokka mul fayya'oommi hawwinne amadanichi gadda'i araqqa.	1. Hanqa 2. Qophano 3. La'oommoyyo	
31	Sukkaa'l xissi qarrarre tee'imi inisulina masakkammi amane itakkam huurbatta keennanicho egerimi hassissokko.	1. Hanqa 2. Qophano 3. La'oommoyyo	
32	Plazimma gilukossi (FBS) sadeenitti sa'aatinna sommanimma tee'imi huuribatta masakkonni xiiqi worronne yoo gilukossi keennanicho moo'isohannee	1. Hanqa 2. Qophano 3. La'oommoyyo	
33	Di'iirrommanni hoffani ihaakko huuribattuwwa itimi woddani xissinne amadanichcha xaa'issokko.	1. Hanqa 2. Qophano 3. La'oommoyyo	
34	Sukkaa'l keennanicho danaamisa egeeru manichina orachchi xoxolishshsa baximmi xiiqi worrone yoo sukkaa'l qaxxomma mahammi dabbasooyyo.	1. Hanqa 2. Qophano 3. La'oommoyyo	
35	Iniffeekishin hee'immi sukkaa'l qaxxomi edoo'isa issokkoo.	1. Hanqa 2. Qophano 3. La'oommoyyo	
36	Lokkii lobanni ihaakko kobbe'e issaimmi lokki madimma hoorokko.	1. Hanqa 2. Qophano 3. La'oommoyyo	
37	Qaxxarro'o eggerakka'aa haakimi beyyo awwonnim sukkaa'l xissinne amaxxamma warro hawwuwwi marre'uwwa gaasakka'aa la'iimminna harammokkkoo.	1. Hanqa 2. Qophano 3. La'oommoyyo	

Xammamanichi uwwo saawwixxi ilagennee (√) marre'ee xammichi ilagge yoo saxinanne disse.

Xigo	Xuunisammi woocca	Lobbakatta itamommo	Itammomm o	Dabachi bee'ee	Itammoyyo	Mahammi itamommoyyo
38	Sukkaa'l jabbi akkamanicha xanakkammi jabbo.					
39	Xiiqqi worronne yoo gilukossi eddohaarre					

	marree'uwwi uroharree qarrarre uulissimmi xanammokkoo.					
40	Sukkaa'l jabbi qarrarre qoddo'oo awonnakka'aa masimmi mu'li xissoo ili xisso hoorrokkoo.					
41	Lipiddaa xiigga eggelimi sukkaa'l xissaninna hasissohanne.					
42	Las gati tee'imi habashshi qarrarre masimmi dollabi qarrarre masiminse elookko					
43	Inisulina masimma asheerimi sukkaa'l jabbo ixee amaxamma waaro hawwo baasissokko					
44	Orachchi xoxolisha hunidi amane baximi sukka'l jabbo eggelimina harramokko.					

Baxaanichi Onto: Xissaanichchii fayya'oommi baxaanichchine yoo exanicha tee'imi shiinatanicha keeno xammichchuwwa.

Tissisha: kanni worronni Xissaanichchii fayya'oommi baxaanichchine he'eena xannokko yoo xuunisammi woccuwwi yookko. Xamammanichi ina labookko yaa itammukki xunisammi wooci ilaggene (√) mare'ee dise.

Xigo	Xuunisammi woocca	Horiyemmi hanqayyo	Hoffiqaxammi hanqa	Hanqa	Lobbakkatta hanqa	Horiyemmi hanqa
45	Fayya'oommi baxaanichchi esse haramohannee					
46	Fayya'oommi baxaanichchi ina ihoo qaxi amane uwwa akamokko					
47	Fayya'oommi baxaanichcho anni amanommo					
48	Fayya'oommi baxaanichchii ii saawittee la'ookko					
49	Fayya'oommi baxaanichchii esse harammena mullakkohannee					
50	Anni fayya'oommi baxaanichchii jabbi maree'uwwi bikkina shiinatamammo					
51	Anni fayya'oommi baxaanichcho attorassimma xanommo					
52	Anni fayya'oommi baxaanichchi uwwo awadone liramammo					
53	Fayya'oommi baxaanichcho hassumi amane sidimma xanommo					

Baxaanichi Loho: Sukkaa'l jabbinna xissaani isimmi hasisso gaqi fayya'omma egelimi bikkina xaammakkam xaammichuwwa

Tissisha: kanni worronni yoo xaammichuwwi sukkaa'l jabbina higuukki lamari bali worronne isakko'ii gaqi fayya'oomma egelim bikkina xamohane. Higuukki lamari bali worronne Xissitakko'olas ee'hanni elagen hee'uu lamari bala sawitakka'aa dabaleh

	Higukki lamari balluwwinse mee'i balane fayyaa'i huurbaxxi itimi qoddo'o awonitakka'attee?							
54	0	1	2	3	4	5	6	7
55	Higukki agaani worronne lamibe'anichisinnee saantane mee'i bala huuribatta itim qoddo'o awonitakka'attee?							
	0	1	2	3	4	5	6	7

56	Higukki lamari baluwwi worronne mee'i balane hoffe'uu beyyone onti mishaa duubbi kashuwwa itakka'attee?
	0 1 2 3 4 5 6 7
57	Higukki lamari balluwwinse mee'i balane di'iri lophakko koobilishina buuri lophakko huuribatta itakka'aattee?
	0 1 2 3 4 5 6 7
58	Higukki lamari balluwwinse mee'i balane hoffe'uu beyyo sadi daqiiqina orachi xoxolisha baxakka'attee?(awonamma yoo mikimikkimmaa lokki taakkommi eddattee)
	0 1 2 3 4 5 6 7
59	Higukki lamari balluwwinse mee'i balane lossamukaani annani ihaakko Orachi xoxolisha (koobilishshina wachimaa, lokki taakkoo, sayikiilla ushe'immaa) baxakka'attee?
	0 1 2 3 4 5 6 7
60	Higukki lamari balluwwinse mee'i balane xiiqi worrone yoo sukkaa'l qaxomma keenitakka'attee?
	0 1 2 3 4 5 6 7
61	Higukki lamari balluwwinse mee'i balane xiiqi worrone yoo sukkaa'l qaxomma fayya'ommi baxanichi ijaajukisine keenitakka'attee?
	0 1 2 3 4 5 6 7
62	Higukki lamari balluwwinse mee'i balane lokko mollakkattee?
	0 1 2 3 4 5 6 7
63	Higukki lamari balluwwinse mee'i balane kobbe'e issimmi gaasitakka'aa wororro mollakkattee?
	0 1 2 3 4 5 6 7
64	Higukki lamari bali worronne heffe'u beyyonne matomi ihukka sigaarra aggakka'ahinihe? 0. Bee'e 1. Ooyya
65	64 xamichi dabachi ooyatti ihukkilas bala mee'i sigaarra aggakko'oo? Siggaa'l xigo_____

Galaxxommo

Annex VII: Ethical Approval of Research Protocol

JIMMA UNIVERSITY

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Ref. No [illegible]
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Date 28/02/2019

Institutional Review Board (IRB)
Institute of Health
Jimma University
Tel: +251471120945
E-mail: zeleke.mekonnen@ju.edu.et

To: Abraham Lomboro

Subject: Ethical approval of research protocol

The IRB of institute of health has reviewed your research project entitled:

"Prevalaence and factors associated with poor glycemic control among adult type 2 diabetie out patients at publc Hospitals in Hadiya Zone, Southern Ethiopia"

This is to notify that this research protocol as presented to the IRB meets the ethical and scientific standards outlined in national and international guidelines. Hence, we are pleased to inform you that your protocol is ethically cleared.

We strongly recommended that any significant deviation from the methodological details indicated in the approved protocol must be communicated to the IRB before they are implemented.

With regards!

Zeleke Mekonnen (PhD)
Associate Professor, Health Research and Postgraduate Director

Institute of Health
Jimma University

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