Addis Ababa University

College of Natural and Computational Sciences

Center for Food Science and Nutrition

Knowledge, Attitude, Practice related to diabetes among Type II Diabetic Patients in Ambo, Ethiopia: *Institutional based cross-sectional study*

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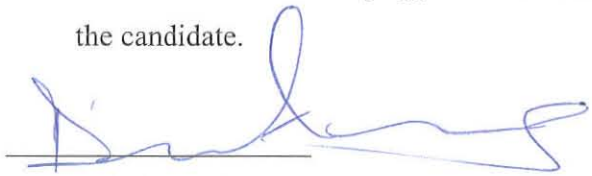
Declaration

I the undersigned declare that this thesis is my original work has not been submitted or presented for a degree in any other institution and that all sources of materials used for the thesis have been duly acknowledged.

Agama Daba

February, 2020

This thesis work has been submitted for examination with my approval as an advisor of the candidate.



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Abbreviation/Acronyms

ADA	American Diabetes Association
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CDC	Centers for Disease Control
Cm	Centimeter
CNCDs	Chronic Non communicable Diseases
DDM	Duration of Diabetes Mellitus
DM	Diabetes Mellitus
DMH	Diabetes Mellitus History
IDF	International Diabetes Federation
KAP	Knowledge, Attitude and Practice
Kg	Kilogram
Mg	Milligram
NCDs	Non-Communicable Diseases
NIDDM	Non-Insulin Dependent Diabetes Mellitus
PPS	Population Proportional to Size
RSM	Random Sampling Method
SD	Sleep Duration
SPSS	Statistical Package for Social Science
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization
WHR	Waist Hip Ratio

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Abstract

Background: *Diabetes is chronic illness significantly affecting health of population throughout the world. In Africa, about 19.8 million adults are affected by diabetes of these; more than 50% are from Nigeria, South Africa, Ethiopia and Tanzania. Knowledge is the greatest weapon in the fight against diabetes mellitus (DM). Self management of patients with T2DM largely depends on the knowledge, attitude and practices of such people regarding the condition.*

Objective*: To assess knowledge, attitude and practices (KAP) related to diabetes among type II diabetes (T2DM) patients attending Ambo University referral hospital, Oromia, Ethiopia.*

Methods: *An institutional based cross sectional study was conducted among randomly selected 248 T2DM patients aged ≥30 years old from Ambo University Referral Hospital. Data regarding KAP towards diabetes were collected using interview techniques. In addition, anthropometric status (body mass index and waist hip ratio) of the participants was assessed. The tool for data collection contains data about socio-demographic characteristics and medical factors. Descriptive statistics was used to set the KAP level among the respondents while logistic regression model was applied to test the association of KAP with various socio demographic and other variables*

Results: *The mean of age among the respondents was 44(±7.2) years. Of 248 respondents, 105 (42.3%) were from rural. Among respondents 111(44.8%), 117(47.2%) and 121(48.8%) were differentiated as not knowledgeable, having poor attitude and exercise poor practice toward diabetes mellitus. Age, place of residence, level of education, average monthly income, family history of diabetes and duration of living with DM were factors affecting KAP towards diabetes. Both sex and occupational status were affecting the knowledge level, but not attitude and practice. Furthermore knowledge level was affecting booth attitude and practice level of participants in the study area*

Conclusion: *This study found that there was gap in knowledge, attitude and practice toward diabetes in the study area among type 2 diabetic patients. Structured diabetes, nutrition and health education should be given for T2DM patients through community based behavioral change to assist and improve the level of KAP towards DM in the study area.*

Key words: Type 2 diabetes mellitus, Knowledge, Attitude, Practice, Adults

1. Introduction

1.1 Background

Diabetes is a chronic illness that significantly affecting health of the population throughout the world. It is a long-term metabolic disorder that occurs either due to inadequate insulin production by the pancreas (type one diabetes mellitus) or when the produced insulin is not effectively used by the body (type two diabetes mellitus) (WHO, 2016). This may result in hyperglycemia (increasing blood glucose concentration) (Tanjia *et al.,* 2016).

Type 2 diabetes mellitus (T2DM) is the most common form of diabetes mellitus and can be controlled through healthy diet, physical activity, losing excess weight, and oral medication (CDC, 2012). Gestational diabetes mellitus occurs only during pregnancy and is a risk factor for T2DM after pregnancy (Mabaso *et al.,* 2014). American Diabetes Association stated that DM may result from causes such as genetic defects in beta cell function, insulin action, pancreatic diseases, and drug- or chemical-induced diabetes mellitus (DM) (such as with HIV medication)(ADA, 2010).

According to the world health organization (WHO) estimate, globally, the number of people with diabetes will be more than double over the next 25 years and the developing world would endure an increasingly larger burden of disease in that period (Primanda *et al.,* 2011). The incidence of the disease varies between populations because of differences in genetic susceptibility and other modifiable risk factors (Quaseem *et al.*, 2007).

Sub-Saharan Africa, like the rest of the world, is experiencing an increasing prevalence of diabetes alongside other non-communicable diseases (WHO, 2004). In 2010, 12.1 million people were estimated to be living with diabetes in Africa, and this is projected to increase to 23.9 million by 2030 (Sicree *et al.*, 2009). In Africa, according to the International Diabetes Federation (IDF) report, 19.8 million adults were estimated to have diabetes. Out of this, more than 50% live in four highly populated countries namely: Nigeria, South Africa, Ethiopia and Tanzania (Cho *et al.,* 2013). Ethiopia, which is one of the developing nations, is at a risk of increased diabetes incidence. The number of deaths attributed to diabetes reached over 21,000 in 2007. This estimate has increased to about 25,000 in 2011 (Feleke *et al.,* 2013). IDF also

reported that about 1.9 million adults aged 20 -79 years in Ethiopia were estimated to have diabetes in 2013 (Guariguata *et al.*, 2013). With national diabetes prevalence of 4.36% and there was about 34,262 estimated diabetes related deaths in same year (Cho *et al.,* 2013).

Complications associated with DM can be reduced by the early diagnosis of the disease and proper treatment (Nathan *et al.,* 2009). Consequently, knowledge about the disease and its complications plays an integral role in the management of diabetes. Patients with proper knowledge about diabetes and its complications pursue suitable treatment and health care (Shrivastava, 2013). Moreover, it is accepted that being knowledgeable, having a positive attitude and following good practices (KAP) assist the successful management of T2DM (Roux *et al.,* 2019).

Diet and exercise play an important role in maintaining normal blood glucose level and prevention of complications in diabetic patients. Most of the diabetic patients do not have enough knowledge about their diet plan and exercise which play an important role in controlling normal blood sugar level. A diabetic diet simply means, eating the healthiest food in moderate amounts at regular mealtimes. In fact, a diabetes diet plan is the best eating plan for every diabetic patient (ADA, 2017). Dietary management in T2DM patients is cornerstone of care and dietary knowledge is significant factor to improve the dietary pattern in our society (Bano *et al., 2017)*. According to Lesser *et al.*, (2014), knowledge regarding diet can change the unfavorable dietary pattern among the diabetes patients. Positive attitude towards dietary management may control the blood sugar among the diabetes patients (Wang *et al.*, 2014). Proper practices according to recommended diet by expert dietician prevent further complications of diabetes (Davison *et al.*, 2014).

Good diabetes management is a balance between healthy eating, exercise and medication (CDC, 2011). WHO also recommends that simple lifestyle measures are effective in preventing the onset of T2DM. People should achieve and maintain healthy body weight; be physically active, eat a healthy diet of fruit and vegetables, reduce sugar and saturated fats intake; avoid tobacco use (WHO, 2013). Early identification of potential complications can provide opportunities for intervention, education, and referral to a specialist when necessary (Health line, 2012).

1.2 Statement of the problem

Type II diabetes is a global health problem and one of the major causes of morbidity and mortality which constitutes about 85 to 95% of all diabetes in high-income countries and accounts for an even higher percentage in low and middle-income countries (Sicree *et al.*, 2009). The global prevalence of diabetes in adults aged 18 years and above was estimated to be 451 million (8.4%) in 2017 and predicted to rise to 693 million (9.9%) in 2045. About 5 million adult deaths worldwide was attributable to diabetes. The global healthcare expenditure on people with diabetes was estimated to be USD 850 billion in 2017 (Cho *et al.,* 2018)

Despite the availability of different treatment modalities, diabetes has remained a major cause of death and its burden is increasing in the developing countries including Ethiopia. IDF reported that Ethiopia ranked 3rd among African countries with 1.4 million DM by year 2012. Worku *et al.*, (2010) reported that the number of diabetics in Ethiopia was about 800,000 by the year 2000, and it could reach 1.8 million by 2030. On the other hand, the 2014 report of the IDF shows that about 4.9 million people adults (20-79 years) in Ethiopia live with diabetes and more than 2.9 million live with impaired glucose tolerance. Another study done in selected hospitals in Addis Ababa reported that the prevalence of T2DM was in the range of 4.6 to 5.1% (Belayneh *et al.*, 2015). Additionally, study done in Bishoftu town, East Shoa, Ethiopia reported that the prevalence of undiagnosed diabetes mellitus was 5% (Megersa *et al.*, 2013). (Abebe *et al.*, 2015). In 2013, a cross-sectional study conducted in Nekemte Referral Hospital showed that there were many patients who lived with T2DM (55%) compared to those patients with type I diabetes (45%) (Tadele *et al.*, 2014).

Knowledge is the greatest weapon in the fight against diabetes mellitus (DM). It is therefore imperative that people with DM and their family members understand the basic facts, such as the type they have, signs and symptoms, treatments, preventive measures, and the importance of maintaining good glycemic control (Raymond *et al.,* 2016). Beke *et al.,* (2013) emphasized that self-management of patients with T2DM largely depends on the knowledge, attitude and practices of such people regarding the condition. Though, A study done in Northwest Ethiopia revealed that about more than half (51%) and 60.1% of type two diabetic patients had poor knowledge and poor attitude respectively (Achenef *et al.*, 2015). As Tadele *et al.*, (2014)

reported that nearly half of diabetic patients had poor self-care practices. Also Abebe *et al.*, (2015) revealed that the level of dietary practice among T2DM patients was poor (51.4%).

Many studies have generated varied results related to factors associated with knowledge and attitude about diabetes. However, it is carried out in developed countries, leaving a gap in knowledge, attitude, practices and associated factors of KAP towards diabetes mellitus in developing countries including Ethiopia in general and the study area in particular. The risk of T2DM is currently increasing in Ethiopia. However, studies assessing KAP towards T2DM and associated factors among type two diabetic patients are scanty. Therefore, this study is designed to assess the level of KAP of T2DM among diabetic patients and factors affecting knowledge attitude and practice towards T2DM in the study area.

1.3 Objectives of the study

1.3.1 General objective

To assess knowledge, attitude, practices and associated factors among type two diabetic patients attending Ambo Referral hospital, Oromia, Ethiopia

1.3.2 Specific objectives

- To assess the level of knowledge, attitude and practices among type two diabetic mellitus patients attending Ambo University Referral Hospital, Oromia, Ethiopia.
- To identify associated factors with knowledge, attitude and practices towards diabetes mellitus among type two diabetic mellitus patients attending Ambo University Referral Hospital, Oromia, Ethiopia.

2. Literature Review

2.1 Diabetes mellitus

Non-communicable diseases (NCDs) are becoming major health challenges with continually increasing burden (Animaw *et al.,* 2017). Diabetes mellitus is one main segments of NCD (ADA, 2013). Almost 80% of the deaths worldwide are due to the diabetes and cardiovascular diseases (WHO, 2011). An approximately 415 million adults were living with diabetes in 2015, about 80% of them were living in low-and-middle income countries and 46% of them were undiagnosed (IDF, 2015).

Diabetes mellitus is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both. Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism. It is one of the chronic non communicable diseases (CNCDs) which have emerged as a leading global health problem. It is also a known risk factor for blindness, vascular brain diseases, renal failure, and limb amputations (Aynalem *et al.,* 2018).

Type2 diabetes is the most common type of diabetes, which accounts for about 90% to 95% of all diagnosed cases of diabetes. This type of diabetes was previously called non-insulin dependent diabetes mellitus (NIDDM) or adult-onset diabetes. Type 2 diabetes is primarily caused by obesity, the lack of physical activity, old age, and family history of diabetes. Other factors that contribute to the development of type 2 diabetes include impaired glucose metabolism and race/ethnicity (CDC, 2014).

2.2 Signs and symptoms of Type 2 Diabetes

The most definitive symptoms of T2DM are polyuria which is excessive urination and increased thirst. The patient also experiences increased appetite resulting from the catabolic state induced by insulin deficiency and the breakdown of proteins and fats (Davidson, 2014). Other symptoms that may or may not be experienced by individuals are weight loss, fatigue, tingling sensation of extremities, lack of concentration, frequent infections, blurred vision, slow wound healing, vomiting and stomach aches (Hinkle *et al.,* 2013).

2.3 Treatment of Type 2 Diabetes

The WHO (2013) recommends the following for the treatment of type 2 diabetes: a healthy diet, rich in fruits and vegetables, insulin, and oral medication to keep blood glucose levels low. It is also important to educate, engage, and empower people with diabetes in the best practices of self-care and management of the disease to improve health outcomes and quality of life (WHO, 2013). This includes regular exercise, healthy weight maintenance, the control of cholesterol and blood pressure, and problem-solving and coping skills (CDC, 2014).

2.5 Epidemiology of DM

2.5.1 Global situation

Diabetes mellitus (especially T2DM) affected the world population in epidemic forms. This epidemic has been triggered by social and economic development as well as urbanization, which is linked with general improvements in nutrition and increasing life expectancy. They are aggravated by some risk factors such as unhealthy dietary habit, smoking, excessive alcohol consumption, hypertension, obesity, overweight and sedentary life style (CDC, 2011). The disease is considered as the most psychologically and behaviorally demanding of the chronic diseases (Asati *et al.,* 2016).

For instance, in 2014 as reported by international diabetes federation, there are 387 million people living with diabetes worldwide. Among these people, 46% of them are undiagnosed for diabetes. The majority of them are aged 40-59 years, and 80% of them live in low-and middle income countries. If these trends continue, by 2035, some 592 million people, or one adult in 10, will have diabetes (IDF, 2014).

The International Diabetes Federation, currently states that the top 5 countries with the highest amount of diabetes patients are China, India, USA, Russia and Brazil However, the countries with the highest prevalence are nations such as Saudi Arabia, Nauru and Mauritius (IDF, 2013).

Globally, the prevalence of diabetes across various occupational groups and its relationship with an occupational factor is a topic of recent interest. Police officers as occupational group are

exposed to unhealthy life style, excessive alcohol consumption and smoking which in turn leads to diabetes mellitus and cardio vascular diseases more than other population. A study conducted by Kumar, 2011, reported that 15% prevalence of diabetes mellitus. Age, hypertension, family histories of diabetes, waist circumference were being identified as risk factors for diabetes mellitus (Wirth *et al.*, 2013).

2.5.2 Situation in Africa

The WHO Step wise approach for chronic non-communicable disease survey which was undertaken in a few African countries reported that the prevalence of diabetes varies widely from one country to another, ranging from 3-11 % (Charles *et al.*, 2013). The islands of Seychelles and democratic Republic of Congo have some of the highest rates of diabetes in the region (Fae, 2007). The absolute and relative mortality rates from diabetes are highest in the 20 to 39 years of age groups that are most economical and productive population in Africa.

Over the past few decades, diabetes mellitus has emerged as an important non communicable disease in sub-Saharan Africa (Jean *et al.*, 2010). Within 20 years if prevention is not well done, the number of cases will be expected to increase by 98%, and impaired glucose tolerance in the region expected to rise by 75.8% (Charles *et al.*, 2013). A study done in Luanda also showed that the prevalence of diabetes mellitus was 7.1%, which indicates a future increases in the frequency of diabetes in this population (Ekpen *et al.*, 2012). In this study, the age group with the highest frequency of diabetes was 60 to 69 years followed by the age group 40 to 49 years (30%).

2.5.3 Situation in Ethiopia

World Health Organization estimated the number of diabetics cases in Ethiopia to be 800,000 by the year 2000 and the number is expected to increase to 1.8 million by 2030 (Gill *et al.*, 2009). International Diabetes Federation (IDF) also reported that the number of adults living with diabetes in Ethiopia was 3.5% (Whiting *et al.*, 2011). Moreover, IDF estimated the national prevalence of DM as 4.36%, but community based survey in Ethiopia suggested even greater prevalence of diabetes. A community based cross sectional study conducted among adults 35 years and above in Gondar, Ethiopia found the prevalence of type two diabetes 5.1% in urban

and 2.1% in rural (Abebe *et al.*, 2014). Another study conducted among commercial bank of Ethiopia employees Addis Ababa, Ethiopia, found 6.4% prevalence of T2DM (Nshisso *et al.*, 2012).

2.6 Associated factors for Type 2 Diabetes

2.6.1 Socioeconomics and demographic factors

According to International Diabetes federation (IDF) Atlas 2013, Type 2 diabetes accounts for 85% to 95% of all diabetes in high-income countries and may account for an even higher percentage in low- and middle income countries. Type 2 diabetes is a common condition and a serious global health problem. In most countries diabetes has increased alongside rapid cultural and social changes: ageing populations, increasing urbanization (IDF, 2013). Rapid increase in both the prevalence and incidence of type 2 diabetes has occurred globally with significant increase, in societies in economic transition (WHO, 2005). Almost half of all adults with diabetes are between the ages of 40 and 59 years. More than 80% of the people with diabetes in this age group live in low and middle-income countries (IDF, 2013).

Studies in Northern Nigeria and Sub-Saharan Africa, The increase in type 2 diabetes mellitus in Africa has been attributable in part to urbanization and urban residence (Dahiru *et al.*, 2008). The finding also reported that subjects in the highest socioeconomic class showed significantly higher prevalence of type 2 diabetes when compared with the others.

In Ethiopia, a community based study in Jima town shows that the prevalence of type 2 diabetes was 5.3% and significantly associated with age (8.2%), those who have middle income (11.2%), male in sex (9.2%) and over weight (12.6%) (Tilahun *et al.*, 2007).

2.6.2 Knowledge, attitude and practices of diabetes mellitus

Knowledge, attitudes and practices (KAP) surveys help to understand misconceptions that may possibly hinder behaviour change (Chiwungwe, 2017). According to a community based study done in Kenya showed that only 27.2% respondents had good knowledge but 49% and 41% of type two DM had good attitude and good practices towards diabetes mellitus, respectively (William, 2010).

2.6.2.1 Knowledge

Knowledge is the greatest weapon in the fight against DM. It is therefore imperative that people with DM and their family members understand the basic facts, such as the type they have, signs and symptoms, treatments, preventive measures, and the importance of maintaining good glycaemic control (Raymond *et al.,* 2016).

Diabetes knowledge is vital in developing diabetes related healthful attitudes which enhance the self care skills of patients. Moreover, the role of diabetes knowledge is to improve clinical outcomes and prevent complications (Shrestha *et al.,* 2015). Community's knowledge can help to assess causes, risk of diabetes and motivate them to seek proper treatment and care (Kassahun *et al.,* 2017). In terms of health and wellbeing, adequate knowledge on behavioral modification has been identified as the most important aspect to influence patients' attitude and practices positively (Kheir *et al.,* 2011). Despite this, KAP of patients with T2DM are reported to be challenging in areas where the incidence of T2DM is high (Roux, 2019).

Well-informed people would be motivated to assess their risk for the disease, seek proper treatment and care, and take charge of their disease (Saleh *et al.,* 2012). Knowledge about DM and its complications could also assist in the early detection of the disease and reduce the incidence of its complications. This would further encourage the individuals to be cautious about the disease and to seriously consider recommendations about prevention of DM (Ahmad *et al.,* 2013).

According to Asmamaw *et al.*, (2015) the study result showed that about 51% participants had poor knowledge and 60.5% participants had poor attitude about diabetes mellitus in Northwest Ethiopia. In addition, a study assessed respondents' diabetes knowledge level in Mekelle city revealed that only 44% of the respondents scored 'good' on the total diabetes knowledge questions (Berhe *et al.*, 2014).

2.6.2.2 Attitudes

Attitude refers to the emotions triggered by certain events as well as the interpretation of certain feelings affected by predetermined beliefs towards that event (Chiwungwe, 2017). In T2DM,

attitude is influenced largely by the subject's knowledge regarding T2DM, and the subject's perception of whether society evaluates the T2DM patients negatively (Schabert *et al.,* 2013).

Adverse attitudes and psychological problems such as depression are common among diabetes patients and can lead to poor diabetes management (Mohammadi *et al.,* 2015). A cross-sectional study done in India showed that about 64 % of DM patients had poor attitude regarding diabetes mellitus and 30.9% of respondents also believe that DM patient can eat all types of food at anytime (Mukhopadhyay *et al.,* 2010).

The negative attitude towards T2DM is not entirely externally generated as a result of what the subject perceives as the understanding of the society. T2DM requires patients to make drastic changes to their diet so that the condition can be controlled (Ajala *et al.,* 2013). Whole grain, vegetables and fruits that are encouraged in T2DM are not as tasty as purified food with additives to adjust taste and the general appeal of food. More often, T2DM patients have to let go of their favorite foods in pursuit of better health, and this is frustrating to these patients who feel they have to be treated like children who are told what to eat and what to avoid. In addition, anxiety and stress about possible complications of T2DM further compounds the frustration of the patients (Smith *et al.,* 2013). All these internally generated perceptions bear negative attitude towards the condition, further hurting self-management and control.

2.6.2.3 Practice

Practice is the habitual community involvement to prevent diabetes mellitus. T2DM is considered a lifestyle condition and the mainstay of its management depends on the patient's knowledge and understanding of the condition as well as acting appropriately to keep the blood glucose within the acceptable limits (Ginter *et al.,* 2013).

Dietary recommendations for diabetic patients focus on the reduction of fat intake and increase of vegetable consumption with moderate calorie restriction. A study done in China showed diet intervention alone associated with 31% reduction in the risk of developing T2DM (Alberti *et al.*, 2007).

According to a study done in Oromia region, Ethiopia, about 33.62% and 17.24% of DM patients had poor and average practices, respectively (Abdulkadir *et al.*, 2014). Moreover, a cross

sectional hospital based study done in Addis Ababa by Worku *et al.*, 2015 showed that the level of dietary practice among type 2 diabetic patients was poor (51.4%).

2.7 Associated factors for knowledge, attitude and practice (KAP) towards diabetes mellitus

KAP towards T2DM was determined by different factors: like age, education level, place of residency, income level, family history, health education, duration of the disease etc. A cross-sectional study in Iran revealed that Age, treatment methods, DM duration, and existence of diabetic retinopathy had significant correlations with KAP level (Niroomand *et al.,* 2015). Furthermore, as it is reported by Rahaman *et al.,* (2017), age and gender were significant predictors of knowledge and attitude whereas patients with graduate degrees and above compared to illiterates reported significantly greater knowledge and practice, after adjustments for covariates.

Niguse *et al.,* (2019) also stated that knowledge level can be vary based on different socio demographic factors like sex, education level, place of residence, monthly income level and marital status indicating that, males were more knowledgeable than females, those from rural were less knowledgeable and those with low income level were less knowledgeable than those have high income. Additionally, Feleke *et al.,* (2013) identified that age, education and duration of the disease were factors affecting knowledge towards diabetes

In the case of attitude Mumu *et al.,* (2014) in Bangladesh reported that participants those with higher education level, those having family diabetes history and those who were in higher socio economic status were with positive attitude towards diabetes mellitus. Also Kassahun *et al.,* (2017) in Bale, Ethiopia showed that knowledgeable individuals were with positive attitude to diabetes mellitus than those with low knowledge level about diabetes.

In the case of practice many studies like Rahaman *et al.,* (2017) in Dhaka, Kassahun *et al.,* (2017) and Berhe *et al.,* (2014) in Ethiopia reported that education level, income level, duration of disease, knowledge and attitude level are determining factors those affecting individuals practice towards diabetes mellitus. Educational program was the most important significant predictor of KAP in all study.

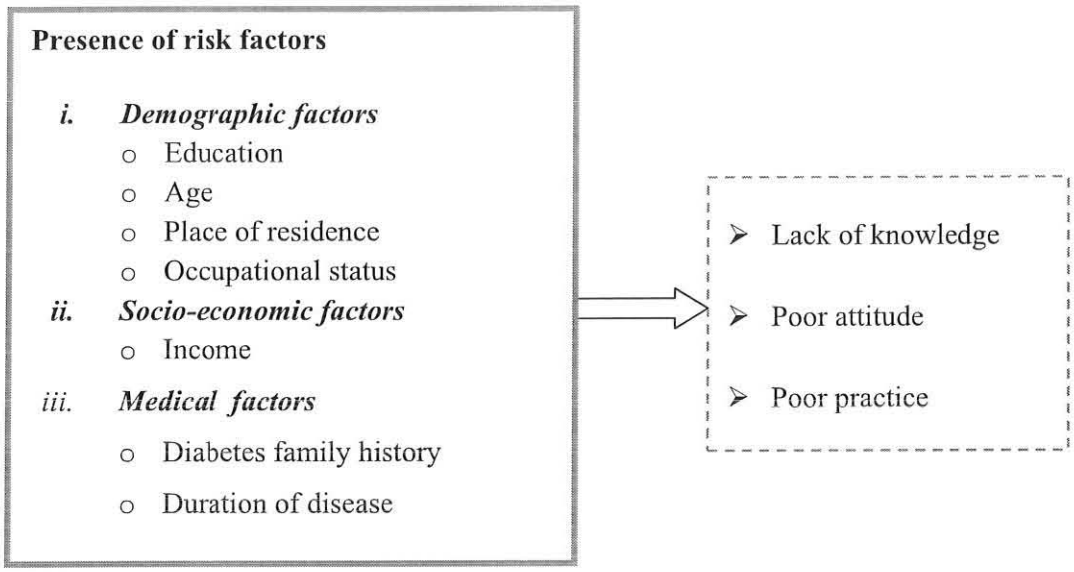


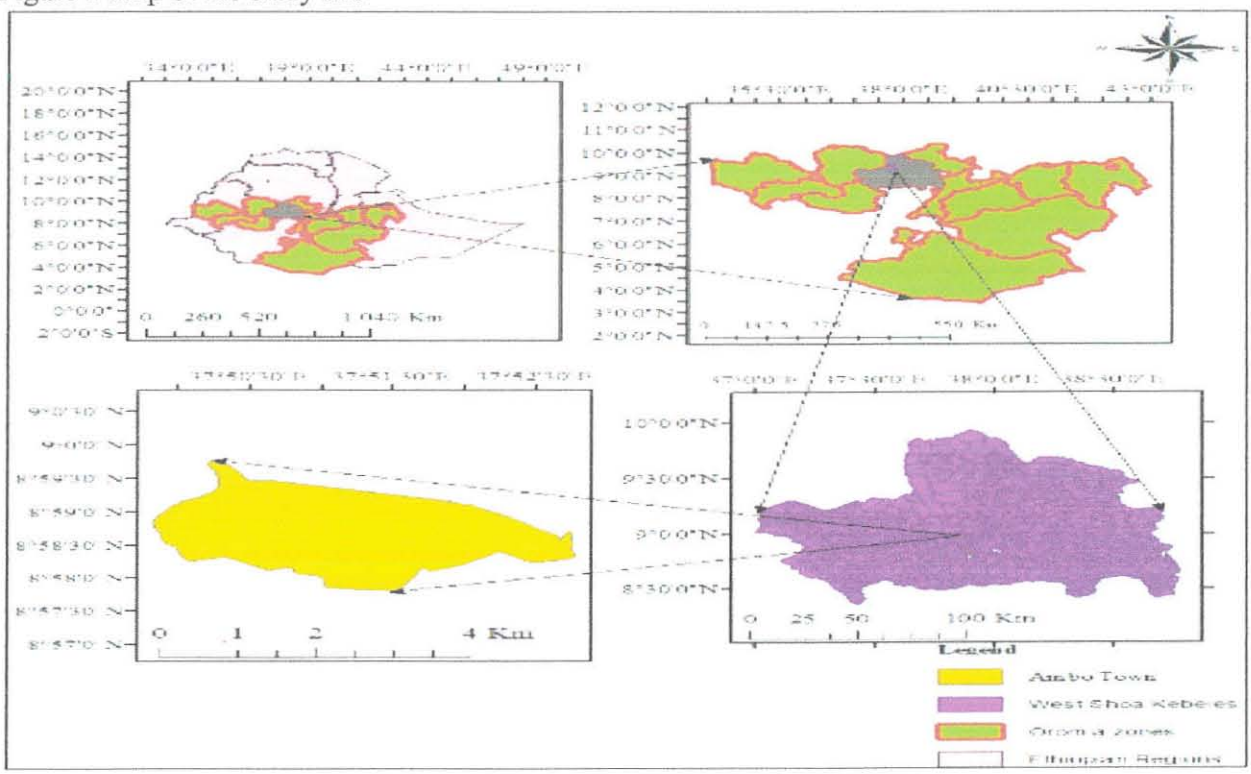
Figure 1Conceptual frame work

3. Materials and Methods

3.1 Description of the study area

Ambo University is one of the higher public academic institutions in Ethiopia. It is located in west Shoa, Ambo town, west of Addis Ababa 112 km and the town has a latitude and longitude of 8°59′N and 37°51′E respectively and an elevation of 2101 meters above sea level. The average annual temperature is 17.5 °C in Ambo. The main agricultural crops grown in the areas are tef, wheat, barley, and maize, sorghum and fruit and vegetables, especially fruits obtained from market with expensive cost. The town's market day is Saturday (Nigatu *et al.,* 2018). According to the town municipality, more than 121,061 populations live in the town in 2019(2011 E.C), in which males accounts for 59,322(49%) and females 61,739(51%).

Figure 2 Map of the study site



Source: Geographical information system (ARC GIS) version 10.1

3.2 Study design and period

Institutional based cross-sectional study was conducted among Type 2 DM patients attending in Ambo University Referral Hospital, Oromia, Ethiopia from December 2018 to May 2019.

3.3 Source population

All type 2 diabetic patients' ≥30 years of age those visited Ambo University Referral Hospital during the data collection period

3.4 Study population

All type 2 diabetic patients' ≥30 years of age those randomly selected from Ambo University Referral Hospital.

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria

- Individuals who were diagnosed to have T2DM
- Adults whose age is ≥30 years old

3.5.2 Exclusion criteria

- Age <30 years old.
- Individuals who cannot respond to the queries and chronically sick at the time of the study.

3.6 Sample size determination

The sample size of the study is calculated using formula for a single population proportion by considering the following assumptions:

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

Where: **n** = required sample sizes, **Zα/2** = critical value for normal distribution at 95% confidence level which equals to 1.96 (z value at alpha =0.05), P1 = Expected prevalence of poor knowledge, attitude and practice about diabetes mellitus was 11.2%, 18.1% and 33.6%

respectively among type two diabetic patients attending Adama hospital Medical college (Abdulkadi *et al.*, 2014).

Table 1 Sample size calculations for each specific objectives of the study

Objectives	**Sample size calculation**	**Correction factor**	**10% NR**	**Final sample size**
To assess the level of Knowledge among type 2 Diabetic patients	$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$ **n**= sample size $Z_{\alpha/2}$ = 1.96 for 95%confidnce level P= 0.11 is Expected prevalence of poor knowledge **d**= margin of error 5% n=151	$\frac{N * n}{N + n}$ $\frac{(670)*(151)}{(670+151)}$ nf= 123	12.3	136
To determine level of attitude among type 2 diabetic patients	$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$ **n**= sample size $Z_{\alpha/2}$ = 1.96 for 95%confidnce level P= 0.18 is Expected prevalence of poor attitude **d**= margin of error 5% n=226	$\frac{N * n}{N + n}$ $\frac{(670)*(226)}{(670+226)}$ nf= 168	16.8	185
To assess level of practice among type 2 diabetic patients	$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$ **n**= sample size $Z_{\alpha/2}$ = 1.96 for 95%confidnce level P= 0.33 is Expected prevalence of poor practice **d**= margin of error 5% n=339	$\frac{N * n}{N + n}$ $\frac{(670)*(339)}{(670+339)}$ nf= 225	22.5	248

The largest sample size which is 248 was used with the consideration of 10% non response rates (NR).

3.7 Sampling procedures

The study samples were selected by using simple random sampling method; from subjects with type two DM ≥ 30 years old attending the diabetic clinic follow up in Ambo University Referral Hospital and those volunteered to give information about their knowledge, attitude, and practice towards DM. Patients with mental health problems and hearing impairments and those patients who were unable to provide the appropriate information were excluded

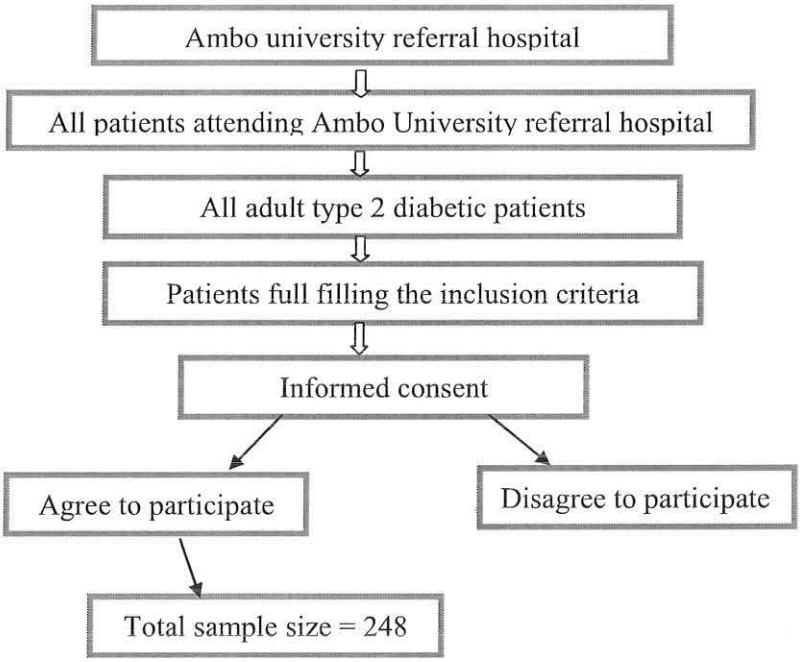


Figure 3 Diagram for sampling technique

3.8 Study variables

3.8.1 Dependent variables

- ✓ Knowledge, attitude and practices

3.8.2 Independent variables

- **Socio-demographic and economic characteristics:** age, sex, occupational status, educational status and wealth status (income).
- **Medical factors:** diabetes treatment regimen, body mass index (BMI), waist and hip ratio (WHR)

3.9 Data collection and its quality assurance

Data regarding KAP towards DM was collected using interview techniques. The data were collected by the structured questionnaire, which contains different items like socio-demographic and KAP towards diabetes mellitus.

Data were collected by four nursing graduate class with the supervision of the researcher. To assure data quality, training and orientation was given for the data collectors by the researcher. The questionnaire was first developed in English and then translated into Afaan Oromoo and then back translated to English. The questionnaire was pre-tested in 5% of the respondent in a health centre not included in the actual sample to check for its understandability, time required completing the questionnaire, etc before the actual data collection begun. Based on feedback from the pretest, necessary corrections and editions were made in the terminologies and formatting of the questionnaire. The collected data was reviewed and checked for completeness and consistency by the researcher on daily bases during the data collection time.

Heights of subjects were measured to the nearest 0.1cm, using a standard stadiometer with subjects standing upright position. Weight of subjects also measured with light dress. The weight was recorded to the nearest kg. Both measurements were taken two times and the average of the two reading was used for the calculation of the body mass index. The participants BMI was be classified using WHO standards as follows; underweight BMI<18.5, normal BMI 18.5 to 24.9, overweight BMI ≥25.0 and <29.9 and obese BMI ≥30.0 (WHO, 2008).

The waist and hip-circumference was measured with the use of a flexible tape graduated with centimeters. Both measurements were taken two times when the difference between measurements is <5cm, unless three times and the average of the two or three readings were used for the calculation of the waist to hip ratio. Finally, a waist hip ratio greater than 0.90 for men or greater than 0.85 for women indicates risk factors for type two diabetic mellitus (WHO, 2008).

3.10 Statistical analysis

Data were analyzed using SPSS statistical software version 21.0. Descriptive statistics was used and presented using tables, graphs and percentages.

Binary logistic regression model was used to identify factors associated to KAP level of the respondents. All independent variables those significant in the bivariate analysis were interred into multivariable logistic regression. Multivariable logistic regression model was used to identify factors affecting knowledge, attitude and practices toward diabetes among respondents. P-value less than 0.05 were considered as statistically significant. The degree of association between dependent and independent variables was reported using Adjusted Odds Ratio (AOR) and 95% CI

3.11 Ethical consideration

Ethical approval was obtained from Institutional Review Board of the Addis Ababa University, College of Natural and Computational Sciences (Annex.4). A formal letter of permission was obtained from Ambo University Referral Hospital (Annex.5). After explaining the purpose of the study, verbal consent was obtained from each study participant. Interviews were carried out privately in a separate room for each respondent. Participants were informed that participation is on voluntary basis and that they can withdraw at any time if they are not comfortable. Names or personal identifiers were not included in the questionnaires to ensure participants' confidentiality. At the end the information especially on prevention, control and management of T2DM was given to the respondents to improve their level of knowledge, attitude and practice towards DM.

Operational definition

Attitude: refers to the emotions triggered by certain events as well as the interpretation of certain feelings affected by predetermined beliefs towards that event (Chiwungwe, 2017) and in the context of this study it is the way a community thinks and behaves toward DM. In this study it is measured by 10 questions. All individual answers to attitudinal questions were computed to obtain total scores; then, 75% score/7.5 was used to categorize as having good attitude (if participants scored ≥ 75% score/7.5) or poor attitude (if Participants scored <75% score/7.5).

Knowledge: is a combination of intellectual ability to achieve, preserve and make use of information through experience, good judgment and expertise (Lakhan *et al.,* 2010). In this study it is the awareness of the community about diabetes mellitus. It is measured by 75% score of the 28 items and categorized as knowledgeable (if participants scored ≥ 75% (21) of the correctly answered questions) or not knowledgeable (if participants scored < 75% (21) of the correctly answered questions).

Practice: The habitual community involvement to prevent DM. It is measured by 10 items. All individual answers to practice questions were computed to obtain total scores and categorized as good practice (if participants scored ≥ 75% score/7.5) or poor practice (if participants scored <75% score/7.5).

Type 2 diabetes mellitus (T2DM): refers to a form of diabetes characterized by a deficiency of insulin secretion, which commonly results in insulin resistance and most frequently arises from obesity and a lack of exercise (WHO, 2016).

4. Results

4.1 Socio-demographic characteristics

From all 248 respondents male to female ratio was 1.88. The mean of age among respondents was 44(±7.2). Of 248 respondents, 105 (42.3%) were from rural and 143 (57.7%) were from urban areas. Among the study participants, 57(23%) were not having formal education and 73(29.44%) of respondents were from having ≤500 birr monthly family income (table 2).

Table 2 Socio demographic characteristics of type 2 diabetic patients attending Ambo, Ethiopia, 2019

Variable	**Level**	No.	%
Age	≤ 35 Yrs(young adults)	28	11.3
	36 - 55 Yrs(middle-aged adults)	197	79.4
	>55 yrs (older adults)	23	9.3
Sex	Male	162	65.3
	Female	86	34.7
Place of residence	Rural	105	42.3
	Urban	143	57.7
Religion	Orthodox	162	65.3
	Protestant	56	22.6
	Waaqeffataa	15	6.0
	Muslim	15	6.0
Respondent education level	No formal education	57	23.0
	Primary education	87	35.1
	Secondary and preparatory	36	14.5
	College and above	68	27.4
Marital status	Married	221	89.1
	Divorced	3	1.2
	Single	13	5.2
	Widowed	11	4.4
Living status	Living alone	13	5.2
	Living with wife/husband	222	89.5
	Living with others	13	5.2
Occupational status	Housewife only	32	12.9
	Farmer	92	37.1
	Merchants	40	16.1
	Gov't and private employed	84	33.9
Family income (Birr)	≤500	73	29.4
	501 -1000	61	24.6
	1001 – 2000	18	7.3
	>2000	96	38.7

4.2 Anthropometric characteristics of the respondents

Among the participants, 9(3.6%) and 32(12.9%) were with underweight and overweight, respectively. Additionally, the mean of WHR was 0.94 vs. 0.87 for male and female, respectively. Among the respondents in 202(81.5%) waist-hip ratio above cut-off points was observed (table. 3).

Table 3 Body mass index and waist hip ratio status of respondents (T2DM), Ambo university referral hospital, Oromia, Ethiopia, 2019

Variable	Level (category)	No.(%)
BMI	Underweight	9(3.6)
	Normal	207(83.5)
	Overweight	32(12.9)
WHR	Normal	46(18.5)
	At risk	202(81.5)

BMI= Body mass index WHR=waist hip ratio

4.3 History and duration of diabetes mellitus of participants

Table 4 below shows that, among the respondents 77(31%) were not having DM history or they do not know their family diabetes history and about 171(69%) were from those having family diabetic history, while the rests were from either father or mother was diabetic. More than two third of the study participants were with DM for 13 and above months (table 4).

Table 4 Frequency distribution of DMH and DDM of respondent's (T2DM), Ambo university referral hospital, Oromia, Ethiopia, 2019

Variables	Level	No. (%)
DMH	No diabetic history	77(31)
	Having DM history	171(69)
DDM	1-6 months	36(14.5)
	7-12 months	40(16.1)
	13 months and above	172(69.4)

DMH= Diabetic history, DDM= Duration of DM

4.4 Knowledge of participants towards diabetes mellitus

Table 5 below shows that the responses of participants on different questions addressing the knowledge towards DM. Participants responded as diabetes is a condition of insufficient insulin production in the body (47.6%), as DM is not curable (85.9%) and as DM is a condition of high level of sugar in the blood (85.1%). Regarding signs and symptoms of diabetes participants

responded as, frequent hunger (87.1%), frequent thirst (83.9%), frequent urination (43.6%), high blood sugar (87.9%), blurred vision (70.9%). Regarding knowledge of associated factors, in this study, respondents stated that as age (33%), genetic (77.4%), lack of physical exercise (92.7%), lack of nutrient intake (39.9%) and obesity (44.7%) could be risk factors to develop diabetes. On knowledge of complications, the response was blindness (65.3%), heart problem (84.7), and brain diseases (81.1%) were major complication of diabetes identified by cases and controls, respectively. Additionally, participants also described that diabetes can be managed by insulin injection (100%), regular exercise (100%) and practices healthy diet (91.1%) (table 5).

Table 5 Frequency distribution of participant's response of knowledge towards diabetes mellitus, Ambo university referral hospital, Oromia, Ethiopia, 2019

Questions	Response (YES)	
	n	%
What is DM		
DM is a condition of insufficient insulin production	118	47.6
DM is a condition of high level of sugar in the blood	211	85.1
DM is not curable disease	213	85.9
DM is a condition of the body which not responding for insulin	88	35.5
DM is diseases which affect any part of body	178	71.8
What are the symptoms of diabetes mellitus?		
Frequent hunger	216	87.1
Frequent thirst	208	83.9
Frequent urination	108	43.6
Weight loss	50	20.2
High blood sugar	218	87.9
Blurred vision	176	70.9
Feeling of weakness	221	89.1
Slow healing of cuts and wounds	30	12.1
What are the risk factors of diabetes mellitus?		
Age	82	33.1
Genetic/family history of diabetes mellitus	192	77.4
Lack of physical exercise	230	92.7
Low nutrient intake	99	39.9
Obesity	111	44.8
Pregnancy	50	20.2
Sleep duration	33	13.3
What are the complications of diabetes mellitus?		
Blindness	166	66.9
Heart problem	200	80.6
Kidney problem	86	34.7
Brain diseases	206	83.1
What are control and management methods of DM?		
Insulin injection is available for control and management of DM	248	100
Regular Exercise	248	100
Weight reduction	196	79
Practices healthy diet	226	91.1

4.5 Attitude of participants towards diabetes mellitus

Regarding the attitude of the respondents, the present study revealed that 168(67.7%) of respondents said as they do not mind if others know that they have diabetes mellitus, and 207(83.5%) were agreed that it is important for family members should be screened for DM. Additionally, among the study respondents, 130(52.4%) of them agreed that Diabetes mellitus seriously affect daily activities. However, around 120(48.4%) were think as diabetes is a communicable disease and they don't know the difference between communicable and diabetes family history (table 6).

Table 6 Frequency distribution of respondents of attitude towards diabetes mellitus among type 2 diabetic patients, Ambo university referral hospital, Oromia, Ethiopia, 2019

Variables	Response	n	%
I don't mind if others know that I am with diabetes mellitus	Agree	168	67.7
	Disagree	76	30.7
	I don't know	4	1.6
It is important that you should be examined for diabetes mellitus	Agree	218	87.9
	Disagree	24	9.7
	I don't know	6	2.4
It is important for family members should be screened for diabetes Mellitus	Agree	207	83.5
	Disagree	25	10.1
	I don't know	16	6.5
Family support is important in dealing with diabetes mellitus	Agree	248	100
	Disagree	0	0.00
	I don't know	0	0.00
We should follow avoiding of consumption of too much sugar for controlling of DM	Agree	218	87.9
	Disagree	30	12.1
	I don't know	0	0.00
Diabetes mellitus seriously affect daily activities	Agree	130	52.4
	Disagree	51	20.6
	I don't know	67	27
Physical activity prevent risk of DM	Agree	188	75.8
	Disagree	0	0.00
	I don't know	60	24.2
Maintaining a healthy body weight is important in management of DM	Agree	115	46.4
	Disagree	0	0.00
	I don't know	133	53.6
Diabetes Mellitus is a communicable disease	Agree	120	48.4
	Disagree	92	37.1
	I don't know	36	14.5
Sleep duration can affect blood glucose	Agree	15	6.1
	Disagree	126	50.8
	I don't know	107	43.2

4.6 Practice towards diabetes mellitus

The present study result shows that majority of the study participants 203(81.8%) did not have meal plans to eat ahead and also 157(63.3%) have never visited dietitians or nutrition and other related professionals for their diet plan. From total respondents 157(63.3%) of them reported that they frequently use fruit and vegetable while others consume fruits and vegetables less frequently. Around, 106(42.7%) of respondents were not using fatty foods at all and the rest were using fatty foods less frequently. Again 65(26.2%) of participants were frequently practicing 30 - 60 minutes physical activity daily. Additionally 167(67.3%) of respondents frequently practice checking of blood sugar regularly (table. 7).

Table 7 Frequency distribution of respondents practice towards diabetes mellitus among type 2 diabetic patients, Ambo university referral hospital, Oromia, Ethiopia, 2019

Variables	**Response status of respondents**		
	Not at all, n (%)	Less frequently, n (%)	Frequently, n (%)
Do you have meal plan?	203(81.8%)	45(18.2%)	0(0%)
Have you ever visited a dietitian/ nutritionist to consult about your diet plan?	157(63.3%)	91(36.7%)	0(0%)
Do you consume fruit and vegetable?	0(0%)	91(36.7%)	157(63.3%)
Do you consume of fatty foods?	106(42.7%)	107(43.2%)	35(14.1%)
Did you drink alcohol	187(75.4%)	41(16.5%)	20(8.1%)
Did you smoke tobacco	238(95.9%)	11(4.4%)	0(0%)
Do you do 30 - 60 minutes physical activity daily?	41(16.5%)	142(57.3%)	65(26.2%)
Have you meet sport professional for your physical activity	217(87.5%)	31(12.5%)	0(0%)
Do you participate in maintaining your healthy weight?	76(30.6%)	107(43.2%)	65(26.2%)
Do you check your blood sugar regularly	0(0%)	81(32.7%)	167(67.3%)

4.7 General KAP status of participants toward diabetes

Generally, based on the 75% of total score for knowledge (21), attitude (7.5) and practice (7.5), this study revealed that, 111(44.8%), 117(47.2%) and 121(48.8%) of respondents were differentiated as not knowledgeable, poor attitude level and having poor practice toward DM (figure 4).

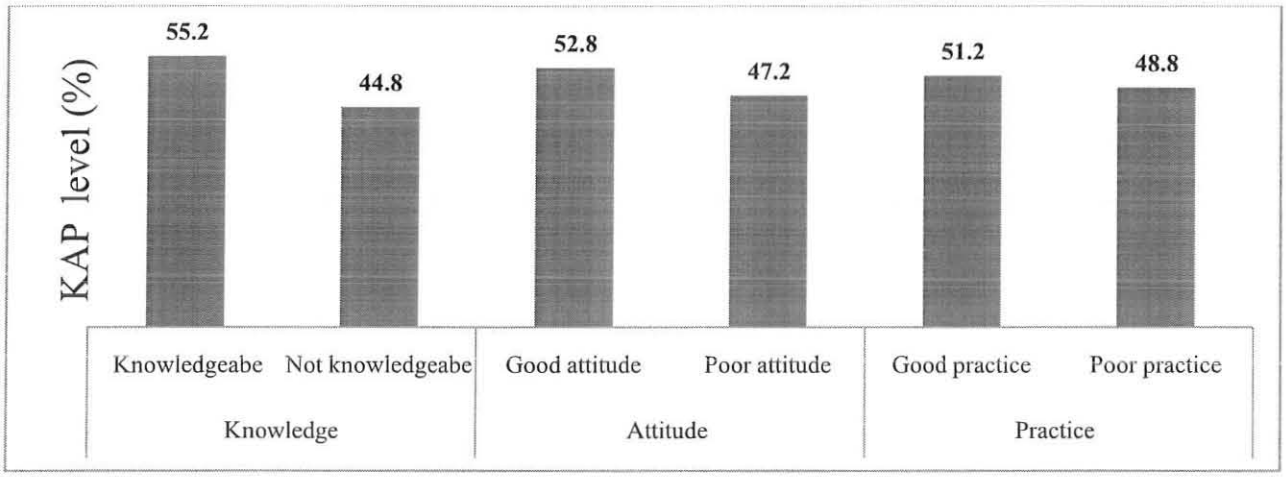


Figure 4 General status of respondents Knowledge, attitude and practice toward diabetes among type 2 diabetic patients, Ambo university referral hospital, Oromia, Ethiopia

4.8 Factors associated with participant's knowledge level towards diabetes mellitus

Table 8 below shows that age, sex, place of residence, level of education, occupational status, average monthly income category, family history of diabetes and duration of living with DM showed significant associations with knowledge level of respondents. In the multivariable logistic analysis, young adult patients were 6.4 times (AOR = 6.4, CI = 1.06, 38.6) more likely to have diabetes knowledge compared to those with older adults. In the case of sex, males were 8.5 times (AOR = 8.46, CI = 2.5, 28.63) more likely to have diabetes knowledge compared to females. The other important variable was place of resident and individuals from rural area were 88% (AOR = .12, CI = 0.04, 0.39) less likely to have diabetes knowledge compared to those from urban. Also educational level was significantly associated with diabetes knowledge of respondents as individuals who were with no formal education were 98.3% (AOR = 0.017, CI = (0.001, 0.06) and those with primary education level were 95.7% (AOR = 0.043, CI = (0.004, 0.26), less likely to have diabetes knowledge than those with college and above educational

level. Additionally individuals who were housewife only were 95.4% (AOR = 0.046, CI = (0.004, 0.320) less likely knowledgeable than those were government and private employed. Similarly individuals earning average monthly family income of ≤500 birr were 80.2% (AOR = .198, CI = 0.08, 0.45), 501-1000 birr were 68% (AOR = 0.320, CI = 0.12, 0.80) less likely to have knowledge as compared to those earned >2000 birr. The other important was subjects with no diabetic history were 71% (AOR = 0.29, CI = 0.12, 0.68) less likely to have diabetes knowledge compared to those having diabetes history. Regarding duration of DM individuals those were with 1-6 months duration 85.1% (AOR = 0.149, CI = 0.05, 0.40) less likely to have diabetes knowledge than those with 13 months and above durations of disease (table 8).

Table 8 Bi-variable and multivariable logistic regression predicting diabetes mellitus related knowledge level among study participants, Ambo university referral hospital, Oromia, Ethiopia, 2019

Variable	Level	Not knowledgeable	Knowledgeable		Indicators of relationship		
		n (%)	n (%)	p-value	COR (95% CI)	p-value	AOR (95%CI)
Age	young adults	6(21.4)	22(78.6)	.002**	6.87(1.97-23.88)	.043*	6.4 (1.06-38.61)
	middle-aged adults	90(45.7)	107(54.3)	.082	2.22 (0.90-5.49)	.099	2.70 (.83-8.81)
	older adults	15(65.2)	8(34.8)	1			
Sex	Male	63(38.9)	99(61.1)	.011*	1.98 (1.16-3.37)	.001**	8.46 (2.5-28.63)
	Female	48(55.8)	38(44.2)	1			
Residence	Rural	81(77.1)	24(22.9)	.000***	.07 (.04-.14)	.000***	.12(.04-.39)
	Urban	30(21.0)	113(79.0)	1			
Family size	≤5	40(46.0)	47(54.0)	.777	.92 (.54-1.56)	-	-
	>5	71(44.1)	90(55.9)	1			
Living status	Living alone	2(15.4)	11(84.6)	.004**	18.33 (2.52-133.26)	.239	.19 (.01-2.96)
	Living with wife/husband	99(44.6)	123(55.4)	.034*	4.14 (1.11-15.45)	.825	1.2 (.23-6.16)
	Living with others	10(76.9)	3(23.1)	1			
Marital status	Married	98(44.5)	122(55.5)	.082	3.32 (.85-12.84)	-	-
	Divorced	3(75.0)	1(25.0)	.930	.88 (.06-12.25)	-	-
	Single	2(15.4)	11(84.6)	.109	14.66 (1.97-109.20)	-	-
	Widowed	8(72.7)	3(27.3)	1			
Education level	No formal education	48(84.2)	9(15.8)	.000***	.009 (.002-.034)	.000**	.017(.001,.06)
	Primary education	46(52.9)	41(47.1)	.000***	.041 (.012-.141)	.001**	.043(.004,.26)
	Secondary education	14(38.9)	22(61.1)	.000***	.073 (.019-.276)	.155	.177(.017,1.88)
	Higher education	3(4.4)	65(95.6)	1			
Occupational status	Housewife only	22(68.8)	10(31.3)	.000***	.091 (.035-.233)	.004**	.046(.004,.320)
	Farmer	65(70.7)	27(29.3)	.000***	.083 (.040-.172)	.902	3.2(.064,22.65)
	Merchants	10(25.0)	30(75.0)	.275	.60 (.240-1.50)	.001**	.061(.004,.26)
	Employed	14(16.7)	70(83.3)	1			

Family income	≤500 ETB	46(63.0)	27(37.0)	.000***	.18 (.09-.36)	.000***	.198 (.08-.45)
	501 -1000 ETB	37(60.7)	24(39.3)	.000***	.20 (.10-.41)	.015*	.320 (.12-.80)
	1001 – 2000 ETB	5(27.8)	13(72.2)	.730	.81 (.26-2.54)	.827	1.15 (.30-4.33)
	>2000 ETB	23(24.0)	73(76.0)	1			
DM history of the family	No diabetic history	47(61.0)	30(39.0)	.001**	.38 (.22-.66)	.005**	.29 (.12-.68)
	Having diabetic history	64(37.4)	107(62.6)	1			
Duration of DM	1 - 6 months	28(77.8)	8(22.2)	.000***	.127 (.05-.29)	.000***	.149 (.05-.40)
	7 - 12 months	30(75.0)	10(25.0)	.000***	.148 (.06-.32)	.000***	.097 (.04.23)
	13 months & above	53(30.8)	119(69.2)	1			

* p<0.05; ** p<0.01; *** p<0.001

4.9 Factors associated with participant's attitude level towards diabetes mellitus

Table below shows that, age, place of residence, educational level, average monthly family income, family diabetes history, duration of diabetes and knowledge level showed significant associations with respondent's attitude. In the multivariable logistic regression analysis, young adults were 7.5 times (AOR=7.5, CI= 1.84, 30.79) more likely to have positive attitude to DM than those from older adults. Respondents from rural areas were 80.5% (AOR= 0.195, CI= 0.107, 0.353) less likely to have positive attitude to DM than those from urban areas. Also subjects those not having formal education were 94.7% (AOR=0.053, CI= 0.012, 0.239), those with primary education level were 93.2% (AOR=0.068, CI= 0.013, 0.175) less likely to have positive attitude towards DM than those with higher education level. In the case income level, individuals earning average monthly family income of ≤500 birr were 74.6% (AOR = .254, CI = 0.18, 0.69), 501-1000 birr were 72.5% (AOR = 0.275, CI = 0.13, 0.55) less likely to have positive attitude towards DM compared to those earned >2000 birr. Additionally, participants with no diabetes history were 67.6% (AOR=0.324, CI= 0.15, 0.70) less likely to have positive attitude compared to those having family diabetes history. In the same way participants those were diabetic for 1-6 months were 93% (AOR=0.07, CI= 0.01, 0.28) less likely to have positive attitude towards DM compared to those were diabetic for 13 and above months. Furthermore being not knowledgeable about diabetes had 77.3% decreases in their positive attitude level about diabetes as compared to those who were knowledgeable (table 9).

Table 9 Bi-variable and multivariable logistic regression predicting diabetes mellitus related attitude level among study participants, Ambo university referral hospital, Oromia, Ethiopia, 2019

Variable	Level	Poor attitude	Good attitude		Indicators of relationship		
		n(%)	n(%)	p-value	COR (95% CI)	p-value	AOR(95%CI)
Age	young adults	9(32.1)	19(67.9)	.010*	4.82(1.46-15.87)	.005**	7.5(1.84-30.79)
	middle-aged adults	92(46.7)	105(53.3)	.044*	2.60(1.02-6.62)	.193	2.06(.69-6.13)
	older adults	16(69.6)	7(30.4)	1			
Sex	Male	75(46.3)	87(53.7)	.703	1.10(.65-1.86)		-
	Female	42(48.8)	44(51.2)	1			
Residence	Rural	75(46.3)	87(53.7)	.000***	.195(.113-.337)	.000***	.195(.107-.353)
	Urban	42(48.8)	44(51.2)	1			
Education level	No formal education	40(70.2)	17(29.8)	.000***	.073(.030-.176)	.000***	.053(.012-.239)
	Primary education	60(69.0)	27(31.0)	.000***	.078(.035-.174)	.000***	.068(.013-.175)
	Secondary education	7(19.4)	29(80.6)	.535	.714(.247-2.069)	.496	.626(.162-2.414)
	Higher education	10(14.7)	58(85.3)	1			
Occupational status	Housewife only	30(93.8)	2(6.3)	.000***	.013(.003-.062)	.429	.35(.02-4.65)
	Farmer	59(64.1)	33(35.9)	.000***	.112(.055-.229)	.174	6.16 (.44-85.08)
	Merchants	14(35.0)	26(65.0)	.025*	.371(.156-.884)	.072	6.92 (.84-56.95)
	Employed	14(16.7)	70(83.3)	1			
Marital status	Married	101(46.1)	118(53.9)	.036*	5.25(1.11-24.89)	.212	2.86(.55-14.88)
	Divorced	4(80)	1(20.0)	.931	1.12(.07-16.30)	.696	.56(.03-9.83)
	Single	3(23.1)	10(76.9)	.008**	15(2.02-111.17)	.133	5.14(.61-43.71)
	Widowed	9(81.8)	2(18.2)	1			
Living status	Living alone	3(23.1)	10(76.9)	.004**	18.33(2.52-133.26)	.096	6.04(.72-50.23)
	Living with wife or husband	103(46.4)	119(53.6)	.018*	6.35(1.37-29.33)	.153	3.26(.65-16.56)
	Living with others	11(84.6)	2(15.4)	1			
Religion	Orthodox	95(58.6)	67(41.4)	.124	.050(.006-.39)		-
	Protestant	18(32.1)	38(67.9)	.078	.151(.018-1.23)		-
	Waaqeffataa	3(20)	12(80)	.304	.286(.026-3.12)		-
	Muslim	1(6.7)	14(93.3)	1			
Family income	≤500 ETB	42(57.5)	31(42.5)	.000***	.31 (.16-.60)	.002**	.254(.18-.69)

	501 -1000 ETB	38(62.3)	23(37.7)	.000***	.26(.13-.51)	.000***	.275(.13-.55)
	1001 – 2000 ETB	8(44.4)	10(55.6)	.241	.54(.19-1.51)	.274	.55(.19-1.59)
	>2000 ETB	29(30.2)	67(69.8)	1			
Family diabetic history	No diabetic history	49(63.6)	28(36.4)	.001**	.37(.21-.65)	.004**	.324(.15-.70)
	Having diabetic history	68(39.8)	103(60.2)	1			
Duration of DM	1 - 6 months	33(91.7)	3(8.3)	.000***	.065(.019-.222)	.000***	.07(.01-.28)
	7 - 12 months	12(30)	28(70)	.170	1.68(.80-3.52)	.438	1.50(.53-4.23)
	13 months & above	72(41.9)	100(58.1)	1			
Knowledge	Not Knowledgeable	77(69.4)	34(30.6)	.000***	.182(.105-.314)	.000***	.227(.127-406)
	Knowledgeable	40(29.2)	97(70.8)	1			

* $p<0.05$; ** $p<0.01$; *** $p<0.001$

4.10 Factors associated with participants practice level towards diabetes mellitus

Table below shows that as age, place of residence, level of education, average monthly family income, diabetic history of family, duration of DM, diabetes knowledge level, and diabetes attitude levels showed significant associations with practice towards DM. In the multivariable analysis, individuals who were young adults were 9.34 times (AOR = 9.34, CI=1.53, 56.68) more likely to practice compared to those older adults. The other was respondents from rural areas were 84.4% (AOR = 0.156, CI=0.030, 0.815) less likely to practice than those from urban areas. Individuals those have no formal education were 81.8% (AOR = 0.182, CI = 0.056, 0.589) less likely to practice than those with higher educational level. Also this study revealed that subjects those having ≤500 Ethiopian birr average monthly family income were 67.9% (AOR = 0.321, CI = 0.12, 0.81) less likely to practice compared to those having >2000 Ethiopian birr average monthly family income. Individuals with no diabetic history were 61.9% (AOR = 0.381, CI = 0.218, 0.673) less likely to practice than those of having family diabetes history. In the case of DM duration participants those were diabetic for 1-6 months were 58.6% times (AOR = 0.414, CI = 0.191, 0.897) less likely to practice than those were diabetic for 13 and above months. In terms diabetes knowledge level, having poor diabetes knowledge had 72.6% (AOR = 0.274, CI = 0.134, 0.560) less likely to practice than those having good diabetes knowledge. Lastly, having poor attitude had 60.7% (AOR = 0.393, CI = 0.206, 0.753) less likely to practice than those having good attitudes towards diabetes (table 10).

Table 10 Bi- variable and multivariable logistic regression predicting diabetes mellitus related practice level among study participants, Ambo University referral hospital, Oromia, Ethiopia, 2019

Variable	Level	Poor practice	Good practice		Indicators of relationship		
		n(%)	n(%)	p-value	COR (95% CI)	p-value	AOR(95%CI)
Sex	Male	78(48.1)	84(51.9)	.781	1.077(.638-1.817)	-	-
	Female	43(50)	43(50)	1			
Age	young adults	4(14.3)	24(85.7)	.000***	21.6(5.06-92.07)	.015*	9.34(1.53-56.68)
	middle-aged adults	99(50.3)	98(49.7)	.016*	3.5(1.27-9.97)	.051	3.35(.99-11.32)
	older adults	18(78.3)	5(21.7)	1			
Residence	Rural	81(77.1)	24(22.1)	.000***	.115(.064-.206)	.028*	.156(.030-.815)
	Urban	40(28)	103(72)	1			
Education level	No formal education	44(77.2)	13(22.8)	.000***	.045(.018-.115)	.004**	.182(.056-.589)
	Primary education	57(65.5)	30(34.5)	.000***	.08(.035-.184)	.001**	.188(.070-.504)
	Secondary education	11(30.6)	25(69.4)	.037*	.347(.128-.940)	.823	.879 (.283-2.732)
	Higher education	9(13.2)	59(86.8)	1			
Occupational status	Housewife only	21(65.6)	11(34.4)	.000***	.123(.050-.306)	.111	5.11(.68-38.07)
	Farmer	67(72.8)	25(27.2)	.000***	.088(.043-.179)	.062	8.52(.90-80.64)
	Merchants	17(42.5)	23(57.5)	.007**	.318(.139-.730)	.172	3.41(.58-19.91)
	Employed	16(19)	68(81)	1			
Family income	≤500 ETB	58(79.5)	15(20.5)	.000***	.086(.041-.179)	.016*	.321(.12-.81)
	501 -1000 ETB	36(59)	25(41)	.000***	.231(.116-.461)	.792	.87(.3-2.32)
	1001 – 2000 ETB	3(16.7)	15(83.3)	.449	1.667(.444-6.257)	.087	3.57(.83-15.30)
	>2000 ETB	24(25)	72(75)	1			
Family DM History	No diabetic history	50(64.9)	27(35.1)	.001**	.383(.219-.670)	.001**	.381(.216-.673)
	Having diabetic history	71(41.5)	100(58.5)	1			
Duration of DM	1 - 6 months	24(66.7)	12(33.3)	.019*	.405(.190-.863)	.025*	.414(.191-.897)
	7 - 12 months	20(50)	20(50)	.550	.811(.407-1.614)	.349	.714(.352-1.447)
	13 months & above	77(44.8)	95(55.2)	1			
Knowledge	Not Knowledgeable	83(74.8)	28(25.2)	.000***	.129(.073-.229)	.000***	.274(.134-.560)
	Knowledgeable	38(27.7)	99(72.3)	1			
Attitude	Poor attitude	77(65.8)	40(34.2)	.000***	.263(.155-.445)	.005**	.393(.206-.753)
	Good attitude	44(33.6)	87(66.4)	1			

* p<0.05; ** p<0.01; *** p<0.001

5. Discussion

Diabetes is a chronic illness and long-term metabolic disorder that drastically affecting health of the population throughout the world. T2DM is the most common form of diabetes mellitus that affecting adults. The risk of T2DM is currently increasing in Ethiopia. Self-management of patients with T2DM largely depends on the KAP of such people regarding the condition. However, studies assessing KAP towards T2DM among diabetic patients are scanty. Therefore, this cross-sectional study is designed to assess the level of KAP towards T2DM and associated factors among diabetic patients in the study area. This study revealed that there is a gap in case of knowledge, attitude, and practice towards diabetes mellitus among T2DM patients in the study area.

This study revealed that (55.2%) of respondents had a good knowledge. This finding was higher than the study done in Malaysia (41.9%) (Minhat *et al.,* 2014); and UAE (33%) (Al-Maskari *et al.,* 2013). This may be because of the study participants were hospital-based and they have better health education access and also there is time gap as the improvements in health and information distribution changes time to time. This result showed lower knowledge level as compared to cross sectional study that was conducted in Bangladesh, in which 17% of diabetic participants were poor in knowledge, while the majorities of diabetic participants were scored from moderate to good knowledgeable (Fatema *et al.,* 2017). This difference may be described because of the limited organized diabetics education facilitates and less participations of media and NGO in awareness creation about diabetes mellitus in study area as compared to Bangladesh.

This study found that age, sex, place of residence, level of education, occupational status, income level, diabetic history and duration of the disease were was significantly associated with knowledge or determining factors for diabetes knowledge.

The result of this study showed that as young adults and middle aged adults were around 6.4 times more knowledgeable than that of older adults. This finding is consistent with the results reported by Shrestha *et al.,* (2015) in Central Nepal patients, Jasper *et al.,* (2014) in Nigerian

diabetics and Gillani *et al.,* (2018) in Pakistan general population, that younger age had significantly higher diabetes knowledge score than older participants. This is may be old age, with deteriorating cognitive function, is considered as a barrier to diabetes education whereas younger patients might have higher motivation and adaptability towards their disease.

In this study males were 8.46 times more than females. This finding is similar to other study conducted by Saleh *et al.,* in Bangladish where males were found to have better knowledge on the disease than females and different from the study Gillani *et al.,*in Pakistan where women were significantly more aware of DM than males.

Also respondents those living in rural area were 88% less knowledgeable than those from urban and this result is in line with study by El-Khawaga *et al.,* (2015) in Egypt and Gillani *et al.,*(2018) in Pakistan, in which urban residents were more knowledgeable. This may be described by the high availability and accessibility of different health based information in urban compared to rural or gap of information is available in rural compared to urban.

Moreover, this study showed significant association between levels of education and level of knowledge among the respondents, showing that higher education level positively affects the level of knowledge. Participants those no formal educations were 98.3% and those with primary education level were 95.7% less knowledgeable than those with college and above education level. This result is similar to many other studies like Deepa *et al.,* (2017) in India, Saleh *et al.,*(2016) in Bangladish and Feleke *et al.,* (2013) in Ethiopia. Almost certainly, it is because of respondents who had higher education would have the chance to get different information contented materials like leaflet and manuals which make them more aware about diabetes. Even they can communicate health care providers easily if they have any doubts.

Regarding occupational status, individuals who were housewife only were 95.4% less likely knowledgeable than those were government and private employed. This may be due to gap in exposure to information and different health professionals among those housewife only than others.

In sense of family income level this study revealed that participants earning average monthly family income of ≤500 birr were 80.2% less likely to have knowledge as compared to those

earning>2000 birr. This findings were supported by different study results in Debre Tabor (Asmamaw *et al.,* 2015), Bale Zone (Kassahun *et al.,* 2017), Pakistan (Gillani *et al.,* 2018) and Malaysia (Minhat *et al.,* 2014) which stated that those who belonged to the upper socioeconomic strata had more knowledge than those with lower socioeconomic status. These might be because of having higher income level will help to access and afford necessary information related to diabetes that resulted in changed behavior among the participants.

Furthermore, interesting results of this study are both history and duration of the disease showed significant association with knowledge level and participants with no diabetic history were 71% less likely to have knowledge than those having diabetic history. Additionally, respondents those with ≤ 6months disease duration were 85.1% less likely to have diabetes knowledge than those with 13 months and above durations of diseases. This finding is supported by study conducted by Rahaman *et al.,* (2017) in Dhaka and Feleke *et al.,* (2013) in Ethiopia in which those participants with higher duration of diabetes were more knowledgeable. This may be due to having diabetes history and living long time with the disease provide more exposure to the information regarding the disease shared through the time. Also there is the time to communicate with health professionals during their health follow up. This indicates that experience may be the source of information to improve knowledge.

In the case of attitude level towards diabetes mellitus, 47.2% of participants of this study had poor attitude level and different socio demographic and other factors including age, place of residence, education level, average monthly income level, family diabetes history, duration of the disease and knowledge level were identified as determining factors for participants attitude level towards diabetes.

In this study, participants those young and middle aged adults had better attitude score than elder adults. This result is supported by study conducted by Rahaman *et al.,* (2017) in Dhaka, Gautam *et al.,* (2015) in Nepal, Maretha le Roux*et al.,* (2018) in South Africaand Al-Maskari*et al.,* (2013) in the United Arab Emiratesin which attitude level was reported as it was higher among young adults compared with older adults. This may be due to higher cognitive performance among younger adult than older adults.

Regarding place of residences among respondents those from rural were 80.5% less likely to have positive attitude towards DM than those from urban. This result is in line with Fatema *et al.,* 2017 in Bangladesh in which the attitude level was higher among urban residents compared to the counterparts. This may be urban residents may got chance to gate more health information, different health and nutrition education from government and NGO than those from rural.

Moreover, respondents those were not having formal education had 94.7% less in attitude level as compared to those with higher educational levels. Also this finding is consistent to the study conducted by Kassahun *et al.,* (2017) in Bale, Ethiopia, Asmelash *et al.,* (2019) in Gondar Ethiopia. Probably, it is because of respondents who had higher education would have the chance to get different information contented materials like leaflet and manuals which make them more aware about diabetes. Even they can communicate health care providers easily if they have any doubts and as a result their attitude level can be improved.

Furthermore, this study showed as both diabetes history and duration of the disease showed significant association with attitude level and participants with those with 1-6 month DM duration were 93% fold decreased in attitude level. This result is consistent with the study in Dhaka (Rahaman *et al.,* 2017) in which Patients with long duration of diabetes had better attitude score than those who had short duration of diabetes. This is might be because of getting and more understanding of information can be improved through experience.

Additionally, being not knowledgeable about diabetes had 77.3% decreases in their positive attitude level about diabetes as compared to those who were knowledgeable. This means that "the higher their knowledge, the better their attitude. These finding is supported by the idea about positive correlation between knowledge and good attitude was observed among participants in a study conducted in Riyadh, Saudi Arabia (Salem *et al.,* 2018) and in Ethiopia (Kashahun *et al.,* 2017).

In the sense of practice towards DM the study result shows that 48.2% of participants were having poor practice towards diabetes mellitus. different socio demographic factors including age, place of residence, education level, income level, family history of the disease, duration of

the disease, knowledge and attitude level were identified as determining factors for participants attitude level towards diabetes.

In this study younger participants were had better practice score than their elders. It is supported by study conducted by Felekeet *al.,* (2013) and Rahaman *et al.,* (2017) in Dhaka in significant association is described indicating that younger adults were more practicing compared to older adults.

Regarding place of residences among respondents those from rural 84.4% less likely to have well practice towards DM than those from urban. This result is in touch with the study conducted by Niguse *et al.,* (2019) in Ayder Comprehensive Specialized Hospital in which participants from urban were better practicing compared to those from rural. This may be urban residents may got chance to gate more health and nutrition education from government and NGO directly through different training and indirectly when health and nutrition promotion takes place through different media than those from rural.

Regarding education level, respondents those not having formal education were 81.8% less practiced compared to those with higher educational levels. This finding is consistent to the study conducted by Salem *et al.,*(2018) in which the practice score was found to be associated with educational level also it is in touch with the study conducted by Mohammadi *et al.,* (2015) in which there was significant association between low level of education (primary) or not having formal education with poor KAP score about diabetes compare to higher level of education. Therefore literacy may be the most important in diabetes management.

Furthermore, this study showed as both DM history and duration of the disease showed significant association with practice level and participants with no diabetic history were 61.9% less likely to have better practice than those having diabetic history. Additionally, respondents those were diabetic for 1-6 months were 58.6% decreased in practice level. This result in line with study conducted by Salem, *et al.,* (2018) and Niroomand *et al.,* (2015) in which found that diabetic history was associated with practice level towards diabetes mellitus. Also the result was in touch with the study reported Dhaka higher duration of diabetes had influenced better practice (Rahaman *et al.,* 2017).

Lastly this study revealed that both knowledge level and attitude level were among affecting factors of practicing level. According to this study, participants those with poor knowledge and poor attitude level were less practicing compared to those having good knowledge and positive attitude towards diabetes mellitus. This result was consistent with the study conducted in Bale, Ethiopia (Kassahun *et al.,* 2017) in which practice level was higher in respondents with high level of knowledge and attitude towards DM. This indicates that having good knowledge and positive attitudes towards diabetes mellitus can improve practice level because if some is not knowing and thinking positively it is impossible to practice.

6. Limitations of the study

This study was conducted outpatient hospital based. The results may not be truly representative of all DM patients in the Ethiopia. Particularly, the study was conducted in university teaching hospital, where diabetes education may be more readily accessible to patients. Other researches concerning knowledge, attitude and practice in the study area is also recommended to conduct including both different health institution and through the general community. Furthermore, participants of the study were not asked the sources of health information. In case of practice only frequency of activity were considered. For the future study including amount or portion especially in dietary practice is highly recommended.

7. Conclusion and Recommendation

7.1 Conclusion

Diabetes is a familiar chronic illness, a group of common non communicable diseases that significantly affect the health of population throughout the world. It is a long-term metabolic disorder that occurs either due to inadequate insulin production by the pancreas (T1DM) or when the produced insulin is not effectively used by the body (T2DM). T2DM is the most common form of DM. Good knowledge, attitude and proper practice towards diabetes enable the people to control and manage diabetes mellitus and its complications. This cross-sectional study was designed to determine the KAP level among participants, to identify the determining factors of knowledge, attitude and practice of the respondents in the study area.

Descriptive statistics was used to set the KAP level while logistic regression model was applied to test the association of KAP with various socio demographic and other variables. This study found that 111(44.8%), 117(47.2%) and 121(48.8%) of respondents were differentiated as not knowledgeable, having poor attitude and poor practice towards diabetes mellitus, respectively. Additionally current study revealed that age, place of residence, level of education, average monthly income, family history of diabetes and duration of living with DM were factors affecting KAP towards diabetes. Both sex and occupational status were affecting the knowledge level, but not attitude and practice. Furthermore knowledge level was affecting booth attitude and practice level of participants in the study area at the significance level of ($p<0.05$). Generally, lack of knowledge, poor attitude, and poor practice level were found in this cross sectional study.

7.2 Recommendation

The following recommendations are made based on the results of this study.

Structured diabetes, nutrition and health education should be given for T2DM patients through community based behavioral change to assist and improve level of knowledge of DM patients, since knowledge is an important factor to influence someone's attitude and practice.

Nutritionists/health extension workers should give nutrition education through mass media like TV, radio to overcome the problems of KAP regarding DM

It is important to create mechanisms by which diabetic patient with different age group, educational status and duration of DM share their experiences.

In order to overcome the income effect on KAP level, since the area is agricultural area, home garden and small animal rearing like hen should be encouraged by agricultural extension workers in order to improve their consumption pattern and generate income for those who have low income.

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Appendix I

Annex 1:- letter of Ambo University Referral Hospital (information sheet)

To:-

1. Ambo University
2. Ambo University College of Health Science
3. Ambo University Referral Hospital manager office

Title of the study: Assessment of KAP and Associated Factors among Type II Diabetic Patients Attending Ambo University Referral Hospital, Oromia, Ethiopia: *A Hospital based case-control study*

Introduction: Diabetes is a familiar chronic illness, a group of common non communicable diseases that significantly affecting health of the population throughout the world. It is a long-term metabolic disorder that occurs either due to inadequate insulin production by the pancreas (T1DM) or when the produced insulin is not effectively used by the body (T2DM). The prevalence of diabetes in adults aged 18–99 years was estimated to be 451 million (8.4%) in 2017 and predicted to rise to 693 million (9.9%) in2045. About 5 million deaths worldwide were attributable to diabetes in the 20–99 years age range. The global healthcare expenditure on people with diabetes was estimated to be USD 850 billion in 2017. In Africa, according to the International Diabetes Federation (IDF) reported, about 19.8 million adults were estimated to have diabetes and regional prevalence of diabetes mellitus 4.9%. Out of this more than 50% lives in four highly populated countries namely: Nigeria, South Africa, Ethiopia and Tanzania.

Ethiopia, which is one of the developing nations, is at a risk of increased diabetes incidence. To prevent and manage the diabetic problem good knowledge, positive attitudes and good practices are the main opportunities for every individual. The risk of type II diabetes mellitus is currently increasing both at national (Ethiopia) and regional level (Oromia); as it is insulin independent diabetes mellitus. However, the study identifying positive and negative KAP towards type II diabetic are scanty

I plan to undertake subject study for the completion of my thesis leading me to the degree of MSc (Community Nutrition) from Addis Ababa University, Ethiopia

You are please requested to cooperate in this regard by letting me to interview and examine the DM patients attending their follow up at your hospital.

Annex 2:-Survey schedule

Name	Ambo University Referral Hospital
Location	Ambo Town
Date of Visit	March 2019
Time	8:00AM(Morning)

Annex 3.Conset Form

I am a student of Addis Ababa University. I am conducting a research study for my MSc thesis. Your hospital is selected for this survey. In this context I will measure your height and weight, Waist and Hip. In order to identify weather you are free or not your blood glucose will be checked by taking a drop of blood from your finger tip through a prick by sterile disposable lancet. To carry out the survey few questions regarding your KAP will also be asked. I hope you are willing to participate in this study.

Benefits of the study: the participant will not get any direct benefit (in terms of money) for being participant, but

- We will provide nutritional and life style counseling for those who are diabetic.
- The result can be used to play a great role to provide a figurative data about KAP towards DM among type 2DM patients in Oromia, Ethiopia.
- The result can be used as a baseline for further studies that can be done in this area.
- The result will be used for the governmental organization or non-governmental organizations, stake holders and policy makers to develop an intervention and prevention mechanism to alleviate the problems regarding DM among T2DM patients in Oromia and Ethiopia as well.

Potential harm: the study has no any harm except that participant will spend up to 20-30 minutes in the interview and taking one drop of blood from your finger prick.

Confidentiality: the secrecy of any information forwarded will be maintained and we assure you that whatever answers you give us will be kept strictly secret.

Person to contact: if you have any question, don't hesitate to ask me at any time. For additional questions or any other concern about the study you may contact to

The principal investigator: Agama Daba Dirbaba
Cell phone: +2519-17-68-59-83/+2519-06-58-22-42
Email: agaamaadhaaba@gmail.com

If you agree to participate in the study, please sign at the space provided below and I would like to thank you for your participation.

Code of the participant:_____

Name and Signature of the participant

Name:-_____

Signature of the participant; - _____

Name and signature of the data collector

Name:- _____

Signature: - _____

Date: _____

Maxxantuu 1

Maxxantuu 1:- Xalayaa Hospitaala Riiferaalaa Yuunbarsiitii Amboo(Waraqaa odeeffannoo)

1. Yuunbarsiitii Ambootiif
2. Koollejjii fayyaa Amboo Yuunbarsiitiif
3. Biiroo hoogganaa Hospitaala Riiferaalaa Yuunbarsiitii Ambootiif

Mata duree qorannichaa: sadarkaa beekumsaa, ilaalchaa fi shaakala dhibee sukkaaraan walqabate kan dhukkubsattoonni dhibee sukkaaraa gosa lammaffaa taasisan qorachuu

Seensa: dhibeen sukkaaraa dhibee rakkisaa fi gartuu dhukkubaa daddarboo hin ta'iiniitti ramamuufi dhibee bal'inaan hawwaasa adduunyaa miidhaa jirudha. Kunis rakkoo meetaabiilizimii yeroo dheeraa sababa hanqina hormoonii insuliniitiin dhufuu yookaan immoo qaamni namaa hormoonii kanatti seeraan fayyadamuu yoo dadhabuudha. Akka lakkoofsa Awurooppaatti, bara 2017 keessa tamsa'inni dhibee sukkaaraa namoota ga'eessota umuriin isaanii waggaa 18-99 keessatti miiliyoona 451, dhibbeentaadhaan (8.4%) yoo ta'u, fuulduratti jechuunis bara 2045tti tamsa'inni dhibee sukkaaraa gara miiliyoona 693(9.9%) ka'a jedhamee kan tilmaamamu akka ta'eefi namoonni (ga'eessonni) miiliyoona 5 ta'an dhibee kanaan akka du'an qorannoon lafa kaa'eera. Akka addunyaatti bara 2017 baasiin fayyaaf ba'e keessaa, baasiin tajaajila dhibee sukkaaraaf ba'e doolara Ameerikaa biiliyoona 850tti tilmaama. Akka federeeshiniin dhibee sukkaaraa adduynaa ibsetti Afiriikaa keessaa ga'eessonni miiliyoona 19.8 dhiibbeentaadhaan 4.5 tu dhibee sukkaaraa waliin jiraata. Isaan keessaa dhibbeentaan 50 biyyoota baay'ina uummataa bal'aa qaban arfan jechuunis: Naayijeeriyaa, Afiriikaa kibbaa, Itiyoophiyaa fi Taanzaaniyaa keessatti akka argaman ifoomseera.

Itiyoophiyaan biyyoota guddataa jiran keessaa tokko taatee kan dhibeen sukkaaraa saffisaan keessatti babal'achaa jiruufi uummata ba'aa mudachaa jiruudha. Dhibee kana hambisuufi to'achuuf; beekumsa ga'aa, ilaalcha gaarii fi shaakalli gocha dhibee sukkaaraa hambisuufi to'achuuf gargaaran isaan ijoodha. Yeroo ammaa kana balaan dhibee sukkaaraa gosa 2ffaa kun akka Itoophiyaattis ta'e akka Oromiyaatti saffisa guddaan dabalaa jira. Haa ta'u malee

qorannoowwan sadarkaa beekumsaa, ilaalchaa fi shaakala dhibee sukkaaraan walqabate adda baasuuf gaggeefaman muraasadha.

Ani barataa digirii lammaffaa(MS.c) sirna nyaata hawaasaa (community Nutrition) Yuunbarsiitii Finfinnee kanan ta'e qorannoo xumuraa hojjechuuf karooreen jira.

Kanaaf isinis kana hubachuun akkan gaaffiiwwan afaaniifi qorannoo barbaachisu gaggeessu naaf eeyyamuun akka na gargaartan kabajaan gaafatamtaniittu.

Maxxantuu 2:- Sagantaa daataa funaanuu

Maqaa	Hospitaala Riiferaalaa Yuunbarsiitii Amboo
Bakka argamaa	Magaalaa Amboo
Guyyaa daataan funaanamu	Bitootessa, 2019
Yeroo	2:00(Ganama)

Maxxantuu 3. Unka eeyyama gaafachuu

Ani barataa yuunbarsiitii Finfinneti. Barnootako Digirii lammaffaf Qoarannokoo isa dhuma hojjechaan jira. Qorannookoo kanaafis Hospitalli keessan filatameera. Qorannoo kana keessatti; dheerina Hojjaa ,ulfaatina,Marsaa Mudhii fi Marsaa Tafa keessan ni safarama ykn madaalama. Meeshaa yaalaa fayyaa faalama hin qabneen fiixee quba harka keessan keessaa coba dhigaa xiqqaa fudhuudhan hammi sukkaara dhiiga keessanii ni ilaalama. Kunis dhibee sukkaaraa irraa bilisaa fi bilisa ta'uu dhabuun keessan mirkaneeffachuuf qofa. Gaffilee qorannoo kanaaf isin gaafannus waa'ee beekumsaa, ilaalchaafi shaakala gochaa dhibee sukkaaraa to'achuuf gargaaran kan ilaalatedha. Qorannicha keessatti hirmaataa ta'uuf fedhii qabdu jedheen amana.

Bu'aa qorannicharraa argamu;- hirmaanna keessaniif faayidaan kallattiin isiniif godhamuu(qarshiidhan)hin jiru. Garuu

- Warren dhibee sukkaraa qabaniif gorsa haala jireenyaa fi soorataa isaani irratti Gorsa nii lanna
- Bu'aan qoranichaa raga sadarkaa beekumsaa, ilaalchaa fi shaakala gochaawwan dhibee sukkaraan wal qabataniin taasifaman ni dhiyeessa.

- Bu'aan qoranichaa qoranno fulduratti adeemsifamaniif odeeffanno ka'umsaa ta'a
- Bu'aan qoranichaa qaamolee mootummaa fi miti mootummaa ta'an, qooda fudhattotaa fi qopheesitoota qajeelfamaa dhibee sukkaraa hambisuu fi gocha furmaataaf giddu galuuf taasisuuf socho'aan maraaf ragaa quubsaa dhiyeessa yookiin kenna.

Miidhaa qoranichaan dhufu:- qorannichi miidhaa geessisu hin qabu, yeroo hirmaataan gaaffii afaaniifi daqiiqaa 20-30 wareeguun alatti.

Amanamummaa: deebii nuuf kennitan maraaf iccitiin yaada keessanii sirritii kan eegamu ta'uu isaa ibsina.

Namni quunnamamuu: gaaffii kamiyyuu yoo qabaattan yeroo kamiyyuu naa gafachuuf hin sodaatina. Gaffii dabalataaf yookiin dhimma biroof toora armaan gadiin nu quunnamuu dandeessu

Maqaa qorataa qorannichaa: Aggaamaa Dhaabaa Dirbabaa

Bilbila harkaa: +2519-17-68-59-83/+2519-06-58-22-42

Email: agaamaadhaaba@gmail.com

Qorannicha keessatti hirmaachuuf walii galuu keessaniif bakka armaan gaditti kaa'ametti mallattoon mirkaneessaa. Hirmaannaa keessaniif galatoomaa.

Kooddii Hirmaataa:_____

Maqaafi mallattoo hirmaataa:

Maqaa hirmaataa_____

Mallattoo hirmaataa_____

Maqaafi mallattoo nama raga funaanuu

Maqaa:_____

Mallattoo:_____

Appendix II: Survey Questionnaire

I. Socio Demographic and Economic characteristics of households			
S. No	**Questions**	**Responses**	**Remark**
1.	Code of respondent _____	Age _____ Sex_____	
2.	Place of residences	1. Rural 2. Urban	
3.	What is the highest level of education you attend?	1. Un able to read and write 2. Able to read and write 3. Grade_____	
4.	What is your marital status?	1. Married 2. Divorced 3. single 4. widowed	
5.	What is your living status	1. Living alone 2. Living with wife/husband 3. Living with parents 4. Living with others	
6.	What is your occupational status?	1. House wife only 2. Farmer 3. Merchant 4. Government/ private employed 5. Daily labors 6. Others (specify) _____	
7.	What is the educational status of your husband/Wife?	1. Un able to read and write 2. Able to read and write 3. Grade_____	
8.	Family size	In number_____	

9.	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Waaqeffataa 6. Others (specify)_____	
10.	Diabetic history of the family	1. No diabetic history 2. Father is diabetic 3. Mother is diabetic 4. Both Father and mother are diabetic 5. Others.....	
11.	Monthly Income of the Family	In birr_____	
12.	How long you are living with DM(duration of DM)	In month _____	
II Knowledge Towards Diabetes Mellitus			
13.	**What is diabetes mellitus?**		
	a. DM is a condition of insufficient insulin production	1. Yes 2. No 3. Don't know	
	b. DM is a condition of high level of sugar in the blood	1. Yes 2. No 3. Don't know	
	c. DM is not curable	1. Yes 2. No 3. Don't know	
	d. DM is a condition of the body which not responding for insulin	1. Yes 2. No 3. Don't know	
	e. DM is diseases which affect any part of body	1. Yes 2. No 3. Don't know	
14.	**What are the symptoms of diabetes mellitus?**		
	a. Frequent hunger	1. Yes 2. No 3. Don't know	
	b. Frequent thirst	1. Yes 2. No 3. Don't know	

	c. Frequent urination	1. Yes 2. No 3. Don't know	
	d. Weight loss	1. Yes 2. No 3. Don't know	
	e. High blood sugar	1. Yes 2. No 3. Don't know	
	f. Blurred vision	1. Yes 2. No 3. Don't know	
	g. Feeling of weakness	1. Yes 2. No 3. Don't know	
	h. Slow healing of cuts and wounds	1. Yes 2. No 3. Don't know	
15.	**What are the risk factors of diabetes mellitus?**		
	a. Age	1. Yes 2. No 3. Don't know	
	b. Genetic/family history of diabetes mellitus	1. Yes 2. No 3. Don't know	
	c. Lack of physical exercise	1. Yes 2. No 3. Don't know	
	d. Low nutrient intake	1. Yes 2. No 3. Don't know	
	e. Obesity	1. Yes 2. No 3. Don't know	
	f. Pregnancy	1. Yes 2. No 3. Don't know	
	g. Sleep duration	1. Yes 2. No 3. Don't know	
16.	**What are the complications of diabetes mellitus?**		
	a. Blindness	1. Yes 2. No 3. Don't know	
	b. Heart problem	1. Yes 2. No 3. Don't know	
	c. Kidney problem	1. Yes 2. No 3. Don't know	
	d. Brain diseases	1. Yes 2. No 3. Don't know	
17.	**What are Control and management methods of DM?**		
	a. Insulin injection is available for control and management of Dm	1. Yes 2. No 3. Don't know	
	b. Regular Exercise	1. Yes 2. No 3. Don't know	
	c. Weight reduction	1. Yes 2. No 3. Don't know	
	d. Practices healthy diet	1. Yes 2. No 3. Don't know	

	III. Attitude Towards Diabetes Mellitus	
18.	I don't mind if others know that I am with diabetes mellitus	1. Agree 2. Disagree 3. I don't know
19.	It is important that you should be examined for diabetes mellitus	1. Agree 2. Disagree 3. I don't know
20.	It is important for family members should be screened for diabetes Mellitus	1. Agree 2. Disagree 3. I don't know
21.	Family support is important in dealing with diabetes mellitus	1. Agree 2. Disagree 3. I don't know
22.	We should follow avoiding of consumption of too much sugar for controlling of DM	1. Agree 2. Disagree 3. I don't know
23.	Diabetes mellitus seriously affect daily activities	1. Agree 2. Disagree 3. I don't know
24.	Physical activity prevent risk of DM	1. Agree 2. Disagree 3. I don't know
25.	Maintaining a healthy body weight is important in management of DM	1. Agree 2. Disagree 3. I don't know
26.	Diabetes Mellitus is a communicable disease	1. Agree 2. Disagree 3. I don't know
27.	Sleep duration can affect blood glucose	1. Agree 2. Disagree

			3. I don't know	
	IV. Practices Towards Diabetes Mellitus			
		Not at all	Less frequently	Frequently
28.	Do you have meal plan you eat ahead?			
29.	Have you ever visited a dietitian for your diet plan?			
30.	Do you use fruit and vegetable?			
31.	Do you consume of fatty foods?			
32.	Did you drink alcohol			
33.	Did you smoke tobacco			
34.	Do you do 40 - 60 minutes physical activity daily?			
35.	Have you meet sport professional for your physical activity			
36.	Do you participate in maintaining your healthy weight?			
37.	Do you check your blood sugar regularly			

Anthropometric Measurement:

No. of measurement	**HEIGHT**	**WEIGHT**	**BMI**
1.			
2.			
Average			
No. of measurement	**Waist circumference (cm)**	**Hip circumference (cm)**	**Waist and hip ratio (WHR)**
1.			
2.			
Average			

Maxxantuu II: Gaaffilee qorannoo

I. gaaffilee Hawwaasummaaf Dinagdee

St No	Questions/ Gaaffilee	Responses/deebii	Ibsa
1.	Kooddii Hirmaataa_____	umurii_____saala_____	
2.	Bakka jireenyaa	1. Baadiyaa 2. Magaala	
3.	Sadarkaan barnootakee maali?	1. Barreessuuf dubbisuu hin danda'u 2. Barreessuuf dubbisuu nan danda'a 3. Kutaa _____	
4.	Haalli gaa'elakee maali?	1. Gaa'ela kan dhaabbate/tte 2. Gaa'ela kan hiikee/te 3. Gaa'ela kan hin dhaabbanne 4. Abbaan mana/ haati manaa kan du'e/duute 5. Kan biroo_____	
5.	Eenyu waliin jiraatta	1. Qofaa kan jiraatu/ttu 2. Haadha warraa/Abbaa warraa waliin 3. Maatii irraa dhalate/dhalatte waliin 4. Kanneen biroo waliin_____	
6.	Sadarkaan/haalli hojiikee maali?	1. Haadha warraa qofa 2. Qotee bulaa 3. Daldalaa 4. Mindeffamaa 5. kanbiroo _____	

7.	Haalli Sadarkaan barnoota haadha warraakee/ abbaa warraakee maali?	1. Barreessuuf dubbisuu hin danda'u 2. Barreessuuf dubbisuu nan danda'a 3. Kutaa _____	
8.	Baay'inni maatii meeqa	Laakkoofsaan _____	
9.	Amantiinkee maali?	1. Oortodooksii 2. Isilaama 3. Pirotestaantii 4. waaqeffataa 5. Kaatolikii 6. Kan biroo _____	
10.	Galii ji'aa kan maatii	Qarshiidhaan_____	
11.	Haala dhibee sukkaara maatii duraanii	1. Namni dhibee sukkaaraa qabu hin jiru 2. Abbaatu dhibee sukkaaraa qaba 3. Haadhatu dhibee sukkaaraa qaba 4. Lamaanuu qabu 5. Kan biro.....	
12.	Yeroo hangamiif dhibamaa dhibee sukkaaraa taatee jiraatte	Ji'aan_____	
13.	Dheerina yeroo hirribaa galgala tokkotti	Sa'aatii_____	
II. Beekumsaa dhibee sukkaaraa ilaalchisee			
14.	Dhibeen sukkaaraa maali?		

	a) Dhibeen sukkaaraa dhibee sababa insuliniin qaama keessatti oomishamu ga'aa ta'uu dhabuun dhufudha	1.Eeyyee 2. Lakki 3. hin beeku	
	b) Dhibeen sukkaaraa dabaluu hamma sukkaara dhiiga keessaati	1.Eeyyee 2. Lakki 3. hin beeku	
	c) Dhibee sukkaaraan qabamanii fayyuun hin danda'amu	1.Eeyyee 2. Lakki 3. hin beeku	
	d) Dhibeen sukkaaraa haala qaamaa kan gocha insuliniif deebii hin laanne	1.Eeyyee 2. Lakki 3. hin beeku	
	e) Dhibeen sukkaaraa kutaa qaamaa kamiyyuu kan miidhudha	1.Eeyyee 2. Lakki 3. hin beeku	
15.	Mallattoon Dhibee sukkaaraa maal fa'ii?		
	a) Irra deddeebiin beela'uu	1.Eeyyee 2. Lakki 3. hin beeku	
	b) Irra deddebiin dheebochuu	1.Eeyyee 2. Lakki 3. hin beeku	
	c) Irra deddeebiin fincaa'uu	1.Eeyyee 2. Lakki 3. hin beeku	
	d) Ulfaatinni qaamaa hir'achuu	1.Eeyyee 2. Lakki 3. hin beeku	
	e) Hammi sukkaaraa dabaluu	1.Eeyyee 2. Lakki 3. hin beeku	
	f) Jaamina ijaa	1.Eeyyee 2. Lakki 3. hin beeku	
	g) Dhadhabbii qaamaa	1.Eeyyee 2. Lakki 3. hin beeku	
	h) Maadaan qaamaa fayyuu diduu	1.Eeyyee 2. Lakki 3. hin beeku	

16.	**Waantotni dhibee sukkaaraaf sababa ta'an maal fa'i?**		
	a) Umurii	1.Eeyyee 2. Lakki 3. hin beeku	
	b) Maatiin dhibee sukkaaraa qabaachuu	1.Eeyyee 2. Lakki 3. hin beeku	
	c) Hanqina sochii qaamaa	1.Eeyyee 2. Lakki 3. hin beeku	
	d) hanqina nyaataa	1.Eeyyee 2. Lakki 3. hin beeku	
	e) Furdina madaala darbe	1.Eeyyee 2. Lakki 3. hin beeku	
	f) Ulfa	1.Eeyyee 2. Lakki 3. hin beeku	
	g) Dheerina yeroo hirribaa	1.Eeyyee 2. Lakki 3. hin beeku	
17.	**Dhibeewwan dhukkuba sukkaaraan wal qabatan gurguddoon maal fa'i?**		
	Jaamina ijaa	1.Eeyyee 2. Lakki 3. hin beeku	
	Dhibee onnee	1.Eeyyee 2. Lakki 3. hin beeku	
	Dhibee kale	1.Eeyyee 2. Lakki 3. hin beeku	
	Dhukkuba sammuu	1.Eeyyee 2. Lakki 3. hin beeku	
18.	**Tooftaa dhibeen sukkaaraa ittiin to'atamu**		
	Insulinii fayyadamuu	1.Eeyyee 2. Lakki 3. hin beeku	
	Sochii qaamaa taasisuu	1.Eeyyee 2. Lakki 3. hin beeku	
	Ulfaatina qaamaa hir'isuu	1.Eeyyee 2. Lakki 3. hin beeku	
	Nyaata fayyaalessa fayyadamuu	1.Eeyyee 2. Lakki 3. hin beeku	
	III. Gaaffilee Ilaalcha dhibee sukkaraa irratti		
19.	Dhibee sukkaaraan qabamuuko namoonni yoo beekan homtuu nutti hin dhaga'amu	1. Ittan walii gala 2. Nan morma 3. Hin beeku	

20.	Dhibee sukkaaraaf qoratamuun barbaachisaadha jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
21.	Miseensi maatii hunduu qorannoo dhibee sukkaaraa qoratamuu qabu jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
22.	Nama dhibee sukkaaraa qabuuf deeggarsi maatii fi hiriyyaa barbaachisaadha jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
23.	Dhibee sukkaaraa to'achuuf soorata sukkaara baay'inaan qabu dhiisuu qabna jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
24.	Dhibeen sukkaaraa sochii jireenyaa guyyaa ciminaam miidha jedheen hin yaadu.	1. Ittan walii gala 2. Nan morma 3. Hin beeku
25.	Sochiin qaamaa dhibee sukkaaraa ittisuu danda'a jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
26.	Ulfaatina qaamaa fayyaalessa taasisuun dhibee sukkaaraa to'achuuf fayyada jettee yaaddaa?	1. Ittan walii gala 2. Nan morma 3. Hin beeku
27.	Dhibeen sukkaaraa dhibee daddarbaa ta'uu danda'aa	1. Ittan walii gala 2. Nan morma 3. Hin beeku

28.	Dheerinni yeroo hirribaa hamma sukkaara dhiiga keessaa murteessuu danda'a	1. Ittan walii gala 2. Nan morma 3. Hin beeku

	IV. Gaaffilee shaakala gochawwan dhibee sukkaaraan wal qabatan			
		Gonkuma	**Yeroo tokko tokko**	**Yeroo hundaa**
29.	Karoora nyaataa guyyaa fuula duraa nyaattu qabdaa?			
30.	Karoora nyaataa qopheeffachuuf ogeessa sirna nyaataa quunnamtee beektaa?			
31.	Kuduraaf muduraa ni fayyadamtaa?			
32.	Nyaatawwan cooma qabu ni nyaattaa?			
33.	Dhugaatii alkoolii ni dhugdaa ?			
34.	Sigaaraa ni xuuxxaa?			
35.	Sochii qamaa guyyaatti daqiiqaa 40-60 ni taasistaa?			
36.	Sochii qaamaa ilaalchisee ogeessa spoortii mar'iattee beektaa?			
37.	Ulfaatina qaamakee fayyaalessa taasisuu keessatti hirmaannaa ni taasistaa?			
38.	Hordoffii idilee hamma sukkaaraa dhiigakee keessaa ni taasiftaa?			

Safartuu Antroopoomeetirii

Lakk. safaraa	**Hojjaa(m)**	**Ulfaatina(Kg)**	**BMI**
1.			

2.			
Giddu galeessaan			
Lakk. Safaraa	**Marsaa mudhii (cm)**	**Marsaa tafaa (cm)**	**Reeshoo mudhiifi tafaa**
1.			
2.			
Giddu galeessaan			