

NON-ADHERENCE TO DIETARY AND PHYSICAL ACTIVITY
RECOMMENDATIONS AND ASSOCIATED FACTORS AMONG TYPE 2
DIABETIC PATIENTS ON FOLLOW UP IN GOVERNMENT HOSPITALS OF
ILU ABBA BORA ZONE, OROMIA REGION, ETHIOPIA.



BY
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ABSTRACT

Background: Diabetes mellitus is one of the rapidly increasing non communicable diseases requiring continuous medical care and mainly life time patient's adherence to self management regimens and life style changes including diet and physical activity recommendations, in order to prevent acute and chronic complications. Various factors influence patients non adherence to diet and physical activity recommendations but these factors are not typically even for all patients. Despite the importance of identifying these factors for health care providers to individualize clinical approaches, there is limited evidence in low income countries like Ethiopia including the study area.

Objective: To assess the proportion of non adherence to dietary and physical activity recommendation and associated factors among type 2 diabetic patients on follow up in government hospitals of Ilu Abba Bora Zone, Oromia Region, Ethiopia, 2018.

Methods: A facility based, cross-sectional study was employed from March 19 to May 19, 2018 in the chronic follow up units of Ilu Abba Bora Zone governmental hospitals. The final calculated sample size was 422 which were proportionally allocated to both hospitals and systematic sampling was used. Data were collected using a structured interview administered questionnaire. Data were edited and entered into Epidata version 3.1 and exported to SPSS for analyses. The results of the descriptive statistics were expressed as percentages and frequencies. Associations between independent variables and dependent variables were analyzed using bivariate and multivariable logistic regression analysis. The odds ratio along with 95% CI was used to determine the association. A statistical significance was declared at p value <0.05.

Results – The study included 392 respondents with 92.9 % response rate. 201(51.3%) were female and mean age was 47.9 years. The respondents' non-adherence to dietary and physical activity recommendation was 51.8% and 38%, respectively. On multivariable logistic regression analyses, dietary non-adherence was found to be lower in housewives [AOR=5 (95%CI: 2.5, 9.8)], diabetic association members [AOR=2.8, (95%CI: 1.6, 4.9)], patients who had high perceived susceptibility [AOR=2 (95%CI: 1.1, 3.7)] and good emotional support for dietary regimen [AOR=1.9 (95%CI: 1.2-3.1)]. Physical activity non adherence was found to be lower in males [AOR=2 (95%CI :1.2, 3.4)], younger patients [(AOR=8.6 (95%CI: 2.6,28.7)], in patients who had high perceived severity [AOR=1.7 (95%CI:1.1, 2.8)], self efficacy [AOR=2.6 (95%CI:1.6,4.4)] and with those had abdominal obesity [AOR=2.5 (95%CI:1.3,4.8)].

Conclusion and Recommendations – The rates of non adherence to dietary and physical activity were generally found to be high. Model based and family centered educational programs that especially focus on individual habits and preferences and ongoing support for patients should be designed and qualitative studies which assess reasons for non adherence should be conducted.

Keywords: Diabetics, Non adherence, Dietary recommendation, Physical activity recommendation

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ABBREVIATIONS

ADA – American Diabetes Association

AHA – American Heart Association

BMI - Body mass index

CVD - cardio vascular disease

DM – Diabetes mellitus

ESRD – End stage renal disease

FBS- Fasting blood sugar

HBM-Health belief model

IDF - International Diabetes Federation

IPAQ – International Physical Activity Questionnaire

MET -Metabolic Equivalent

MMAS - Morisky medication adherence scale

MKRH- Metu Karl Referral Hospital

NCD - Non-Communicable Diseases

SD- Standard deviation

SPSS – Statistical Package for Social Science Software

SDSCA - Summary of Diabetes Self-care Activities

WHO – World Health Organization

WC–waist-circumference

1 - INTRODUCTION

1.1. BACKGROUND

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage and dysfunction of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels(1). It has become one of the world biggest health concern affecting both developed and developing countries (2).

Type 2 diabetes is the most common type of diabetes it accounts for about 90% to 95% of all diagnosed cases of diabetes in adults(3). It usually occurs in adults, but is increasingly seen in children and adolescents. In type 2 diabetes, the body is able to produce insulin but becomes resistant so that the insulin is ineffective. Over time, insulin levels may subsequently become insufficient. Both the insulin resistance and deficiency lead to high blood glucose levels (2).

The number of people with type 2 diabetes is growing rapidly worldwide. This rise is associated with ageing populations, economic development, increasing urbanization, less healthy diets and reduced physical activity(2).

The hypothesis proposed by Barker and Hales: the idea of the “thrifty phenotype.” As an adaptation to under nutrition in fetal life permanent metabolic and endocrine changes occur which would be beneficial if nutrition remained scarce after birth? If nutrition becomes plentiful, however, these changes predispose to obesity and impaired glucose tolerance. These hypothesis predicts that more heart disease and impaired glucose tolerance will be seen in a population that is undergoing transition from sparse to better nutrition (4). Thus with the rising economy and nutritional transition the incidence of type 2 diabetes is rising rapidly in Ethiopia, coinciding with increasing urbanization and obesity, Urbanization has led many Ethiopians towards a stressful, unhealthy life style, mainly altering their dietary patterns from the consumption of fresh, healthy food to more refined carbohydrates and high fat containing junk food and beverages.

The majority of persons with Type 2 diabetes are overweight or obese, which further increases their risk of macro vascular and micro vascular complications through worsening of hyper glycaemia, hyper lipidaemia and hypertension (1). The personal and public health problem of diabetes, already of vast proportions, continues to grow despite exciting advances in the past few years in virtually every field of

diabetes research and in patient care (e.g. improved treatment, protection against complications, improved lifestyles and even primary prevention of some form of diabetes) (5).

Even though the person with type 2 diabetes and his or her health care provider work together to design and modify treatment regimens, type 2 diabetes is primarily a self-managed condition. Management of type 2 diabetes often necessitates changes in the patient's lifestyle. The cornerstone of any diabetes treatment regimen, and the first step toward disease management, is a tailored program of diet and physical activity. While the primary goal of this approach is the achievement of glycemic control, secondary benefits include weight loss and reduction in risk factors for common co morbidities of type 2 diabetes, such as hypertension and cardiovascular disease (6). Approximately 50% of new cases of type 2 diabetes can be controlled adequately by lifestyle changes (diet and exercise); 20-30% will need oral hypoglycemic drugs (as an additional measure); and 20-30% will require insulin (7). The World Health Organization defines adherence as "the extent to which patients take medications as prescribed by their health care providers, following a diet and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider"(5) .

Non-adherence to lifestyle recommendations occurs when a patient deviates below the acceptable level of adherence from mutually agreed collaborative approach to lifestyle changes (6). World Health Organization (WHO) report in 2003, average of patient adherence in long-term therapy for chronic diseases in developed countries is only 50%, while in developing countries, it is even lower(5). The prevalence of non adherence in diabetic patients is high, due to the duration of treatment, and may lead to an increase in mortality, morbidity, and other adverse effects (8). Non adherence affects the health care provider and the health care delivery system as well as the patient as the patient has to suffer from the poor quality of life and long duration of hospital stay and increased cost and burden of the disease (11).

Several studies have shown the benefit of healthy dietary habits and regular exercise in the prevention and management of type 2 diabetes mellitus. Adherence to prescribed lifestyle changes have also been shown to improve glucose levels, to lead to decreased blood pressure and to correct lipid abnormalities which are factors associated with the micro and macro-vascular complications of diabetes (8,9). Health workers need constant and up to date information on barriers to the recommended exercise and diet regimens in order to be in a better position to mitigate them with effective and more acceptable options personalized to individual capabilities.

1.2. STATEMENT OF THE PROBLEM

Diabetes Mellitus is rapidly emerging as a major public health concern across the globe and increasingly been diagnosed in the developing countries including Ethiopia.

According to International Diabetes Federation (IDF), about one out of every 11 adults worldwide has diabetes. Furthermore, it is estimated that around 415 million people had diabetes as of 2015(3). This number is expected to rise to 642 million people by 2040. In Africa 14.2 million adults aged 20 -79 have diabetes and by 2040, 43.2 million adults expected to have diabetes. Ethiopia is one of the countries mostly affected by the disease. According to the 2015 report of IDF, the number of adults aged 20-79 years, living with diabetes in the country was 2.135 million (4.8%) (2). In North West Ethiopia, Gondar, the prevalence of the disease was 2.1% in rural areas and 5.1% in urban areas (10). Similarly, study in Jimma has revealed that the prevalence of diabetes mellitus to be 6 % and 2.9 % in urban and rural areas respectively(11).

Because of different factors, diabetic patients fail to adhere to medication and dietary and physical activity recommendations, when it is not properly managed; diabetes is one of the major causes of premature illness and death worldwide. Globally, high blood glucose causes about 7% of deaths among men aged 20–69 and 8% among women aged 20–69, premature deaths attributable to high blood glucose is higher in low- and middle-income countries than in high-income countries (3).

In 2015 more than 321,100 deaths in the Africa Region could be attributed to diabetes. Furthermore, 79.0% of those deaths occurred in people under the age of 60, the highest proportion of any region. This highlights that investment, research and health systems are slow to respond to this burden in the Africa Region and remain focused primarily on infectious diseases (2). The total diabetes related death by 2015 was estimated to be 23 ,145 in Ethiopia (2). According to a study in Addis Ababa diabetes is a cause for 5% of mortalities (13).

Failure of adherence to medication, dietary and physical activity leads to complications such as blindness, kidney failure, lower limb amputation and several other long-term consequences that impact significantly on quality of life (12). DM associated complications and admissions in Addis Ababa, at St. Paul and Black Lion Specialized Hospitals show that the prevalence has increased from 7.1% in 2005 to

34.1% in 2009(14). A study in Hossana revealed 46.2% of diabetic patients had at least one chronic complications (15).

In addition to causing a high degree of morbidity and mortality, the metabolic control of diabetes and the treatment of its complications have a high cost for health services(12). A diverse group of studies shows that weight gain and obesity may elaborate the possibilities of diabetes (12). Survey results found that diabetes associated with obesity is the sixth leading cause of death (16).

The combination of increasing prevalence of diabetes and increasing life spans in many populations with diabetes may be leading to a changing spectrum of the types of morbidity that accompany diabetes. In addition to the traditional complications described above, diabetes has been associated with increased rates of specific cancers, and increased rates of physical and cognitive disability, this diversification of complications and increased years of life spent with diabetes indicates a need to better monitor self management practice of diabetes patients including dietary and physical activity modifications (12). National guidelines and management protocols developed for or adapted to individual settings are useful tools in achieving a standardized and consistent management approach. The national comprehensive guidelines for prevention, screening, diagnosis, treatment and care for non-communicable diseases (NCDs) including diabetes is one of the efforts made to reduce the increasing burden of non-communicable diseases in Ethiopia (1).

Ethiopia has launched the second National Nutrition Program with five strategic objectives including Improve the delivery of nutrition services for communicable and non-communicable/lifestyle related diseases and also Ethiopia is preparing its first ever national food and nutritional policy that will facilitate integrated management of diabetes and other nutrition related diseases(17).

The Ethiopian Diabetes Association was established in 1984 in response to the growing problem of diabetes in the country with the objective of improving the lives of people with diabetes (18). In spite of relatively better efforts to manage diabetes, a huge gap exists in the provision of recommended components of diabetes care and the level of achievement of glycemic control among people with diabetes in Ethiopia.

Interventions to achieve good glycemic control in diabetic patients are cost effective method in reducing morbidity and mortality; however, glycemic control is poor in both developed and developing countries (9). Studies have indicated that recommended glycemic goals are achieved by less than 50%

of patients(3,19–22), which may be associated with decreased adherence to therapies. As a result, hyperglycemia and long term complications increase morbidity and premature mortality, and lead to increased costs to health services.

The rates of non-adherence to diet have been reported to be high in different studies, in study done in Egypt, Saudi Arabia and Mexico ,non adherence to dietary management ranges from 52-62% (23–25). Different studies explored poor adherence status to physical activity recommendation as well , 72,68.3 and 47% in Sweden, India and Addis Ababa respectively, non adherence to physical activity recommendation have been reported (26–28).

Furthermore, studies have indicated some of the factors associated with diabetes self care including diet and physical activity regimen, frequently reported factors are age, sex, income, duration of disease social supports, and etc.

There is an urgent need to improve adherence status of recommended healthy life styles to ensure achievement of maximum health benefits to patients and for a quality life because the risk of complications of diabetes can be reduced by proper adherence. patient non adherence to treatment recommendations is often provoking for health care professionals(8).

Though the issue of dietary and physical activity regimen practice and its adherence requires strong devotion and considerable attention, few studies are conducted to show the gap and magnitude of the problem in Ethiopia particularly in the study area. Even though socio-demographic factors have major impact on how patients deal with their illness, multiple independent factors that could influence patients’ adherence to dietary and physical activity recommendations are hardly studied. Understanding the determinants of non-adherence to dietary and physical activity recommendations can help to plan and implement more intensive interventions to assist patients' long-term task of achieving beneficial lifestyle behavioral changes.

2. LITERATURE REVIEW

2.1. Dietary and physical activity recommendations

Abundant literatures support the beneficial effects of diet and exercise recommendations for improving and maintaining glycemic level of people with diagnosed type 2 diabetes mellitus. Patient adherence to therapeutic lifestyle modification recommendations is notoriously difficult to achieve, but essential to the success of managing type 2 diabetes mellitus.

The problem of poor adherence to lifestyle measure recommendations amongst patients with type 2 diabetes is very complex and multi-faceted in nature. Poor adherence to life style modification is very prevalent in patients with diabetes and there is a variation in different part of the world, due to the presence and absence of risk factors, and also varies according to the type of life style change adherence being measured and measurements used. The rates of non-adherence to diet and exercise recommendations ranged from 24% -95% and 15%-70% respectively(19,29–43).

2.1.1. Magnitude of Non Adherence to Dietary Recommendation

Dietary adherence status is significantly related to glycemic control As such, it is central to the treatment of diabetes. However, it is also one of the most challenging aspects of diabetes regimens because it extends over time, requires adjustment on an ongoing basis, and consists of many conceptually different self-care behaviors (i.e. making appropriate food choices, limiting overall caloric intake, and timing meals appropriately ,Adherence level to dietary regimen of diabetic management are poorer than medication adherence (9).

A cross sectional study conducted on 423 Brazilian diabetic patients using semi qualitative FFQ, showed that 96.9% of the respondents were not adherent to dietary recommendation (33). In contrast a cross sectional study done in India in 2017 on 290 diabetic patients to assess adherence status to diet and physical activity among diabetic patients using revised version of Summary of Diabetes Self-care Activities (SDSCA) showed 24% of participants were non adherent to dietary recommendation however this finding is also dissimilar with another cross-sectional study conducted to at the Doon Government Hospital, Dehradun, Uttarakhnad, India which showed 76.7 % of the participants to be non adherent to diet regimen (34,36).

A descriptive cross sectional study conducted in Botswana by Dr Ganiyu, on 105 patients selected by convenient sampling using food frequency questioner (FFQ) estimated rates of non-adherence to diet to be 37.4%. However the sample size for this study was relatively small (31).

Similarly study in Addis Ababa done on dietary practice of type 2 DM patients ; dietary habit was assessed using the modified form of the eight-item Morisky medication adherence scale (MMAS-8) (Morisky and DiMatteo2011) and the study revealed that 51.4% of the patients had poor dietary practice(29). In An analytical cross-sectional study conducted on 385 Nepalese type 2 diabetic patients selected by systematic random sampling using three days recall method for dietary history ,87.5% were non adherent to dietary recommendation(35). Similarly a cross sectional study conducted in Yemen in 2016 on 210 participants reported the rate of non adherence to diet to be 79% (30).

A cross sectional study conducted in 2015 in Addis Ababa primary level health care's, on 595 patients to assess self-care practices and its predictors among adults showed that Almost half (49.2%) of the respondents managed their diet regularly, (40%) managed their diet occasionally and 62(10.4%) never managed their diet (37) . However these studies were conducted to asses self care practice, not particularly focusing on adherence on dietary recommendations.

A prospective study done to assess Cultural factors and patients' adherence to lifestyle measures by serour et al 2007 in Kuwait on 334 patients with hypertension , diabetes or both selected by convenient sampling estimated that 63.5% of were not adhering to any diet regimen (38). This is yet again dissimilar with findings in facility based cross sectional study conducted in Harari Region on 222 type 2 diabetic patients to assess self care practice showed 42.3% non adherence to the recommended dietary intake(39).

2.1.2. Magnitude of Non Adherence to Physical Activity Recommendation

Adherence to physical activity recommendation is very crucial for optimal management of DM. Exercising according to standard recommendations is very important not only for better glycemic control, but also for reduction of cardiovascular complications. According to the WHO, insufficient physical activity, defined as less than 150 minutes of moderate physical activity per week , was present in about a quarter of men and a third of women in African region (44).

A study done in Harari, Ethiopia, showed that only 31.1% of the diabetic patients had exercise for thirty minutes per day (39). Similarly a cross-sectional study done in slums of Bengaluru ,India comprising 163 diabetes patients to assess The prevalence of self-care practices and their socio demographic risks using Summary of Diabetes Self-care Activities self-report scale (SDSCA), reported non adherence to exercise to be 69.3%(45).

A cross sectional done at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, on 323 patients using SDSCA, showed 46.9% non adherence to recommended physical activity(19). In qualitative study done to describe self-care practices among individuals with type 2 diabetes in Addis Ababa, on 13 purposively selected participants for in-depth interview , nearly all informants admitted that they do not exercise regularly even if most patients better adhered to medication prescription (40). However a study done to assess adherence and factors associated with self-care on 187 type 2 diabetes patients in Ghana indicated that exercise to be the most commonly performed self-care behavior(41). However in study done in Yemen only 15.2% of participants reported good adherence to the recommended levels of physical exercise and 21.0% reported partial adherence to the recommended levels of physical exercise, while the majority (63.8%) reported non-adherence to any exercise advices at all(30).

Similar study conducted in Nepal assessed adherence to physical activity advice using Compendium of Physical Activity and showed that 42.1% of the participants were non adherent to physical activity(35). A cross-sectional study carried out to assess the physical activity levels on 132 type 2 diabetes patients in Kuala Lumpur, Singapore, using International Physical Activity Questionnaire (IPAQ) reported 47.0% of patients had moderate physical activity level followed by 33.3% of the subjects had low physical activity(42).

2.1.3. Factors associated with non adherence to dietary and physical activity recommendation

To improve patient adherence to dietary and physical activity recommendation , it is important to understand why patients fall short to adhere to diabetes dietary and physical activity regimen. A substantial literature has documented a number of factors related to diabetes dietary and physical activity regimen non adherence problems, since reasons for non adherence are multi factorial, different literatures suggest that It is helpful to consider demographic, psychological, and social factors, as well as disease- and treatment- related factors (8).

2.1.3.1. Socio demographic factors

2.1.3.1.1. Socio demographic factors associated with physical activity non adherence

Age of the patient has been associated with non adherence to physical activity recommendations among diabetes patients, compared to younger participants, older age patient's adherence to physical activity recommendations have been reported to be less. In study done in India adherence to physical activity recommendation was stated to be higher among Younger patients (<55 years) than old age patients

(AOR :1.7,95% CI :1.01, 2.84 P = 0.04) (34). A survey conducted in America indicated individuals over the age of 65 years were associated with physical inactivity(32) . Study in Yemen showed patients who were under 60 years old were about four times more likely to be engaged in regular exercise compared with those who were above 60 years [<40 years: P-value 0.019 ; 40-60 years, P-value=0.006] (30).

Gender has also been associated with exercise non adherence, men diabetes patients were found to be more physically active than the women, Study in India stated Male Patients were two times more likely to adhere to physical activity than female patients(P = 0.005) (34). In another study in India adherence to exercise was associated with age (P = 0.02) and formal education (P = 0.02), People <55 years exercised regularly and people who had formal education exercised regularly.(45) In a study in Bangladesh non-attendance to diabetes education class (P = 0.014), older age (P = 0.037) are associated to non-adherence to exercise(46). similarly In study in Addis Ababa Marital status, level of education, monthly income and diabetes complication showed significant association with their adherence condition to physical activity (19)

2.1.3.1.2. Socio Demographic Factors Associated Dietary Recommendation Non Adherence

Age of the patient has been associated also with dietary adherence status of diabetes patients; advancing age is a possible factor that might positively influence the dietary adherence status. A survey conducted in America indicated individuals over the age of 65 years ate a higher number of fruits than their counterparts (32) .

Gender as well has been associated with dietary adherence status , men diabetes patients were found to have lower levels of adherence . Study done in Kuwait showed male patients had significantly poor diabetes dietary practice than females (P=0.010)(47). A study result done in India indicated that more women (52%) than men (32%) followed the recommended diet schedule (48) , however study conducted in Dilla University Referral Hospital, showed that male diabetic patients were more likely to have diet adjustment than female patients (43).

Significant association between adherence status to dietary recommendation and residence, occupation have been indicated, in study done in Yemen Urban residents were two times more likely to adhere to the diet than rural residents (P-value=0.012). Employees (P-value=0.006) and housewives (P-value=0.012) were three times more likely to adhere to the diet compared with unemployed individuals(30). In a study in Bangladesh higher education (P = 0.013), rural area (P = 0.013) and

attendance to diabetes education sessions ($P = 0.043$) showed association with dietary adherence (46). In study in India Patients level of education, occupation, marital status and Family type was found to have statistically significant association to adherence to dietary and physical activity(34) similarly In study done in Bahrain socio demographic factors such as age, marital status & level of education had been shown to have significant relationship with the dietary practice score (p-value .000) (49). In contrast a study in Brazil stated that There was no association between adherence to treatment and the variables gender, age, education and family income (33).

A study in Harar indicated that education level, income and diabetic education had significant association with self care practice including dietary and exercise regimens (39). In study done in Egypt Married diabetes patients showed significant higher rate of therapeutic adherence including diet and physical activity (48.6%) than single, widowed or divorced ones (21.9%)(50). Study done in Ghana revealed that income level ($p=0.043$) and educational level ($p=0.000$) were statistically significant to adherence to healthy dietary habits, as those with higher income and educational levels tend to adhere better to healthy dietary habits. However, age ($p=0.184$) and sex ($p=0.137$) of the respondents reported to be not statistically significant regarding adherence to dietary intake (51).

2.1.3.2. Medical factors

2.1.3.2.1. Medical Factors associated with physical activity non adherence

Duration of disease appears to have a negative relationship with adherence status: the longer a patient has had diabetes, the less likely he or she is to be adherent to treatment. Studies found that level of physical activity was associated with duration of disease. Patients who had had diabetes for 10 years or less reported greater energy expenditure in recreational physical activities, and exercising on more days per week, than those with a longer history of diabetes. Similarly study in India showed Participants who had Duration of diabetes ≤ 10 years had statistically significant association with their adherence condition about two times more likely to engage in physical activity when compared with their counterparts respectively($P = 0.008$) (34).

Adherence status to exercise was reported to be associated with type of medication. study in Yemen indicated that Patients who treated with oral hypoglycemic medications adhered to physical exercise about four times more than who treated with insulin injection ($P=0.001$)(30).

A review of literature on diabetes self management practice in India indicated having a co morbid condition had negative association with exercise adherence status (52). A study in Nepal reported Physical activity adherence level to be higher in the respondents with positive family history of diabetes compared to those with no family history ($p = 0.001$)(35).

2.1.3.2.2. Medical Factors associated with dietary non adherence

Dietary adherence status as well has been shown to be negatively affected by duration of disease , In study done in Dilla Individuals who had 3-5 years of duration of DM were less likely to have diet adjustment than those who had less than one year's duration of DM (43). In similar study in Yemen Patients who had DM for ≤ 5 years adhered to diet better than those who had DM for >5 years (P -value=0.040) (30). Type 2 diabetic patients on insulin treatment was found to have statistically significant adherence to dietary activity compared to those who are on oral hypoglycemic agents(34). In study done in Nepal Adherence level of dietary advice was shown to be higher among those advised by physicians than others ($p = 0.001$)(35).

A study in Australia has evaluated the association between self-care behaviors and body mass index (BMI) and waist circumference (WC) in type 2 diabetes patients in which those with $BMI \geq 35$ Kg/m² compared to those with $BMI < 35$ Kg/m² were less likely to achieve healthy diet and exercise targets ,however a study in Ghana reported BMI and WC not being associated to dietary and exercise practices (51,53).

A study in Brazil indicated The glycosylated hemoglobin had significant association with adherence status to physical exercise (33). A study in Mexico stated factors associated with type 2 diabetes therapy noncompliance was the presence of co morbidity specifically related to hypertension and obesity (25).

2.1.3.3. Health beliefs of type 2 dm patients about dietary and exercise recommendations

According to the HBM, people with diabetes will adhere to treatment plans if they are concerned about their health and believe that they are susceptible to problems, believe that diabetes could have serious consequences, believe that following medical recommendations will reduce threats, and believe that the benefits outweigh the costs of not adhering. On the other hand, self-efficacy refers to the belief in the ability to perform an action, and improve a person's health behaviors, and withdraw behaviors detrimental to health (54).

A cross-sectional study conducted in 390 Iranian diabetic patients showed that, HBM constructs could explain 29.6% of the variance in self care behaviors including dietary and exercise practices in type 2

diabetic patients(55), again a cross-sectional study done 110 Iranian diabetic patients to analyze Determinants of Self-Care in Diabetic Patients Based on Health Belief Model indicated Health belief model constructs including perceived benefits, barriers, severity, susceptibility, self-efficacy and social support predicted 33.5% of the observed variance of self-care behaviors. Perceived susceptibility and self-efficacy had positive effect on self-care behavior; whereas perceived barrier's has negative effect. Self-efficacy, perceived susceptibility and barriers were most powerful predictor respectively(56). Similarly study in Harar showed perceived severity and perceived barrier to be significantly associated with self care practice(39).

A study conducted in Jimma showed; Patients with high perceived severity of the disease was more likely to adhere to self-care practice. In Study in Addis Ababa high perceived severity of diabetes complications , high perceived benefit and barriers of diabetes self-care practice were reported to be statically associated with good diabetes self-care practice than their counter parts(37). In study done in America self-efficacy was associated with self-management behaviors. Self-efficacy was strongly related to healthy eating and calories expended in physical activity, as was behavior-specific support from family and friends(57).

2.1.3.4. Social Support

If the regimen is perceived as merely to stop the disease from worsening and not to cure it totally, or if it involves big changes in lifestyles to be followed over an extended period of time, adherence is usually low. Coupled with these psychological challenges, lack of social support can engender non-compliance to dietary and exercise regimen of diabetes self management. A survey conducted on 151 diabetic patients in America showed that both emotional and instrumental support have a positive association with the diet adherence, with increasing social support associating with increasing adherence to dietary regimen(58). However study done in Nigeria stated that family involvement will not significantly affect people with diabetes adherence to diet regimen(59).

2.1.4. Reasons for non adherence to recommended dietary and physical activity recommendations

2.1.4.1. Reasons for Non Adherence to Physical Activity Recommendation

Despite the fact that exercise had proven to be important to achieve and maintain good glycaemic control, majority still reported a range of reasons for not adhering Serour *et al* identified reasons for

non adherence to regular exercise to be lack of time 39.0%; coexisting disease 35.6%; lack of exercise partner 3.7% (38).

In a qualitative study in Addis Ababa reasons for not doing regular physical exercise were lack of interest, lack of motivation, busy work schedule, and not being able to afford gymnasium fees (40). in study in Botswana The main perceived reasons for non-adherence to exercise were lack of information 65.7%, exercise as potentially exacerbating illness 57.6%, lack of exercise partner 24.0%, specific locations away from home 18.0%, and winter weather 15.4% (31). Similarly in study in India, reasons for Physical activity non adherence were , 36.7% patients had lack of time due to 9-10 hours daily working; 30.2% patients could not exercise due to negative attitude or laziness; 17.7% patients believed that surrounding environment or weather doesn't suit them to exercise regularly(34).

2.1.4.2. Reasons for Non Adherence to Dietary Recommendation

Regardless of the fact diet is established to be significant to achieve and maintain good glycaemic control, majority still reported a range of reasons for not adhering to dietary recommendation.

Study in Kuwait identified unwillingness 48.6%; difficulty in following a diet regimen different from that of the rest of the family 30.2%; high frequency of social gatherings 13.7%; no advice given by health care providers 4.2%; workload 3.3% as reasons for non adherence to diet(38).

Similar qualitative study in Addis Ababa showed Lack of awareness/information, inconveniences at workplaces, personal food preferences, family meal preparation habits, low income, negligence, temptations and the pressure during social gatherings to be reason mentioned for not following a recommended diabetes diet (40).

2.2. Conceptual Frame Work

There is a complex set of interactions between non adherence to dietary and physical activity recommendation and the associated factors. From all the discussion the interdependency of multiple factors contributes the high prevalence of non adherence to dietary and physical activity recommendation among diabetic patients. From the factors that affect non adherence to dietary and physical activity recommendation are socio demographic/economic factors including age, gender, educational status ,occupation , family size and income , health related factors including, duration of illness, type of treatment , family history ,diabetic education ,membership of diabetic association and co morbidity , glycemic control, obesity , social factors including emotional and instrumental family and non family members support and patient related factors including diabetic health belief i.e. perceived susceptibility to diabetic complication, perceived severity of diabetes , perceived benefit and barrier of dietary and physical activity regimen , self efficacy and low attendance at follow-up, or at counseling, as well have an effect on adherence status to dietary and exercise recommendations .

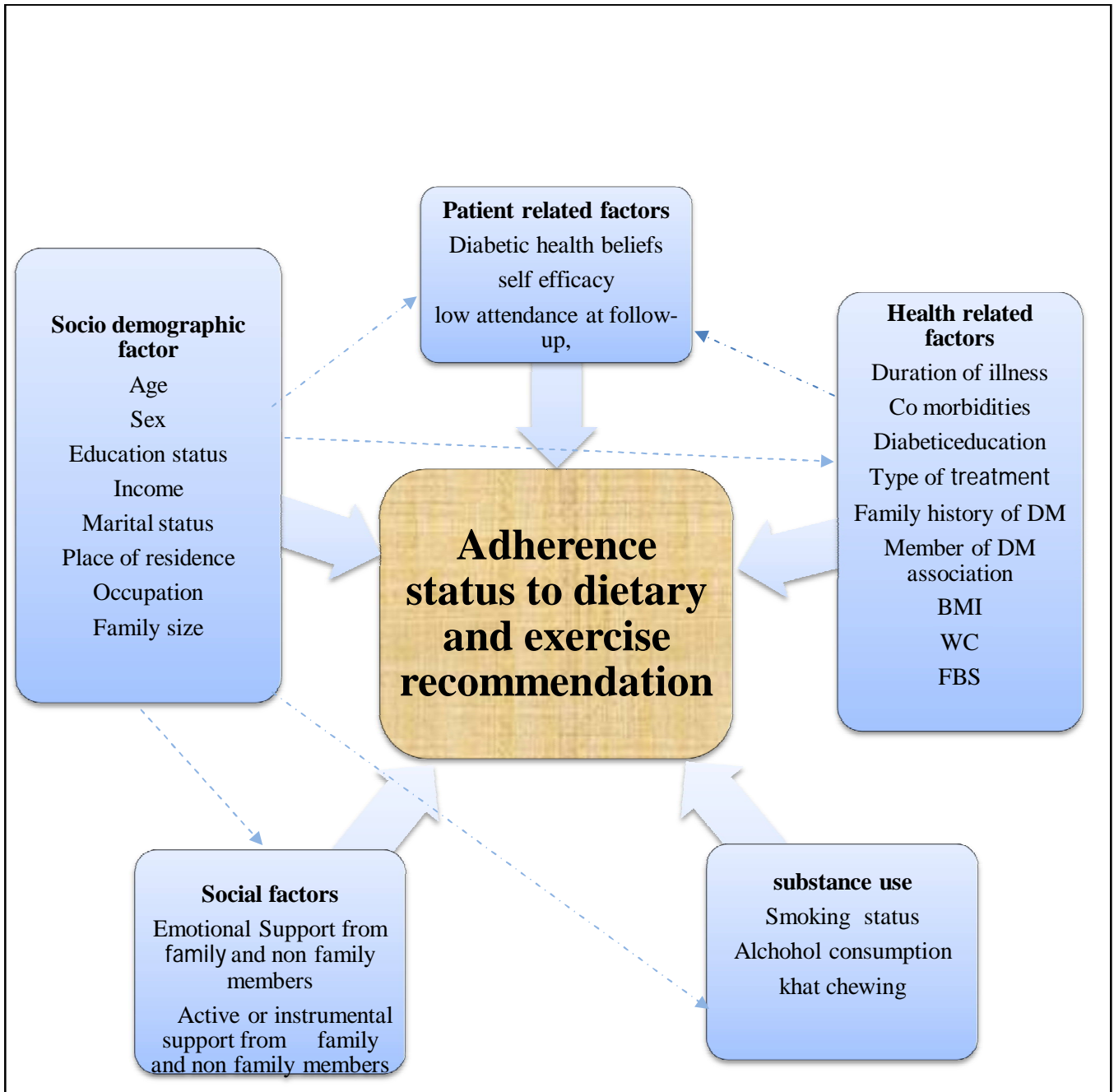


Figure 2: conceptual framework of factors affecting non adherence to dietary and physical activity recommendations developed from different literatures.

2.3. SIGNIFICANCE OF THE STUDY

Adherence to prescribed dietary and physical activity regimens have been shown to improve glucose levels, to lead to decreased blood pressure and to correct lipid abnormalities which are factors associated with the micro and macro-vascular complications of diabetes. However most patients do not adhere to the recommendations, various specific personal and external factors influence patient's non adherence to dietary and physical activity recommendations and these factors are not typically stable for all patients. Identification of those parameters may help the health care system and the primary care physician to individualize clinical approaches toward improving diabetes management. Despite a number of articles on self-care management, dietary and physical component of the self care management have not been well assessed. Therefore this study gives us clear picture of what diabetic patients dietary and exercise recommendation adherence status looks like and factors affecting non adherence to the recommended dietary and exercise practices.

The result from this study will help in developing strategies for intervention targeting the factors which makes patients not to adhere so as to improve dietary and physical activity recommendation practices thereby improving quality of life. It could also help to see the real practice among diabetic patients so based on this finding appropriate intervention and strategies can be developed to provide base line data for policy makers, health care providers and concerned bodies for further improvements of dietary and physical activity counseling and intervention strategies which will be a great help in reducing progression of the diabetes and related morbidity and mortality.

3 - OBJECTIVES

3.1. General Objective

To assess proportion of non adherence to dietary and physical activity recommendation and associated factors among type 2 diabetic patients on follow up in government hospitals of Ilu Abba Bora Zone, Oromia Region, Ethiopia , 2018.

3.2. Specific Objectives

1. To determine proportion of non adherence to dietary recommendations in type 2 diabetes mellitus patients.
2. To determine proportion of non adherence to exercise recommendations in type 2 diabetes mellitus patients.
3. To identify factors associated with non- adherence to dietary recommendations in type 2 diabetes mellitus patients.
4. To identify factors associated with non- adherence to exercise recommendations in type 2 diabetes mellitus patients.

4 - METHODS

4.1. Study area and period

The study was conducted in Ilu Abba Bora Zone of Oromia Region which is one of the 18 zones of Oromia and organized in to 24 districts and Metu Town is the administrative center of the zone which is 600 km south west of Addis Ababa, the capital city the total population of the zone is estimated to be 1,271,609 with male population 640891 and female 630718 (CSA, July, 2010), In this zone, there are 39 health centers and 2 hospitals (personal communication). This study was conducted in those 2 government hospitals. These hospitals are; Metu Karl Referral Hospital and Darimu Hospital. Metu Karl Referral Hospital is one of the oldest hospitals found in Oromia regional state. It is placed at the center of Metu town. Darimu hospital, which is among the recently established hospitals and is found in Darimu Wereda of Ilu Abba Bora Zone it, is 70km from the capital of the zone. The hospitals have NCD follow up units which give services for diabetes patients. Patients collect their medication regularly on a monthly basis and the clinics give service for diabetes patients on all of the weekdays. The diabetic clinics provide services on average for 20-22 patients per day i.e.440 -484 patients per a month. The study was conducted from March 19 to May 19, 2018.

4.2. Study design; Hospital based cross sectional study was employed.

4.3. Population

4.3.1. Source population

All adults diagnosed with type 2 diabetes mellitus who were on regular follow up at MKRH and Darimu hospital NCD follow up units.

4.3.2. Study population

All selected adults diagnosed with type 2 diabetes mellitus who were on regular follow up at MKRH and Darimu hospital NCD follow up units.

4.3.3. Inclusion criteria

A patient who had at least 3 followup visits to the clinic within the previous year.

4.3.4. Exclusion criteria

Patients who were unable to provide the required information by themselves (critically ill and patients with severe mental illness) were excluded.

Newly diagnosed patients or those who have less than six months' duration were not interviewed for therapies of adherence.

4.4. Sample size and sampling technique

4.4.1. Sample size determination

Sample size for the 1st and 2nd objectives

Sample size for the 1st and 2nd objective was calculated using single population proportion formula.

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

For the 1st objective sample was calculated considering the expected proportion of poor dietary practice to be 51.4 % taken from a study in Yekatit Hospital Addis Ababa city (29). Additionally, 95% confidence level, 5% margin of error, and 10% non response rate was considered. Considering the above mentioned parameters the sample size became 422.

For the 2nd objective assuming the expected proportion of for poor physical activity practice among diabetic patients to be 64% from study done in Jimma University Specialized Hospital (20), with desired degree of precision 5%, 95% confidence level and 10% non response rate, sample was 389.

Sample size for the for the 3rd and 4th objective

Sample size for the 3rd and 4th objective was calculated using double population proportion formula.

$$n = \frac{(p_1q_1 + p_2q_2) (f(\alpha,\beta))}{((p_1 - p_2)^2)}, f(\alpha,\beta) = 10.5, \text{ when the power} = 90\% \text{ and the level of Significance} = 5\%, \text{ that is, } \alpha = .05 \text{ (two sided)} \Rightarrow Z = 1.96, \beta = (1 - .9) = .1 \text{ (one sided)} \Rightarrow Z = 1.28$$

Taking the proportion of good self care practice in those who have self efficacy and do not have self efficacy 37 % and 17 % respectively from study done in West Shoa Zone considering 95% confidence level, 90% power and 10% non response rate, sample size was 216 (60),

Considering the proportion of good self care practice in those who have social support and do not have social support 41.6 % and 12.8 % respectively from study done in West Shoa Zone with 95% confidence level, 90% power and 10% non response rate , sample size was 102 (60).

Assuming the proportion of high self care practice in those who have less and moderate perceived barrier 32.7% and 6.8% respectively from study done in Harar considering 95% confidence level, 90% power and 10% non response rate , sample size was 98 (39).

By taking the largest sample size the final sample size for this research was 422.

4.4.2. Sampling technique

The determined sample (422) was proportionally allocated to each hospital. Finally study participants were selected by systematic sampling technique. The sampling interval was calculated by dividing the expected number of diabetic patients per 2 month, since the data collection period was two month, by the sample size, which gave sampling interval of two. Thus, every other patient coming to the clinics for follow-up services was interviewed until the total sample size was fulfilled. The first respondent was selected by lottery method using patients' card number.

Table 2: Number of diabetes patients on follow up in government hospitals of Ilu Abba Bora Zone, 2018 (n=422).

S/N	Hospitals name	Number of diabetes patients	Proportionally Allocated
1	MetuKarl Referral Hospital	756	187
2	Darimu Hospital	338	84
	Total	943	422

4.5. Data Collection tools

Structured interviewer administered questionnaire was used to collect data on adherence status and associated factors. The first part of the questionnaire contains socio demographic information which includes age, sex, and marital status, level of education, family size and residence, and a questioner to assess wealth of participants. The second part of the questionnaire contains health profile information, including ; duration of disease, type of treatment , co morbidity, family history, and Fasting blood sugar which was reviewed from follow up chart, Third part contains questions to asses diabetes health

beliefs which was adapted from similar study done in Addis Ababa(37), Diabetic health belief was assessed using 26 questions with 5 scale questions each assessing the perceived susceptibility to diabetes complications and perceived severity constructs, 4 and 8 questions assessing perceived benefit and barrier to diet and physical regimen follow up respectively and 4 questions assessing self efficacy towards following dietary and physical activity recommendations. The fourth part contains questions to assess emotional and active or instrumental family and non family members support which was modified from “The Diabetes Social Support Questionnaire-Family Version: developed in 2002 by *Annette M. La Greca*, , and *Karen J. Bearman* (61). Emotional and active support to dietary regimen was assessed with 5 questions each, while emotional and active support to physical activity regimen was assessed with 2 and 4 scale questions respectively. The fifth part contains tools to assess dietary adherence status. Dietary adherence status was assessed using the modified form of the eight-item Morisky medication adherence scale (MMAS-8) which was developed in 2008, with a reliability of 0.83 and good concurrent and predictive validity (62), it is 12 item scale modified based on the general advice for diabetic diet plan (association SAd: South African diabetes association. In.: South Africa diabetes association 2001). by *Almelmal Worku et al*, (2015)(29). The sixth part contains tools to assess physical activity. The questionnaire was the Global Physical Activity Questionnaire (GPAQ)(63). The seventh part of the questionnaire contains questions to assess participant’s substance use, adopted from similar study(64).

4.6. Data collection methods

Data were collected by interviewing eligible subjects using a pretested structured questionnaire by two trained nurses.

Anthropometric measurements was taken by two trained professional nurses at the end of the interview, weight of the participants was measured using a digital scale (SECA), to the nearest 0.1 kg; each participant was asked to remove heavy clothes and the scale was calibrated to zero before and after each measurement. Height was measured to the nearest 0.1cm using stadiometer without shoes, the head of participants at the Frankfurt plane, knees straight and the heels, buttocks, calves and the shoulders blades touching the vertical stand of the stadiometer. BMI was calculated as body weight in kilograms divided by the squared value of body height in meters (kg/m²). Waist circumference (WC): was measured midway between the inferior angle of the ribs and the suprailiac crest at the end of normal expiration to the nearest 1 cm using a non-stretchable rubber measuring tape, participants in an upright

position, with arms relaxed at the side, feet evenly spread apart and body weight evenly distributed in accordance with the WHO recommendation (65) .

4.7. Study variables

4.7.1. Dependent variable

- Adherence status to dietary recommendations
- Adherence status to physical activity recommendations

4.7.2. Independent variable

- **Socio-demographic factors:** age & sex, religion, educational level, occupation, income and marital status, place of residence, family size.
- **Clinical characteristic:** duration of DM, family history of diabetes, type of treatment, diabetic education co morbidity, fasting blood sugar
- **Diabetes health belief:** Perceived susceptibility and severity of DM complication, Perceived benefit of dietary and physical activity recommendations, Perceived barrier to dietary and physical activity recommendations and self efficacy to follow the recommended dietary and physical activity practices.
- **Social factors** : Emotional and Active / Instrumental Support from family and non family members
- **Anthropometric variables** : BMI, waist circumference
- **Substance use:** smoking, chat chewing, alcohol

4.8. Operational and standard definitions

- **Diet** : refers to the recommended diet for people with DM who should ate small meals spread throughout the day (at least 5/day), ate fruits and vegetables daily, and ate foods high in fibers and whole grain but low in fats, sugars and carbohydrates that have high glycemic index
- **Physical activity** : refers to bodily movement produced by the contraction of skeletal muscle that requires energy expenditure in excess of resting energy expenditure.
- **Adherent to dietary recommendation:** are those who scored the mean and above the overall dietary recommendation score.
- **Non Adherent to dietary recommendation:** are those who scored below the overall mean dietary recommendation score.

- **Non Adherent to physical activity recommendation:** are those who scored less than 600 METs per week based on the GPAQ incorporated scoring mechanism.
- **Adherent to physical activity recommendation:** are those who scored greater than 600 METs per week based on the GPAQ incorporated scoring mechanism.
- **Adequate glycemic control for DM:** FBS measurement 70mg/dL -126 mg/dL.
- **Inadequate glycemic control for DM:** FBS measurement ≥ 126 mg/dL.
- **Obese :** individuals with BMI ≥ 30 Kg/m².
- **Over weight :** individuals with BMI 25.0–29.9 Kg/m².
- **Abdominal obesity :** participants with waist circumference >102 cm in men and >88 cm in women.
- **Alcohol consumer:** participants who consume at least one standard alcohol unit using local conventional measures at least once per week.
- **Khat chewers:** participants who had been chewing khat for more than 6 months and chew khat within the last 30 days preceding the study.
- **Cigarette smoker's:** participants who had been smoking cigarette for more than 6 months and smoke minimum of one stick of cigarette per week.
- **Adult :** a person who has reached 18 years old

4.9. Data quality management

Data quality assurance was considered before, during and after data collection. Accordingly before data collection: objective based and standardized questionnaire was prepared, All the questions were prepared in English and were translated to Afaan Oromo by experts“ who are fluent in the language and back translated to English to see its consistency, training was given for data collectors and supervisors on data collection tools, techniques of interviews and data collection process and the questionnaire was pre-tested for its understandability on 21 type 2 diabetic patients on follow up at Bedele Hospital, Buno Bedele Zone, Oromia. The Cronbach's alpha was applied to measure the reliability of the questionnaires.

During data collection: the supervisors closely followed the day-to-day data collection process and ensured completeness and consistency of questionnaire administered each day and Anthropometric measuring instruments was calibrated each day.

After data collection: the collected information was rechecked for its completeness and consistency by the supervisors and the principal investigator before transferring in to computer software.

4.10. Data analysis procedure

Data were cleaned, edited, coded and entered to Epi data version 3.1 and was exported to SPSS for windows version 20 for analysis. Exploratory data analysis was carried out to check the levels of missing values, presence of influential outliers, multi co-linearity. Descriptive statistics including proportion, percentage, ratios, frequency distribution, mean and standard deviation was used to describe the data. Wealth index was constructed using the principal component analysis (PCA) form 27 items; all assumptions of PCA were checked.

The outcome variables were dichotomized thus, cross-tabulation and bivariate logistic regression analysis were done to see the association between individual explanatory and outcome variables, variables with P-value <0.25 were a candidate for multi variable logistic regression. Odds ratio with 95% C.I was used to measure the strength of association between dependent and independent variables. Homer and Lemeshow Test was used to see model fitness. P value < 0.05 was used to declare level of statistical significance.

The scores of each diabetic health belief construct were summed up, to come up with a single scoring for each construct, for every respondent. Participants were labeled to have high or low level of these constructs based on correct response of mean value as a cutoff. The scores of each social support factor were summed up, to come up with a single scoring for each factor, for every respondent. Participants were labeled to have poor or good social support factors based on mean value. Dietary adherence status score was computed by taking the mean values of 12 questions assessing patients' dietary recommendation adherence. BMI was categorized into underweight ($BMI \leq 18.5 \text{Kg/m}^2$), normal weight (18.5–24.9 Kg/m^2), overweight (25.0–29.9 Kg/m^2) and obese ($\geq 30 \text{Kg/m}^2$) based on the World Health Organization (WHO) criteria and abdominal obesity was determined as a waist circumference >102 cm in men and >88 cm in women according to the WHO cut-off points and substantial risk of metabolic complications for waist circumference (65)

4.11. Ethical consideration

The ethical approval for this study was obtained from the Research Ethical Committee of Jimma University, Permission letter was written for both Mettu Karl Referral and Darimu Hospital then

informed consent was obtained from the participants, after the necessary explanation about the purpose and benefits of the study and their right on decision to participate in the study. All the interviews with respondents were made under strict privacy.

4.12. Plan for Dissemination of results

The findings of the study will be presented to the Jimma University Scientific Community and submitted to the department of Population and Family health; It will also be sent to FMOH, MKRH, Darimu Hospital and Ethiopian Diabetic Association after permission from the department. Effort will be made to disseminate through publication and presentation in scientific conferences.

5 – RESULTS

5.1.1. Socio demographic characteristics

A total of 392 respondents participated in the study, yielding a response rate of 92.9%.

Of 392 respondents, 201 (51.3%) were female. The mean (+SD) age of the respondents was 47.49 (+13). Nearly two third of respondents (63.8%) were married, furthermore one fifth (20.2%) of participants were illiterate, whereas 62.7% attended formal education. Similarly regarding occupation 28.3% were self-employed, and 25.8% were house wives. The large majority of respondents (90.6%) were living with family in addition one third of the participants have low household wealth (33.2%). (Table 2)

Table2: Socio demographic Characteristics of study population on diabetes follow-up at government hospitals in Ilu Aba Bora Zone May 2018

VARIABLES		FREQUENCY(n=392)	PERCENT
Gender	Male	191	48.7
	Female	201	51.3
Age	<29	32	8.2
	30-39	88	22.4
	40-49	102	26.0
	50-59years	83	21.2
	>60	87	22.2
Marital Status	Single	71	18.1
	Married	250	63.8
	Widowed	44	11.2
	Divorced/separated	27	4.3
Educational Status	Illiterate	79	20.2
	can read and write	67	17.1
	Primary	52	13.3
	Secondary	64	16.3
	Certificate	56	14.3
	Collage and above	74	18.9
Occupation	Self employed	111	28.3
	Employed	112	28.6
	Unemployed	68	17.3
	House wife	101	25.8
Ethnicity	Oromo	228	58.2
	Amhara	82	20.9
	Tegere	25	6.4
	Gurage	48	12.2
Family condition	Other	9	2.3
	Live alone	37	9.4
Household wealth	Live with family	355	90.6
	Low	130	33.2
	Moderate	134	34.2
	High	128	32.7

5.1.2. Clinical characteristics of study participants

Nearly half of the respondents (46.9%), have been diagnosed with type 2 diabetes for 2-5 years. One hundred eighty two (46.4 %) patients reported that they had family history of DM and nearly half of the respondents (46.9 %) had co- morbidity. More than half of patients (52.3%) used oral hypoglycemic agent and nearly one third of the participants (32.7%) used insulin to control blood sugar level while 7.7% of participants used both insulin and oral medication and the rest (7.4%) used diet alone to control their blood sugar level. Hundred sixty nine (41.8%) never missed their diabetic follow up appointment in the past three month. Of the 392 respondents, 105 (26.8%) of them reported that they did not attended diabetic education and only 47 (12%) received regularly. For most (86.7%), of participants their source of diabetes information was medical staff, while media and family and friends account 5.4% and 13.3%, respectively. Further more 41.8% of participants got advise from doctor about diabetes self management. Only 100 (25.5 %) of respondents were a member of Ethiopian diabetic association. Three fourth (74.8%) and 87% of respondents were not given written dietary or physical activity written instruction respectively. Among the participants based on the current visit (single) FBS result, only (35.5%) had adequate glycemic control. The mean BMI (+SD) was 27 (+13) and 44.1% of patients had normal BMI while 140 (35.7%) were overweight and 77(19.6%) were obese. Sixty two (17.3%) of the respondents had abdominal obesity (Table3).

Table 3: The Clinical characteristics of the study population on diabetes follow-up at government hospitals in Ilu Aba Bora Zone May 2018

VARIABLES	FREQUENCY(n=392)	PERCENT	
Duration of DM	<1year	27	6.9
	2-5year	184	46.9
	6-10years	92	23.5
	>11years	89	22.7
Co morbidity	Yes	184	46.9
	No	187	47.7
	I don't know	21	5.4
Treatment Intensity	Insulin injection	128	32.7
	Oral medication	205	52.3
	Both	30	7.7
	Diet only	29	7.4
Family History	Yes	182	46.4
	No	110	28.1
	I don't know	100	25.5
Missed appointment in the past three month	None	169	43.1
	One	127	32.4
	Two	75	19.1
	Three and above	21	5.4
Diabetic education	Never	105	26.8
	Sometimes	240	61.2
	Regularly	47	12
Source of diabetic information	Media	21	5.4
	Medical staff	319	81.4
	Friends and family	52	13.3
Diabetic information from Doctors	Yes	164	41.8
	No	228	58.2
Dietary written instruction	Yes	101	25.8
	No	291	74.2
Physicalactivity written instruction	Yes	51	13
	No	341	87
DM association member	Yes	100	25.5
	No	250	63.8
	I don't know there is diabetic association	42	10.7
BMI	Under weight	2	
	Normal	173	44.1
	Over weight	140	35.7
	Obese	77	19.6
WC(Abdominal obesity)	Yes	68	17.3
	No	324	82.7
FBS	Inadequate glycemic level	253	64.5
	Adequate glycemic level	139	35.5

5.1.3. Diabetes health belief

The mean (SD) scores of perceived susceptibility of diabetes complication and perceived severity of diabetes and its complications were 19.9(\pm 4) and 18.7(\pm 3.9) respectively, accordingly 72.7% and 54.6% of the study respondents had high perceived susceptibility and severity respectively. The mean (SD) score of perceived benefit and barrier to the recommended dietary and physical activity regimen were 15.5(3.4) and 24.9(6.4) respectively. Majority of the respondents 220(56.1%), 261(66.6%) had low perceived barriers and high perceived benefit respectively. The respondents self efficacy (confidence) to follow dietary and physical activity recommendation revealed that 238(60.7 %) had high self efficacy, with mean (\pm SD) score 14.9 (\pm 4), (Table 4).

Table 4: Diabetes health beliefs among study population on diabetes follow up at government hospitals in Ilu Aba Bora Zone, May 2018

Variables	Frequency(n=392)	Percent
Perceived Susceptibility		
Low	107	27.3
High	285	72.7
Perceived Severity		
Low	178	45.4
High	214	54.6
Perceived Benefit		
Low	131	33.4
High	261	66.6
Perceived Barrier		
Low	220	56.1
High	172	43.9
Self efficacy		
Low	154	39.3
High	238	60.7

5.1.4. Diabetes social support

The mean (\pm SD) score of emotional support for dietary regimen was 11.5(\pm 5.8), the result also indicated only 179 (45.7%) participants had good emotional support for dietary regimen. Among the total number of respondents 177(45.2%) got good active support for dietary regimen with mean (\pm SD) score of 11.17(\pm 5.6). The mean (SD) score of emotional support for physical activity and active support for physical activity regimen were 4.9(\pm 2.5) and 2.9 (\pm 4.7), respectively. Additionally, only 49% and 43.4%) had good emotional and active social support for physical activity, respectively.

Table 5: Diabetic social support among study population on diabetes follow up at government hospitals in Ilu Aba Bora Zone, May 2018

Variables		Frequency	Percent
Emotional support for dietary regimen	Poor	213	54.3
	Good	179	45.7
Active support for dietary regimen	Poor	215	54.8
	Good	177	45.2
Emotional support for physical activity regimen	Poor	200	51
	Good	192	49
Active support for physical activity regimen	Poor	222	56.6
	Good	170	43.4

5.1.5. Participants substance use

Approximately 89.5% of participants lie under nonsmokers or ceased smoking category, while 61.5% and 73.2% of the participants were neither alcohol consumers nor Chat chewers.

Table 6: substance use among study population on diabetes follow up at government hospitals in Ilu Aba Bora Zone May 2018

Variables		Frequency	Percentage
Alcohol consumption	Yes	151	38.5
	No	241	61.5
Smoking	Yes	41	10.5
	No	351	89.5
Chat chewing	Yes	105	26.8
	No	287	73.2

5.1.6. Proportion of non adherence to dietary and physical activity recommendation

The result of study shows that 200(51.8%) of the respondent were non-adherent to dietary recommendation, 111 (54.7%) of them are male. Similarly, the prevalence of non adherence to physical activity was 38 %, more than half (65.1) of them were females. Overall non adherence (diet and Physical activity) for male and female were (66%) and (69.7%), respectively.

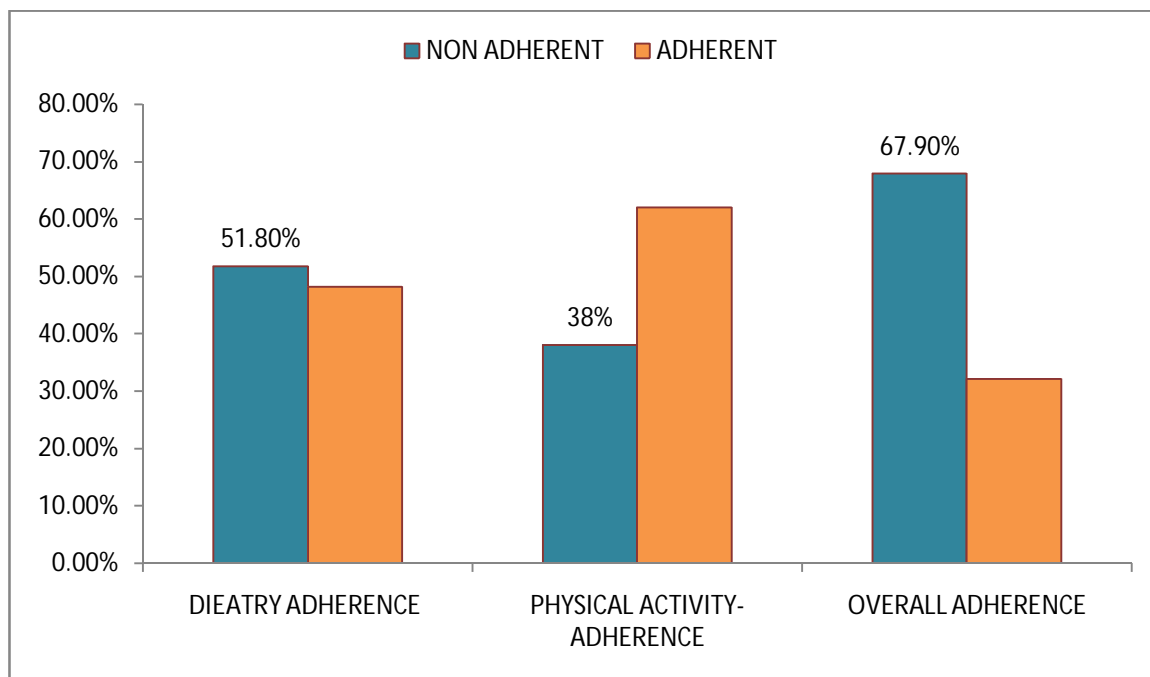


Figure3 proportion of nonadherence to dietary and physical activity recommendation among type2 diabetic patients on follow up at governmet hospitals in Ilu Aba Bora zone Oromia region,may 2018.

5.1.7. Reasons for non adherence to dietary and physical activity recommendation

Among the respondents one hundred seventy one (43.9%) answered unavailability of healthy food while 166(42.3%) reported Poor self control and 152 (38.8 %) inappropriate dietary habits as a reason for not following the recommended diet. Similarly one hundred seventy two (43.9) of participants mentioned being busy in other tasks while 121(30.9%) stated lacking exercise partner and criticism (being uncomfortable by presence of others) as reasons for non adhering to physical activity recommendation. (table7)

Table 7: Reasons for nonadhering to dietary and physical activity recommendation among study population on diabetes follow up at government hospitals in Ilu Aba Bora Zone, May 2018

Variable		Frequency	Percentage
Reasons for non-adhering to dietary recommendation	Eating out	125	31.9
	Inappropriate dietary habits	152	38.8
	Financial constraints	124	31.6
	Unavailability of healthy	171	43.6
	Poor self control	166	42.3
	Lacking of family support	81	20.7
Reasons for non adhering to physical activity recommendation	Too busy schedule	172	43.9
	Weather	95	24.2
	Lacking exercise partner/spouse	121	30.9
	Specific locations away from home	99	25.3
	Criticism	121	30.9
	Lacking of family support	80	20.4

5.2 Factors associated with dietary and physical activity recommendation adherence

5.2.1. Factors associated with dietary recommendation adherence

5.2.1.1 Socio demographic factors associated with dietary recommendation adherence

In bivariate analysis among the socio demographic characteristics of respondents' gender, age, educational status and occupation showed significant statistical association (P value <0.25) with adherence to dietary recommendation .Whereas marital status, family status and household wealth did not show statistically significant association with dietary recommendation adherence. (table8)

Table8: Socio demographic factors associated with dietary recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May,2018.

Variables		Adherence status to dietary recommendation		COR(95% C.I)	P
		Non adherent No.(%)	Adherent No.(%)		
Gender	Male	111(58.2)	80(41.8)	1	0.260
	Female	92(45.8)	109(54.2)	1.6(1.1,2.45)	
Age	<29	19(59.4)	13(40.6)	1	0.046
	30-39	34(38.6)	54(61.4)	2.3(1.1,5.3)	
	40-49	59(57.9)	43(42.1)	1.1(0.5,2.4)	
	50-59years	43(51.8)	40(48.2)	1.4(0.6,3.1)	
	>60	48(56.2)	39(44.8)	1.2(0.5,2.7)	
Marital status	Single	36(50.7)	35(49.3)	1	0.900
	Married	125(50)	125(50)	1.03(0.6,1.74)	
	Widowed	26(59)	18(41)	0.7(0.33,1.5)	
	Divorced /separated	16(59.2)	11(41.8)	0.71(0.3,1.7)	
Educational level	Illiterate	48(60.7)	31(39.3)	1	0.301
	Can read and write	35(52.3)	32(47.7)	1.4(0.7,2.7)	
	Primary	36(69.3)	16(30.7)	0.7(0.3,1.4)	
	Secondary	34(53.1)	30(46.9)	1.4(0.7,2.7)	
	Certificate	24(39.3)	32(60.7)	2(1.1,4)	
Occupation	Collage and above	26(42.9)	48(57.1)	2.8(1.5,5.5)	0.002
	Self employed	70(63.1)	41(36.9)	1	
	Employed	40(35.7)	72(64.3)	3(1.8,5.3)	
	Unemployed	50(73.5)	18(26.5)	0.6(0.3,1.2)	
Family status	House wife	43(42.5)	58(57.5)	2.3(1.3,4)	0.003
	Live alone	17(44)	20(54)	1	
	Live with family	186(52.4)	169(47.6)	0.8(0.4,1.5)	
Household wealth	Low	68(52.3)	62 (47.7)	1	0.540
	Moderate	65(48.5)	69(51.5)	1.16(0.71,1.88)	
	High	70(54.7)	58(45.3)	0.9(0.55,1.48)	

5.2.1.2 Clinical characteristics associated with dietary recommendation adherence

In bivariate analysis among the clinical characteristics of respondents, family history, diabetic education, receiving written dietary instruction and diabetes association membership showed significant statistical association (P-Value<0.25) with dietary adherence status while duration of disease, co morbidity, type of treatment and BMI didn't show any significant statistical association. (Table 9)

Table9: clinical factors associated with dietary recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May, 2018.

Variables		Adherence status to dietary recommendation		COR(95% C.I)	P
		Non adherent No.(%)	Adherent No.(%)		
DurationofDM	<1year	17(63)	10(37)	1	
	2-5year	81(44)	103(56)	2.2(0.94,4.975)	0.070
	6-10years	54(58.7)	38(41.3)	1.2(0.5,2.9)	0.700
	>11years	51(60.6)	38(39.4)	1.3(0.52,3)	0.600
Comorbidity	Yes	100(55.4)	84(45.6)	1	
	No	90(48.1)	97(51.9)	1.3(0.9,1.9)	0.231
	I don't know	13(62)	8(38)	0.7(0.3,1.8)	0.511
Treatment Intensity	Insulin injection	74(57.4)	55(42.6)		
	Oral medication	101(49.5)	103(50.5)	1.4(0.9,2.1)	0.163
	Both	17(56.7)	13(43.3)	1(0.5,2.3)	0.945
	Diet only	11(38)	18(62)	2.2(0.96,5)	0.062
Family History	Yes	75(41.3)	107(58.7)	1	
	No	63(57.3)	47(42.7)	0.5(0.3,0.8)	0.008
	I don't know	65(65)	35(35)	0.4(0.23,0.6)	<0.010
Missed appointment in the past three month	None	78(46.1)	91(53.9)	1	
	One	68(53.5)	59(46.5)	0.7(0.5,1.2)	0.209
	Two	44(58.7)	31(41.3)	0.6(0.3,1)	0.072
	Three and above	13(61.9)	8(38.1)	0.5(0.2,1.3)	0.178
Diabetic education	Never	64(61)	41(39)	1	
	Sometimes	120(50)	120(50)	1.6(1,2)	0.061
	Regularly	19(40.4)	28(59.6)	2.3(1.2,4.6)	0.020
Diabetic information from Doctors	Yes	92(56)	72(44)	1	
	No	111(48.6)	117(51.4)	0.74(0.6, 1)	0.119
Dietary written instruction	Yes	35(34.7)	66(65.3)	1	
	No	168(57.8)	123(42. 2)	0.4(0.24,0.62)	<0.010
DM association member	Yes	40(40)	60(60)	1	
	No	163(55.8)	129(44.2)	0.5(0.3,0.8)	0.007
BMI	Under weight	1	1	1	
	Normal	95(55)	78(45)	0.8(0.05,13.3)	0.900
	Over weight	63(45)	77(55)	1.2(0.075,19.9)	0.800
	Obese	44(57.2)	33(42.8)	0.7(0.45,12.4)	0.800
WC (Abdominal obesity)	Yes	46(67.6)	22(32.4)	1	
	No	157(48.5)	167(51.5)	2.2(1.3,3.9)	0.005
FBS	Inadequateglycemic evel	140(55.4)	113(44.6)	1	
	Adequate glycemic level	63(45.4)	76(54.6)	1.5(1.012,2.2)	0.044

5.2.1.3 Diabetes health belief Diabetes social support and substance use associated with dietary recommendation adherence

In bivariate analysis, high perceived susceptibility to diabetic complications, high perceived benefit of diabetes self management, high self efficacy to follow the recommended diet and physical activity and good emotional and active support to dietary recommendation were statically associated with adherence to dietary recommendation (P-value <0.25). (Table 10)

Table 10: Diabetes health belief Diabetes social support and substance use associated with dietary recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May, 2018.

Variables		Adherence status to dietary recommendation		COR(95%C.I)	P
		Non adherent No (%)	Adherent No (%)		
Perceived Susceptibility	Low	78(73)	29(27)	1	<0.010
	High	125(44)	160(56)	2.4(1.6,3.6)	
Perceived Severity	Low	103(57.9)	75(42.1)	1	0.340
	High	100(46.7)	114(53.3)	1.5(1.1,2.3)	
Perceived Benefit	Low	97(74)	34(26)	1	<0.010
	High	106(40.7)	155(59.3)	3(2.1,4.9)	
Perceived Barrier	Low	109(49.5)	111(50.5)	1	0.400
	High	94(54.6)	78(46.4)	0.8(0.5,1.2)	
Self efficacy	Low	112(72.7)	42(27.3)	1	<0.010
	High	91(38.2)	147(61.7)	3.8(2.5,5.7)	
Emotional support for dietary regimen	Poor	126(59.2)	87(40.8)	1	0.001
	Good	77(43)	102(57)	1.9(1.3,2.9)	
Active support for dietary regimen	Poor	127(59)	88(41)	1	0.001
	Good	76(43)	101(57)	1.9(1.3,2.9)	
Alcohol consumption	Yes	88(58.3)	63(41.7)	1	0.070
	No	115(47.7)	126(52.3)	0.7(0.47,1.030)	
Smoking	Yes	26(61)	15(39)	1	0.700
	No	177(50.4)	174(49.6)	1.085(0.7,1.6)	
Chat chewing	Yes	66(62.8)	39(37.2)	1	0.443
	No	137(47.8)	150(52.2)	1(0.87,1.4)	

5.2.2. Factors associated with physical activity recommendation adherence

5.2.2.1 Socio demographic factors associated with physical activity recommendation adherence

In bivariate analysis among the socio demographic characteristics of respondent's gender, age, marital status, educational status and occupation showed significant statistical association (P-value <0.25) with physical activity adherence. (Table 11)

Table11: Socio demographic characters associated with physical activity recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May, 2018.

Variables		Adherence status to physical activity recommendation		COR(95%C.I)	P
		Non adherent No (%)	Adherent No (%)		
Gender	Female	97(48.3)	104(51.7)	1	
	Male	52(27.2)	139(72.8)	2.5(1.6,3.8)	<0.010
Age	>60	60 (69)	27(31)	1	
	<29	4(12.5)	28 (87.5)	15.5(5,48.7)	<0.010
	30-39	19 (21.6)	69 (78.4)	8(4,16)	<0.010
	40-49	26 (25.5)	76 (74.5)	6.4(3.4,12.2)	<0.010
	50-59years	40 (48.2)	43(51.8)	2.4(1.2,4.4)	0.006
Marital status	Single	13(18.3)	58 (81.7)	1	
	Married	93(37.2)	157(62.8)	0.4(0.2,0.7)	0.040
	Widowed	33(75)	11 (25)	0.07(0.03,0.2)	<0.010
	Divorced /separated	10(37.1)	17(62.9)	0.4(0.1,1)	0.050
Educational level	Illiterate	35(44.3)	44(55.7)	1	
	can read and write	34(50.7)	33(49.3)	0.5(0.2,0.9)	0.001
	Primary	21(40.4)	31(59.6)	0.4(0.2,0.7)	0.001
	Secondary	25(39)	39(61)	0.5(0.3,1.2)	0.100
	Certificate Collage and above	14(25) 20(27)	42(75) 54(73)	0.6(0.3,1.2) 1.1(0.5,2.5)	0.100 0.800
Occupation	Self employed	35(32)	76(68)	1	
	Employed	36(32)	76(68)	1.0(0.6,1.7)	0.900
	Unemployed	28(41)	40(59)	0.7(0.4,1.2)	0.200
	House wife	50(49.5)	51(50.5)	0.5(0.3,0.8)	<0.010
Family status	Live alone	8(21.7)	29(78.3)	1	
	Live with family	141(39.8)	214(60.2)	0.4(0.19,0.94)	0.350
Household wealth	Low	60(46.1)	70(53.9)	1	
	Moderate	52(38.8)	82(61.8)	1.35(0.8,2.2)	0.220
	High	37(30)	91(70)	2(1.2,3.52)	0.005

5.2.2.2 Clinical characteristics associated with physical activity recommendation adherence

In bivariate analysis among the clinical characteristics of respondents, duration of diabetes, co-morbidities, type of treatment, diabetic education, diabetes association membership, receiving written physical activity instruction, missed follow-up, abdominal obesity, blood glucose level and household wealth showed significant statistical association (P-value <0.25) with physical activity adherence. (Table12)

Table12: Clinical characteristics associated with physical activity recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May,2018.

Variables		Adherence status to physical activity recommendation		COR(95% C.I)	P
		Non adherent No (%)	Adherent No (%)		
DurationofDM	<1year	7(26)	20(74)	1	
	2-5year	44(24)	140(76)	1(0.4,2.8)	0.800
	6-10years	36(40)	56(60)	0.5(0.2,1.4)	0.200
	>11years	62(69.7)	27(30.3)	0.2(0.1,0.4)	<0.010
Comorbidity	Yes	98(53.2)	86(46.8)	1	
	No	39(20.9)	148(79.1)	4.3(2.7,6.8)	<0.010
	I don't know	12(57.1)	9(42.9)	0.8(0.3,2)	0.700
Treatment Intensity	Insulin injection	60(46.6)	69(53.4)	1	
	Oral medication	64(32.4)	140(68.6)	1.9(1.2,2.9)	0.010
	Both	17(56.4)	13(43.6)	0.6(0.3,1.5)	0.300
	Diet only	8(27.6)	21(72.4)	2.3(0.9,5.5)	0.070
FamilyHistory	Yes	67(37.8)	115(63.2)	1	
	No	35(31.8)	75(68.2)	1.2(0.7,2)	0.400
	I don't know	47(47)	53(53)	0.7(0.4,1)	0.100
Missed appointment in the past three month	None	60(35.5)	109(64.5)	1	
	One	42(33.1)	85(66.9)	1(0.6,1.8)	0.700
	Two	39(25)	36(75)	0.5(0.3,0.9)	0.020
	Three and above	8(38)	13(62)	0.9(0.4,2.3)	0.800
Diabetic education	Never	47(44.8)	58(55.2)	1	
	Sometimes	92(38.4)	148(61.6)	1.3(0.8,2)	0.300
	Regularly	10(21.2)	37(78.7)	3(1.4,6.7)	0.010
Diabetic information from Doctors	Yes	61(37.2)	103(62.8)	1	
	No	88(68.6)	140(61.4)	0.9(0.6,1.4)	0.700
Dietary written instruction	Yes	10(19.6)	41(80.4)	1	
	No	139(40.8)	202(59.2)	0.4(0.2,07)	0.010
DM association member	Yes	49(49)	51(51)	1	
	No	100(34.2)	192(65.7)	1.8(1.2,3)	0.010
BMI	Under weight	0	2	1	
	Normal	42(24.3)	131(75.7)	0	0.990
	Over weight	56(40)	84(60)	0	0.990
	Obese	51(66.3)	26(33.7)	0	0.990
Abdominal obesity	Yes	46(67.7)	22(32.3)	1	
	No	103(31.8)	221(68.2)	4.5(2.5,7.8)	<0.010
FBS	Inadequateglycemic evel	111(43.9)	142(56.1)	1	
	Adequate glycemic level	38(27.4)	101(72.6)	2(1.3,3.3)	0.010

5.2.2.3 Diabetes health belief Diabetes social support and substance use associated with physical activity recommendation adherence

In bivariate analysis, high perceived susceptibility to and perceived severity of diabetes complications, high perceived benefit of diabetes self management, high self efficacy to follow the recommended diet and physical activity, emotional and active support for physical activity regimen and alcohol consumption were statically associated with adherence to physical activity recommendation (P-value <0.25). (Table 13)

Table13: Diabetes health belief Diabetes social support and substance use associated with physical activity recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May, 2018.

Variables		Adherence status to physical activity recommendation		COR(95%C.I)	P
		Non adherent No (%)	Adherent No (%)		
Perceived Susceptibility	Low	62(58)	45(42)	1	
	High	87(30.5)	198(69.5)	3(2,5)	<0.010
Perceived Severity	Low	83(46.7)	95(53.4)	1	
	High	66(30.9)	148(69.1)	2(1.3,3)	0.010
Perceived Benefit	Low	74(56.5)	57(43.5)	1	
	High	75(28.7)	186(71.3)	3.2(2,5)	<0.010
Perceived Barrier	Low	79(36)	141(64)	1	
	High	70(40.7)	102(59.3)	0.8(0.5,1.2)	0.340
Self efficacy	Low	92(59.8)	62(40.2)	1	
	High	57(24)	181(76)	4.7(3,7)	<0.010
Emotional support for PA regimen	Poor	98(49)	102(51)	1	
	Good	51(26.6)	141(73.4)	2.7(1.7,4)	<0.010
Active support for PA regimen	Poor	104(46.8)	118(53.2)	1	
	Good	45(26.4)	125(73.6)	2.4(1.6,3.8)	<0.010
Alcohol consumption	Yes	42(27.8)	109(72.2)	1	
	No	107(44.3)	134(55.7)	2(1.3,3.2)	0.010
Smoking	Yes	14(34.1)	27(65.9)	1	
	No	135(38.5)	216(61.5)	0.8(0.4,1.6)	0.600
Chat chewing	Yes	48(45.7)	57(54.3)	1	
	No	101(35.1)	186(64.9)	1.6(1,2.4)	0.060

5.3 Over all factors associated with dietary and physical activity recommendation adherence

5.3.1 Over all factors associated with dietary recommendation adherence

Variables with p-value less than 0.25 on bivariate analysis were entered to multivariable analysis. Among these variables which were entered to multivariate analysis occupation, receiving dietary written instruction, diabetes association membership, abdominal obesity, perceived susceptibility, self efficacy and emotional support for dietary regimen were the independent predictors of dietary adherence. House wife's were 5 times more associated with dietary adherence than self employed patients, [AOR=5 (95% CI: 2.56,9.85)] additionally, patients who received dietary written instruction were 1.8 times more likely adhere compared to those who did not receive [AOR =1.837 (95% CI: 1.06,3.18)]. Patients who were member of diabetic association were 2.8 times, more likely adhere to dietary recommendation than their counterparts [AOR = 2.8 (95% CI: 1.58, 4.95)]. Further more Patients who were not abdominally obese were 2.7 times more likely to have dietary adherence compared those who have abdominal obesity [AOR = 2.69 (95% CI: 1.4, 5.19)]. Diabetic patients who had high perceived susceptibility to diabetic complication [AOR = 2.067(95% CI: 1.14, 3.77)], and high self efficacy to follow the recommended dietary and physical activity regimens [AOR = 3.448 (95% CI: 1.96, 6)], were 2 times and 3.4 times more likely to be adherent to dietary recommendation compared those have low perceived susceptibility and low self efficacy respectively. Similarly patients who got good emotional support for dietary regimen were 1.9 times more likely adhere to dietary recommendation as compared to those with low support [AOR=1.919 (95% CI: 1.176,3.131)].(Table 14)

Table14: Overall factors associated with dietary recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May,2018.

Variables	Adherence status to dietary recommendation		COR(95%C.I)	AOR(95% C.I)	P
	Non adherent No (%)	Adherent No (%)			
Occupation					
Self employed	70(63.1)	41(36.9)	1	1	
Employed	40(35.7)	72(64.3)	3(1.8,5.3)	2.24(1.22,4.129)	0.009
Unemployed	50(73.5)	18(26.5)	0.6(0.3,1.2)	0.8(0.4,172)	0.600
House wife	43(42.5)	58(57.5)	2.3(1.3,4)	5(2.56,9.85)	<0.01
Dietary written instruction					
Yes	35(34.7)	66(65.3)	1	1	
No	168(57.8)	123(42.2)	0.4(0.24,0.62)	0.544(0.3,0.94)	0.030
DM association member					
Not member	163(55.8)	129(44.2)	1	1	
Member	40(40)	60(60)	1.895(1.194,3)	2.8(1.586,4.957)	<0.010
Waist circumference(Abdominal obesity)					
Yes	46(67.6)	22(32.4)	1	1	
No	157(48.5)	167(51.5)	2.2(1.3,3.9)	2.69(1.4,5.19)	0.003
Perceived Susceptibility					
Low	78(73)	29(27)	1	1	
High	125(44)	160(56)	2.4(1.6,3.6)	2.067(1.14,3.77)	0.018
Self efficacy					
Low	112(72.7)	42(27.3)	1	1	
High	91(38.2)	147(61.7)	3.8(2.5,5.7)	3.448(1.96,6)	<0.010
Emotional support for dietary regimen					
Poor	126(59.2)	87(40.8)	1	1	
Good	77(43)	102(57)	1.9(1.3,2.9)	1.919(1.176,3.131)	0.009

5.3.2 Over all factors associated with physical activity recommendation adherence

Multivariable logistic regression analysis was done to identify independent predictors of adherence to physical activity recommendation. Accordingly compared to female patients male patients were 2 times more likely adherent to physical activity recommendation [AOR=2.029 (95% CI: 1.2,3.38)]. Similarly among the study participants respondents aged < 29 years [AOR=8.6 (95% CI: 2.58,28.7)], were 8.6 times more likely to be adherent to physical activity recommendation compared to respondents aged > 60 years old . Respondents who did not have abdominal obesity were 2.5 times more likely to be adherent to physical activity regimen compared to those who were not abdominally obese, [AOR=2.5 (95% CI: 1.3, 4.84)]. Furthermore among the participants, patients with high perceived severity of diabetes and its complication, [AOR=1.7 (95% CI: 1.052, 2.85)] and high self efficacy to follow the recommended physical activity and dietary recommendation [AOR=2.64 (95% CI: 1.6, 4.38)] were 1.7

and 2.6 times more likely be adherent to physical activity recommendation compared to those with low perceived severity and self efficacy, respectively. (Table 15)

Table15: Overall factors associated with physical activity recommendation adherence among study participant on follow up at government hospital in Ilu Abba Bora zone, Oromiya region May, 2018.

Variables	Adherence status to physical activity recommendation		COR(95%C.I)	AOR(95% C.I)	P
	Non adherent No (%)	Adherent No (%)			
Gender					
Female	97(48.3)	104(51.7)	1	1	
Male	52(27.2)	139(72.8)	2.493(1.63,3.8)	2.029(1.2,3.378)	0.006
Age					
>60 years	60 (69)	27(31)	1	1	
<29	4 (12.5)	28 (87.5)	15.5(4.96,48.7)	8.6(2.58,28.7)	<0.01
30-39	19 (21.6)	69 (78.4)	8(4,15.95)	5.25(2.4,11.2)	<0.01
40-49	26 (25.5)	76 (74.5)	6.49(3.4,12.27)	4.7(2.3,9.46)	< 0.01
50-59years	40 (48.2)	43(51.8)	2.3(1.27,4.467)	1.96(0.97,3.96)	0.060
Abdominal obesity					
Yes	46(67.7)	22(32.3)	1	1	
No	103(31.8)	221(68.2)	4.5(2.5,7.8)	2.5(1.3,4.84)	0.007
Perceived Severity					
Low	83(46.7)	95(53.3)	1	1	
High	66(30.9)	148(69.1)	2(1.3,3)	1.7(1.052,2.85)	0.031
Self efficacy					
Low	92(59.8)	62(40.2)	1	1	
High	57(24)	181(76)	4.7(3,7)	2.64(1.6,4.38)	<0.010

6. DISCUSSION

The prevalence of adherence to therapies of diabetes showed remarkable variation in different regions and nations. The current study indicated that the proportion of non adherence to dietary recommendation among type 2 diabetic patients on follow-up at government hospitals in Ilu Aba Bora Zone to be 51.8 %. From the available study findings, the finding of the current study is comparable with studies done in Addis Ababa, Yekatit12 medical college Hospital and Dilla University Referral Hospital, which non adherence to dietary recommendation was reported to be 51.6%, and 50.3% respectively (29,43). However, it is higher than the studies done in Harar, Nepal, and Surat city India, which indicated 42.3% ,41% and 34% non adherence to dietary recommendation respectively (34,39,66), and lower than studies done in Yemen and Ghana, which showed 79% and 65.1% non adherence to dietary recommendation respectively (30,51).

The variation can be explained by difference in the setting, measurement tool, sample size or patient's socio economic and educational level, seasonal availability of fruits and vegetables or patients difficulty to differentiate the recommended diet. The study area is cash crop area, thus there is very little and seasonal production of vegetables and fruits.

According to different literatures, supporting local food outlets (farmers) and growing food in community garden or back yard will contribute towards peoples food consumption decision, since food price and availability are major factors influencing food choice (67). Since there is no one set of nutritional recommendation that apply to all diabetes patients dietary recommendation had to be based on individuals habit, preference and availability of food by thoroughly discussing with their physicians(8).

Concerning non adherence to physical activity, the present study exhibited a proportion of 38% non adherence, which is lower than similar studies done in Jimma University Specialized Hospital which reported 64 %, and in Harar which indicated that 69.9% of the participants don't follow the recommended exercise plan, additionally another study done in Yemen reported 85% non adherence to the recommended physical activity regimen,(30,39,68). It is comparable to study in Kuala Lumpur, Singapore, which 33.3% of the subjects reported to had low physical activity(42).

These variation might be due to measurement variation or the difference in life style, as Metu and Darimu are small towns patients may most likely take long walks and patients from surroundings

woredas may work in in farm fields where as in relatively bigger towns like that of Harar and Jimma patients may take different means of transportation. Physical activity, issues include requirements for physical activity in working, home, transportation and access to physical activity during leisure.

The study also revealed that adequate glycemic control was only reported by 35.5% of respondents, relatively higher than studies done in Jimma and Dilla which showed adequate glycemic control was only reported by 18.1% and 14.2% respectively, and the difference can be explained by the relatively higher physical activity adherence in the study area (43,68).

In the present study nearly three fourth (72.7%) of the study participants had high perceived susceptibility which is comparable with study done in Jimma University specialized hospital which is 75.9% and 54.6% of participants in the study had high perceived severity which was relatively lower than from study done in Jimma and higher than study done in Harar (39,68). The magnitude of high self efficacy (confidence) to follow dietary and physical activity recommendation among type 2 diabetic patients on follow up at government hospitals of Ilu Aba Bora zone was 60.7% which was again consistent with similar study done in Jimma (68).

Though research identified social support as a key factor in regimen adherence of diabetic patients, there has been little research investigating the association between emotional and active/instrumental social support dietary and physical activity recommendation particularly in Ethiopia. This study indicated that only 45.7% and 45.2% of the participants had good emotional and active support for dietary regimen respectively. Similarly 49% and 43.4% of the participants of the study had good emotional and active social support for physical activity regimen respectively; this is lower than the study done in Arbaminch which indicated 85% family support to diabetes care, the difference might be attributed to the difference in measurement (69).

According to the current study, being house wife was associated with dietary recommendation adherence status which is consistent to the studies done in Yemen and India, this may be due to housewives mostly eat at home or cooking in Ethiopian society is exclusively done by housewife, giving them the chance to prepare foods in accordance with their diet plan. Furthermore, decisions about food and nutrition are often made by women and are based on culture and traditional diets. Recommendations and diet plans should therefore be sensitive to such differences (30,34).

The current study also showed that not receiving detailed written instruction regarding dietary recommendation was associated with dietary recommendation non adherence. Lack of dietary written instruction have been stated as most common reason for non adhering to dietary recommendation in a qualitative study done in Belgium and study done in Botswana in 2013(31,70) . Providing written instructions for diet and exercise prescriptions is helpful because it aids patients to remind recommendations as patients may not remember all the details of discussions during follow up (8) .

Diabetic association membership was as well significantly associated with dietary recommendation adherence status, the finding is also supported by findings from Bahirdar Felegehiwot Hospital(71) . This might be due to the association's monthly regular diabetic education, or it may be because the association provides a chance to learn from each other's experience, a forum for sharing of information and resources. However according to this study only 25.5 % of the participants were members of a diabetic association, which may be due to the associations' poor promotion and/or health professionals' negligence to aware importance of the diabetic association.

This study also indicated that emotional support for dietary regimen was associated with dietary recommendation adherence status, this finding is in line with study done in Nigeria, which reported practical and emotional family involvement are strong factors in diabetes diet regimen and study done in China, also showed social support to be positively associated with overall diabetic self management(59,72). Social support is required for dietary practice change especially in Ethiopia, where, extended family arrangement is frequently found and families usually share a dish, family members and friends provide encouragement and appraisal support and hence contribute to dietary recommendation adherence. Considering family based approaches as central to the management of diabetes will ensure better adherence level to diabetic self management.

In line with the assumption of health belief model this study indicated that patients perceived susceptibility to diabetic complication is associated with dietary adherence, which was in contrast with study done in Harar which indicated perceived susceptibility as poor predictor of self care practice. Similarly in the current study patients with high perceived severity of diabetes and its complication are 1.7 times more associated with physical activity adherence which is in line with similar study done in Harar(39). In contrast to the assumptions of HBM, in the present study perceived barrier and perceived benefit were not associated neither with dietary nor with physical activity recommendation, this is consistent with study done in Jimma, perceived benefit of the recommended physical activity were no

significant association but in contrast with study done in Harar which indicated perceived barrier as good predictor of self care practice.

Participants' who had high self efficacy were 3.4 and 2.6 times more likely to adhere to dietary and physical activity recommendation respectively, this result is consistent with a meta analysis done in China, there was a consistent strong association between increased self-efficacy level and better diabetic self management behaviors and study done in Jimma, which indicated patients who had high self-efficacy were more likely to engage in the recommended physical activity (68,72). This finding is in line with Bandura's theory of self efficacy, those who had high self efficacy are confident in keeping up with their daily dietary and physical activity plan because they believe they can control their diabetes. It seems that focus on self-efficacy is the most influential element in the success of such health promotion programs.

According to the findings of this study male patients were 2 times more adherent to physical activity recommendation which is similar with finding of study done in India (34). This could be due to socio cultural and religious advantages given for males to engage in outdoor work related physical activities and recreational physical activities. Empowering women's and enhancing self efficacy will improve female patients' adherence to physical activity recommendation.

This study showed that respondents aged 19-29 years were 15.5 times more associated with physical activity adherence than those above the age of 60 years. This study is similar to study done in Jimma, age is associated with self care and studies done in Yemen and India which indicated age as independent predictor of physical activity adherence(30,34,68). In fact, with increasing age, a decline in strength motor abilities and co morbid disease can occur, that make it difficult to perform routine physical exercises and also the variation may be attributed to lack of motivation in elderly individuals compared to young adults. Since most of old age patients were living retired life thus, appropriate guidance needs to be given for the kind of exercise that can be done at home, and exercise recommendations should be customized to individuals' health and physical condition.

The present study also showed WC was significantly associated with both adherence to dietary and physical activity recommendation, in line with study done in Australia and in contrast with studies done in Ghana and Harar, BMI and WC had no statically significant association with diabetic self care practice (39,41,53). This might be due to carrying extra body weight is physically disabling or they may be insecure to do exercises and increased depression and lower self esteem associated with body disatisfacton may decrease adherence to dietary recommendation.

Reasons for not adhering to diet and exercise recommendations

Despite the fact that most participants perceived diet and exercise as important to achieve and maintain good glycaemic control, majority still reported a range of reasons for not adhering. The most frequent reasons for not adhering to dietary recommendations are unavailability of healthy foods, poor self control, in-appropriate, dietary habits, eating out (especially, social gathering, restaurant, and family and friends' homes). Frequently reported reasons for not adhering to exercise are having too busy schedule, lack of exercise partner, criticism (being uncomfortable by presence of others while exercising)specific locations away from home (such as field work). The above mentioned reasons are in consistent with study done in Botswana, Nepal , Saudi Arabia and India (31,34,66,73).

Health services should direct their efforts in health education programs that should emphasize the benefits of lifestyle modification, which must be tailored to the individual needs and perceived reasons for non-adherence in a culturally acceptable manner. Patterns of physical activity and diets differ according to sex, culture and age. National strategies should therefore be culturally appropriate and able to challenge cultural influences and to respond to changes over time.

The study has practical significance. Given the emergence of chronic non-communicable diseases in Ethiopia and lack of preventive efforts, the level of non-adherence indentified by this studies calls for arguments to fortify policy and programmatic actions for the change of life styles including adherence to physical activty and diet. Short of this, the economic and human cost of non-communicable dieases will be eminent.

7. LIMITATIONS OF THE STUDY

The limitations of these study were that the study participants were patients on regular follow up and therefore likely to be motivated to practice the recommended dietary and physical activity regimens, have higher perception towards the disease therefore may not be a true indication of the entire diabetic patients on follow up at the hospital .

Only one fasting blood glucose measurement may not be a valid measurement to assess glycemic control. There was also probably recall bias and social desirability bias.

8. CONCLUSION

This study revealed that non adherence to dietary and physical activity recommendation in diabetic patients attending follow up at governmental hospitals in Ilu Aba Bora zone to be 51.8.% and 38% respectively. Participant's occupation, receiving dietary written instruction, diabetic association membership, perceived susceptibility and emotional support to dietary regimen were significantly associated with dietary recommendation adherence where as gender; age and perceived severity were significantly associated with physical activity recommendation adherence. Similarly abdominal obesity and self efficacy were significantly associated with both dietary and physical activity recommendation adherence.

9. RECOMMENDATIONS

Policy makers and planners

Planner and policy maker need to address the high proportion inadequate glycemic control among type 2 diabetes patients through advocating and supporting dietary and physical activity regimen adherence which is fundamental for improving glycemic control through patients family centered model based diabetic education that consider educational status, gender and different age group and detailed written instruction like handouts/ leaflets and audio visuals as preferred by the patients .

The Health care and professionals

Health professionals should educate and empower patients to adhere to the recommended dietary and physical activity regimens and hospitals in general should improve the diabetic follow up service by making the follow up time more flexible and convenient for patients and devoting adequate time for consultation during each visit.

Researchers

Furthermore investigation is needed to assess magnitude of glycemic control and to identify its association with diabetic self management regimens. Qualitative study is needed to understand reasons for non adherence to the recommended self management regimens.

Diabetic association

The Ethiopian Diabetes association needs to strengthen the advocacy on the benefits of involving in diabetes association and the recommended self management regimens.

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APPENDIX

Jimma University
Institute of health science

Annex 1: Subject Information Sheet

My name is I am here on behalf of Rukiya Debalke student of jimma University She is conducting a research on ‘non adherence and factors associated with dietary and physical activity recommendation among type 2 diabetic patients at Metu Karl Refferal Hospital. She received permission from Jimma university institute of health science and Metu worda health beauro to conduct this study.

You are selected by systematic random sampling method to participate in this study because you currently attending diabetic patient follow up. Your participation is purely based on your willingness .You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment.

If you agree to participate in the study, you will be asked to answer some questions about yourself and your household environment. The interview with you will take about 20 minutes.

The study will help u to practice the recommended dietary and physical activity practice to prevent further complications. It can also provide base line data for policy makers and other researchers for further improvements diabetic education. The information that you provide will be kept confidential by using only code numbers and locking the data. Do not give your name. No one will have access to the non-coded data except the principal investigator and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Address: Cell phone +251 (0) 932395443 Email: desti1984@gmail.com

Annex 2: Informed Consent Form

Based on the understanding of the information I gave you, are you willing to participate in this study?

A) Yes B) No

(1) If yes, I will continue and 2) if no I will skip to next participant after writing the reasons of refusal.

Respondent

Signature _____ Date _____

Interviewer

Name _____ Signature _____

Questionnaires number _____

Date of interview _____ Starting time _____ Completed _____

Result of interview A) Completed B) Not completed C) Partially completed D) Refused

Checked by Supervisor: Name _____ Signature _____

Address: Cell phone +251 (0) 932395443

Email: desti 1984@gmail.com

Instruction: circle all the possible answers of the respondent from the choice provided

Annex 3: Questionnaire (English version)

Part one A.: socio economic /demographic conditions

No	Questions	Response
Q101	AgeYears
Q102	Sex	1. Male 2. Female
Q103	Marital status	1. Single 2. Married 3. Widowed 4. separated 5. Divorced
Q104	Educational level	1.Illiterate 2.Can read and write 3.Primaryschool 4.Secondary school 5. technical school 6.College graduate or above
Q105	Occupation	1. Student 2. Self employed 3. Employed 4. Unemployed 5. House wife 6.Other(Specify)_____
Q106	Ethnicity	1. Oromo 2.Amhara 3.Tigre 4.Gurage 5.Other(Specify)_____
Q107	Family size?	_____Members

Part one B. Household Wealth Now I will ask you about some fixed assets that your household have.

Does the household have any of the following properties?		Yes	No
B1	Functioning radio/Tape recorder/CD player	1	0
B2	Functioning Television	1	0
B3	Gas Stove	1	0
B4	Kerosene stove	1	0
B5	Electric stove	1	0
B6	Bicycle	1	0
B7	Motor Cycle	1	0
B8	Cart/Gari	1	0
B9	Watch (Hand/Wall)	1	0
B10	Mobile phone	1	0
B11	Plough	1	0
B13	Sofa	1	0
B14	Spring mattress	1	0
B15	Sponge/Foam mattress	1	0
B16	Cotton mattress	1	0
B17	Grass Mattress	1	0
B18	Chair/Stool	1	0
B19	Generator	1	0
B20	Milling	1	0
B21	Water pump	1	0
Does the household have any of the following animals?		1.Yes 0. No	How many?
B22	Oxen		
B23	Cows		
B24	Horse/mules		

B25	Goats/Sheep		
B26	Chickens		
B27	Donkey		

Part Two: Health Profile Questions

No	Questions	Response
Q201	Duration of DM	_____Year
Q202	Co morbidities	1.Yes 2.No 3. don't know
Q203	Current treatment	1. Insulin injection 2. Oral medication 3. both 4. I don't take medication
Q204	Do you have Family history of diabetes	1.Yes 2.No 3.don't know
Q205	In the past 3 month how many of your diabetic follow up appointment have you missed	1.None 2.One 3.Two 4.Three and above
Q206	Have you attended a diabetic education	1. no never 2. Yes sometimes 3. yes regularly
207	What is your source of information About diabetic self management? (multiple answer is possible)	1. Media 2.Doctors 3.Nurses 4. Dietitians 5. Social media 6. Diabetic patients 7.Non diabetic patients 8.Neighbors
Q207	Have you ever received detailed written instruction regarding exercise programs from any health care provider?	1. Yes 2. No
Q208	Have you ever received detailed written instruction regarding healthy dietary habits from any health care provider?	1. Yes 2. No
Q209	Are you a member of diabetic association	1. yes 2. no 3. I don't know there is diabetes association.
Q210	Last fasting blood sugar (FROM CHART)	_____
Q211	Weight in kg	----- kg
Q212	Height in cm	----- cm
Q213	Waist circumference in cm	----- cm

Part3 The Diabetes Social Support Questionnaire, question to assess how often family members and friends do things to help or support the participant to follow dietary and physical activity recommendations..

No	Questions	Response
Emotional Support Questions for dietary regimen		

Q301	How often does a family member encourage you to eat the right foods?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q302	How often does a family member ask if certain foods are okay for you to eat, before serving them?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q303	How often does a family member remind you about sticking to your meal plan?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q304	How often does a family member tell you not to eat something you shouldn't?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q305	When eating out or eating at other people's houses, how often do your friends provide emotional (verbal) support to help you eat in a way that helps you maintain good blood sugar level?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q306	How often does a family member do grocery shopping for your meals?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q307	How often does a family member suggest foods you can eat on your meal plan?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q308	How often does a family member join you in eating the same food as you?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q309	How often does a family member cook meals for you that fit your meal plan?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q310	When eating out or eating at other people's houses, how often do your friends provide active support by choosing to eat healthily along with you?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Emotional Support Questions to physical activity regimen		
Q311	How often does a family member remind you about sticking to your exercise plan?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q312	How often does a family members encourage you to be part of regular exercise program?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q313	How often does a family member do buy you equipments for exercise?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always

Q314	How often does a family member suggest ways to exercise?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q315	How often does to family members ask you join them for exercise?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always
Q316	How often does a family member join you in your exercise program?	0. Never 1. Not very often 2. Sometimes 3. Very often 4. Almost Always

Part 4: Diabetes health belief

N0	Questions	strongly disagree(1)	disagree (2)	Undecided (3)	agree (4)	Strongly agree (5)		
Perceived susceptibility Diabetic complications								
401	My diabetes is well controlled			1	2	3	4	5
401b	My diabetes would be worse if I did nothing about it			1	2	3	4	5
402	Diabetes can be serious disease if u don't control it			1	2	3	4	5
403	poorly managed diabetes will lead to serious health problems in the future			1	2	3	4	5
404	poorly managed diabetes will lead to health problems affecting the nerves, kidneys, eyes, or heart			1	2	3	4	5
Perceived severity								
405	My diabetes is no problem to me as long as I feel all right			1	2	3	4	5
406	My diabetes will have a bad effect on my health			1	2	3	4	5
407	My diabetes will cause me to be sick a lot			1	2	3	4	5
408	I believe I will always need my diabetes diet(Medication)			1	2	3	4	5
409	Uncontrolled diabetes will shorten life			1	2	3	4	5
Perceived benefit								
410	Gentle aerobic exercise has a role to play in the management of type 2 diabetes mellitus?			1	2	3	4	5
411	Gentle aerobic exercise helps to control and maintain glucose (sugar) level			1	2	3	4	5
412	Healthy dietary habit has a role to play in the management of type 2 diabetes mellitus			1	2	3	4	5
413	Healthy dietary habit helps to control and maintain glucose (sugar) level			1	2	3	4	5
Perceived Barriers								
414	I would change too many habits to follow recommended life dietary and physical activity practices			1	2	3	4	5
415	It has been difficult what the doctor told prescribed for me			1	2	3	4	5

	about diet					
416	It has been difficult what the doctor told prescribed for me about exercising	1	2	3	4	5
417	I cannot understand what my doctor told me about my diet.	1	2	3	4	5
418	I cannot understand what my doctor told me about exercise .	1	2	3	4	5
419	following the recommended life style interferes with my normal daily activities	1	2	3	4	5
420	cost of recommended foods keeps me from following my Diet plan?	1	2	3	4	5
421	Negative emotions, feeling stressed, Depressed, etc keeps me from following my diet and physical activity plan	1	2	3	4	5
Self efficacy						
		Not at all	A little	Undecided	Some what	Very
422	To what extent do you feel you have control over your diabetes?	1	2	3	4	5
423	How confident are you in your ability to follow your diabetes meal plan	1	2	3	4	5
424	How confident are you in your ability to select healthy foods when eating away from home?	1	2	3	4	5
425	How confident are you in your ability to exercise (e.g. walk, bike, swim) 3-5 Times a week for at least 15-20 minutes at a time?	1	2	3	4	5

Part 5: environmental and situational barriers To Life Style Modification (Diet & Exercise) Please tick the option (s) that expresses your view about each of the statements describing reasons for non-adherence to lifestyle modification (i.e. what is preventing you?) You may tick more than one option.

No	Question	Response
Q 501	From the following list, Please indicate reason(s) for non-adherence to exercise.	<ol style="list-style-type: none"> 1. Too busy schedule 2. Weather (especially during winter) 3. Lacking exercise partner/spouse 4. Specific locations away from home (e.g. field work,) 5. Criticism (presence of others make you uncomfortable) 6. Lacking of family support 7. Others_____
Q502	From the following list, please indicate reason (s) for non-adherence to dietary habits/recommendation.	<ol style="list-style-type: none"> 1. Eating out (restaurant, ceremonies, work, family & friends" homes ,Social gatherings) 2. Inappropriate dietary habits (e.g. eating snacks in-between meals) 3. Financial constraints (to procure idea healthy diets) 4. Unavailability of healthy diets 5. Poor self control 6. Lacking of family support

		7. Others specify-----
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Part 6 Adherence to dietary recommendation this section contains questions to establish whether or not type 2 diabetes mellitus patients are adhering to dietary recommendations please tick the appropriate option inside the box.

No	Question	Response
Q601	Forgetting to plan the meals you eat ahead?	1. Yes 2. No
Q602	Did you miss your dietary plan yesterday?	1. Yes 2. No
Q603	Over the past two weeks, were there any days when you did not take your dietary plan properly?	1. Yes 2.No
Q604	Do you sometimes forget to comply your dietary plan with everyday life?	1. Yes 2. No
Q605	When you feel like your DM is under control, do you sometimes stop taking your dietary plan?	1. Yes 2.No
Q606	Do you ever feel hassled about sticking to your dietary plan?	1. Yes 2. No
Q607	Did you have feelings of dietary deprivation?	1. Yes 2. No
Q608	Are you rigid, instead of flexible eating to control your DM?	1. Yes 2. No
Q609	Forgetting to include fruits in your food daily?	1. Yes 2. No
Q610	Do you forget to include vegetables in your food daily?	1. Yes 2. No
Q611	Do you forget to cut down butter and fat intake in your food?	1. Yes 2. No
Q612	Do you forget to avoid simple sugars from your food?	1. Yes 2. No

Part 7. Global Physical Activity Questionnaire (GPAQ) Physical Activity			
<p>Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.</p>			
No	Questions	Response	Skip to
	Activity at work		

Q701	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?	1. Yes 2. No, If No, go to	Q704
Q702	In a typical week, on how many days do you do vigorous intensity activities as part of your work?	Number of days	
Q703	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours Minutes	
Q704	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	1. Yes 2. No, If No, go to	Q707
Q705	In a typical week, on how many days do you do moderate intensity activities as part of your work?	Number of days	
Q706	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours: Minutes	
Travel to and from places			
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example, to work, for shopping, to market, to place of worship.			
Q707	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	1. Yes 2. No, If No, go to	Q710
Q708	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days.....	
Q709	How much time do you spend walking or bicycling for travel on a typical day?	Hours: Minutes	
Recreational activities			
Q710	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	1. Yes 2. No, If No, go to <input type="checkbox"/> <input type="checkbox"/>	Q713
Q711	In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational (leisure) activities?	Number of days.....	
Q712	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours: Minutes	
Q713	Do you do any moderate-intensity sports, fitness or a recreational (leisure) activity that causes a small increase in breathing or heart rate such as brisk walking (cycling, swimming, volleyball) for at least 10 minutes continuously?	1. Yes 2. No, If No, go to <input type="checkbox"/> <input type="checkbox"/>	Q716
Q714	In a typical week, on how many days do you do	Number of days.....	

	Moderate-intensity sports, fitness or recreational (leisure) activities?	
Q715	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours Minutes
Sedentary behavior		
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent [sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping.		
Q716	How much time do you usually spend sitting or reclining on a typical day?	Hours Minutes

Part 8 – substance use

This section is assess participants substance use

1 drink = 1/2 pint (1 bottle) of beer or 1 glass of wine, „Tela“, „Tej“ or 1 single spirits

Alcohol consumption

	Questions	0	1	2	3	4	Remark
Q801	How often do you have a drink Containing alcohol?	Never	Monthly or less	2 to 4 times a month	2 to 3 times a week	4 or more times a Week	If never jump to QNO.4
Q802	How many drinks containing alcohol do you have on a typical day when you are drinking	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	

Smoking

No	Questions	Response	Remark
Q803	have you ever smoked cigarette	1.Yes 2.no	If no jump to Q801
Q804	Do you smoke cigarettes now?	1.Yes 2.no	If no jump to Q801
Q805	For how long u have been a smoker	1. less 6 month 2. 1 year 3. 2-5 years 4. more than 5 years	
Q806	how many stick of cigarettes do u smoke per day	1. 1 2. 2-5 3. 5-10 4. 10 or more	
khat chewing			
Q808	have u ever chewed khat	1.Yes 2.no	
Q809	Do you chew khat currently	1.Yes 2.no	
Q810	For how long u have been chewing khat	1.less 6 month 2.1 year 3.2-5 years 4. more than 5 years	
Q811	11. have you chewed khat in the past 30 days	1.Yes 2.no	

Annex 4: Subject information sheet (Afan Oromo version)

Ibsa waliigalaa waa`ee qoranno kanaa illaachisee

Kabajammoo hirmaataa qo`annaa kan`aa : ani kanan armaan gaditti siiniin mallattessisuu barataa Uniiversitii Jimma , institiyutii saayinsii fayyaa yoo tahuu yeroo amma Godina Illu Abba Bora hospitaloot motumma keessatti dhukkubsatoota dhukkuba sukkaaraa deddebi`eni yaalaman irratti qo`anna geggeessuratti argama . kanaafuu , isiiniis hirmaattoota qo`anna kanaa akka taatan waan filatamtaniif yaada qo`annaa kanaa gabaabaatti ibsuu yaala.

Hirmaachuu kessaniif midhaa fi faayidaa argamuu:qo`annaa kanarratti waan hirmmaattaniif kallattidhan qarshiis tahee bu`aawwan kan biro waantii argattan hin jiru. Garuu yaadni/ deebii waa`ee qo`annaa kanaratti illaalchisee kennitan firiin isaa qaama ilaallatuu wajjin waliin tahuun sirraffamni ni godhama. Qo`anna kanaratti waan hirmmaattaniif daqiqaa 30` fudhachura kaan darbee midhaa qaama tahee kan sammuu waantii siinarra gahuu hin jiru.

Iciti odefannoo eeguu: maqaa keessan waraqaa irratti hin barreeffamu. Ragaan /yaadnii nuuf laattan ammo bifa kammiyyuu nama sadaffaa (kan biraatti) hin agarsiifamu. Qo`anna kana keessatti hirmmaachuu dhiisuufiyeroo barbaaddan addaan kutuun bahuuf mirgii keessan eegamaa dha. Waa`ee qo`annoo kanaafi firii isaa beekuuf yoo barbaaddan teessoo armaan gaditti argachuu dandeessu.

Rukiya Debalke

Lakkoofsa bilbilaa: 0932395443 emeelii: desti1984@gmail.com

Annex 5: Consent form (Afan Oromo version)

FOORMII WALIGALTEE

Ani kan armaan gaditti malleettessu godina shewaa lixaatti dhukubsatoota sukkaaraa hospitaaloota mootummaa irratti deddebi`eenii yaalaman waa`ee kunuunsa dhukuba sukkaaraatiif kana faana walitti dhufeny qaban qo`annaa taasiffammurratti feedhiin hirmaachu koo ibsaa , hirmaachuukootiif ammo iccittin odefannoon keene kan egamee fi rakkin tokkolee akka na hin mudanee naaf ibsaniiru. Dhumarratti gaaffii barbaachisa tahee Rukiya Debalke gaafachu akka danda`u hubadhera.

Mallattoo hirmaata_____ Mallattoo daataa sassaabu_____

Annex 6: Questionnaire (Afaan Oromo version)

Kutaa 1ffaa: Haala waligala waa'ee hawaassumaa

No	Gaaffiilee	Deebii
Q101	Umurii	_____ Wagga
Q102	Saala	1. Dhiira 2. Dhalaa
Q103	Haala Gaa'elaa	1. kan hin herumne/ hin funee 2. . kan herumte/ fudhee 3. Abbaan /hati manaa du'eera /ti 4. addan bahera/ti 5. hiikteetti/ hikeeraa
Q104	Educational level	1.hinbaranne 2. dubbisuufi barreessuu 3. sadarkaa 1ffaa (1-8) 4. sadarkaa 2ffaa(9-12) 5. barumsa oggumma 6.Collejiifii ol
Q105	Occupation	1. Barataa 2. Hojeta dhunfaa 3. Hojjettaa 4. Miti hojjettaa 5. Hadha waraa 9. kan bira (ibsii)_____
Q106	Qomoo	1. Oromo 2.Amhara 3.Tigre 4.Gurage 5.kan bira (ibsii)_____

<i>Qabenyaa maati</i>			
Mana kessan kessati qabanyaawan armaan gadi qabdu ? (Circle)		Yes	No
B1	Radio;/Tape recordara/CD tephachisaa hojjetu	1	0
B2	Televisiona hojjetu	1	0
B3	Gemmoo gaazii	1	0
B4	Gemmoo gaazii adiii	1	0
B5	Gemmoo elektrikaa	1	0
B6	Sayikalii	1	0
B7	Doqdoqqee	1	0
B8	Gaarii	1	0
B9	Saaaati harka/ fannoo	1	0
B10	Mobaayila	1	0
B11	Qootiyoo	1	0
B13	Sofaaa	1	0
B14	Firaashiii ispringiii	1	0
B15	Firaashiii fomiii	1	0
B16	Firaashiii jirbii	1	0
B17	Firaashiii margaa	1	0
B18	Tessuma	1	0
B19	Generatara	1	0
B20	Babura	1	0
B21	Baastu bishaanii	1	0
	Mana kessan kessati ?	1.qaba 0. hinqabu	Meeqa ?
B22	Sangaa		
B23	Saawan		
B24	Farda /Gaange		

B25	Raee/Holaaa		
B26	Hindaqqoo		
B27	Harree		

Kutaa 2ffaa: waa`ee kilinikaala dhukuba sukkaaraafi Kan kana faana walitti dhufeenya qaban.

lakk	Gaafii	Deebii
Q201	Erga dhukuba sukkaaraa qabaachuu keessan barme/ mirkanaa`ee waggaa meeqa?	_____
Q202	Dhukkuboota biraa	1.Eeyyee 2.Lakkii 3. Hinbeeku
Q203	Haala yaalii ammaa	1. insuuliinii limmoodhaan2. qoricha liqimfamu 3.lammanuu 4. umaa hinfudhu
Q204	Dhukkuba sukkaaraa maatii keessan keessaa qabuu jiraa ?	1.Eeyyee 2.Lakkii 3. Hinbeeku
Q205	Ji`oota sadan dabran keessatti yeroo meeqa beellama haftan?	1.umaa 2.tokko 3.lama 4.sadi fi isaa ol
Q 206	Barnoota dhukkuba shukkaaraa baratani beektuu?	1. lakkii takkumaa 2. eeyyeen yeroo tokko tokko 3. eeyyen sagantaan
207	Offeeganno dhuunfa dhukuba shukkaaraa ilaalchisee maddi odeefannoo keessan maali? (deebii lama sadii keennuun ni danda`ama)	1. Miidiyaa 2. Doktoora 3. Narsii 4. Ogeeyyi nyaataa 5. Sooshaal miidiyaa 6. Dhukkubsattoota dhukichaa 7. Dhukkubsattoota biraa 8. Ollaa
Q207	Ogeeyyi fayyaa irraa qajeelfama akkaataa sagantaa sochii qaamaa barreefamaan fudhatanii beektuu?	1.Eeyyee 2.Lakkii
Q208	Ogeeyyi fayyaa irraa qajeelfama akkaataa sina nyaataa barreefamaan fudhatanii beektuur?	1.Eeyyee 2.Lakkii
Q209	Isin miseensa walda dhukkubsattoota shukkaaraatii?	1.Eeyyee 2.Lakkii 3. jiraachuu isaa hinbeeku .
Q210	Last fasting blood sugar (galmeera irraa)	_____
Q211	Ulfina qaama	----- kg
Q212	Dheerina	----- cm
Q213	Safara mudhii	----- cm

Kutaa 3.Gaaffilee degersa hawaasummaa dhukkubsataa shukkaaraatiif

Gaaffilee degersa hawaasummaa dhukubsataa shukkaaraatiif maatiini fi hiryooni hordoffii sagantaa sochii qaamaatiif hordoffii sirna nyaataa irratti kennan madalan

Lakk.	Gaaffilee	Deebii	yaadachiisa
Degersa hamilee hordoffii sirna nyaataa irratti godhamu			
Q301	Maatiin keessa akka isin nyaata sirrii ta'e akka nyaattan ammam isin gargaaru?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q302	Maatiin keessan yeroo ammam nyaata tokko ituu isinii hinkennin sirrii ta'uu isaa isin gaafatu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q303	Maatiin keessan yeroo ammam akka sagantaa ciree keessan hordoftanii nyaattan isin yaadachiisu?	0. tasuma 1. yeroo tokko tokko 2. darbeedarbee 3. yeroo bayyee 4. yeroo hunda	
Q304	Maatiin keessa yeroo ammam waan isin nyaachuu hinqabne akka hinnyaanne isinitti himu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q305	Yeroo alaa nyattan firri ykn hiryooni yeroo ammam akka ofeeggannoodhaan nyaattan isin jajabeessu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Gaaffilee degersa gochaan hordoffii sirna nyaata irati jiran madaalan			
Q306	Maatii keessan yeroo ammam nyaata barbachisaa isiniif jecha bitu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q307	Maatiin keessan yeroo ammam akka isin sirna nyaataa keessan eeggattan isin gorsu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q308	Maatiin keessan yeroo ammam nyaata isin nyaattan isin walin nyaatu ?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee	

		4. yeroo hunda	
Q309	Maatiin keessan yeroo ammam nyaata sirri ta'ee isiniif hojjetu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q310	Yeroo alaa nyaattan firri ykn hiriyaan yeroo ammam isin waliin nyaata sirri ta'ee nyaatanii isin jajjabeessu ?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Degersa hamilee sochii qaamaa/ispoortii irratti			
Q312	Maatiin keessan yeroo ammam akka isin saganta sochii qaamaa/ispoortii keessan eeggatanii shakaltan isin yaadachiisu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q313	Maatiin keessan yeroo ammam akka isin saganta sochii qaamaa/ispoortii irratti isin jajjabeessu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Gaafilee degersa gochaan hordoffii sochii qaamaa/ispoortii irati jiran madaalan			
Q314	Maatiin keessa yeroo ammam meeshaa ispoortii isinii bitu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q315	Maatiin keessa yeroo ammam akkaataa sochii qaamaa hojjetan irratti yaada isinii kennu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q316	Maatiin keessa yeroo ammam sochii qaamaa irratti waliin hojjechuuf isin affeeru?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	
Q317	Maatiin keessa yeroo ammam sochii qaamaa irratti waliin hojjetu?	0. tasuma 1. yeroo tokko tokko 2. ee darbeedarb 3. yeroo bayyee 4. yeroo hunda	

Kuttaa 4 faa : Amantaa fayyummaa dhuunfaa waa'ee dhukkubaa shukkaaraa irratti

Gaafii	Tasa walii hingalu	Waliihingalu	Giddu gallessa	Waliin gala	Daraan waliigala
Q501. Hubannoo saaxilamummaa dhukkuba shukkaaraa					
Dhukkubbi shukkaarakoo toa'tameera	1	2	3	4	5
Ituun to'achuu yaale dhukkubni koo natti caalaa ture	1	2	3	4	5
To'atamuu baannan dhukkubi shukkaaraa dhukkuba hamaadha	1	2	3	4	5
Dhukkubni shukkaaraa sirritti to'atamuu baannaan rakkoo cimaa namarraan ga'a	1	2	3	4	5
Dhukkubni shukkaaraa sirritti hinta'atamne narvii, kalee, ijaa fi laphee irratti rakkoo cimaa fida	1	2	3	4	5
Q502. Hubannoo cimina dhukkubichaa					
Amma natti hinbeekamnetti dhukkubbi shukkaaraa humaa rakkoomiti	1	2	3	4	5
Dhubi shukkararaa qaama koo irratti hubaatii cimaa geesisa	1	2	3	4	5
Dhukkubni shukkaaraa yeroo baayyee akan dhukkubsadhu nagodha	1	2	3	4	5
Qorichaaf nyaata sirri yeroo hunda fudhachuu akkan qabu nan amana(Medication)	1	2	3	4	5
Dhukkubnishukkaaraa hin to'atamne umurii gabaabsa	1	2	3	4	5
Q503. Hubannoo faayidaa					
Sochii qaamaa giddu-galeessi dhukkuba shukkaaraa to'achuu keessatti shoora guddaa taphata	1	2	3	4	5
Sochii qaamaa giddu-galeessi baayina gluukoosii to'achuuf nigargaara	1	2	3	4	5
Nyaata sirrii ta'e nyaachuun dhukkuba shukkaraatiif gaariidha	1	2	3	4	5
Nyaata sirrii ta'e nyaachuun baayina gluukoosii to'achuuf nigargaara	1	2	3	4	5
Q504. Hubannoo guufuu					
Nyaata sirrii ta'e nyaachufiif sochii qaama gochuuf barmaatilee baayyee jijjiruun qaba	1	2	3	4	5
Wanti doktooriin wa'ee nyaataa nan jedhe hojiirra oolchuuf cimaadha	1	2	3	4	5
Wanti doktooriin wa'ee sochii qaamaa/ispoortii nan jedhe hojiirra oolchuuf cimaadha	1	2	3	4	5

Wanti doktoriin waa'ee nyaataa nan jedhe naaf hingalu.	1	2	3	4	5
Wanti doktoriin waa'ee sochii qaamaa nan jedhe naaf hingalu..	1	2	3	4	5
Gorsi akkaataa jireenyaa naaf kenname jireenya koo waliin hindeemu	1	2	3	4	5
Gatiin nyaatota an gorfamee akkan hordofee hinnyaane nagodhe	1	2	3	4	5
Mirri jibbaa, muddamni fi dhadhabbiin akkan gorsa waa'ee nyaataa fi sochii qaama sirritti hojii irra hin-olchine nagadhu,	1	2	3	4	5
Q506. Ofga'ummaa					
	Tasuma	Xiqqoo-xiqqoo	Giddu-galeessa	Amma tokko	Akka gaariitti
Akka dhukkuba keessan to'achuu dandeesan ammam isinitti dhaga'ama?	1	2	3	4	5
Sagantaa nyaataa sirritti fayyadamuu irratti ammam ofitti amantu	1	2	3	4	5
Mana keessaii ala yeroo nyaattan nyaata sirri ta'ee filachuu irratti ammam of amantu?	1	2	3	4	5
Toranitti guyyaa 3-5 daqiiqaa 15-20 sochii qaamaa gochuu irratti ammam of amantu ?	1	2	3	4	5

Kutaa 5ffaa sababoota horddooffii sochii gahumsa qaamatiifi karoora nyataatiif guufuu tahan

Lakk	Gaafii	Deebii
Q 603	Kan armaan gadii kessaa sababoota horddooffii sochii gahumsa qaamatiif guufuu tahan caqsi.	8. Yeroo dhabu 9. Haala qillensaa nannoo 10. Nama waliin sochii gahumsa qaama godhan dhabuu 11. Mana irra fagoo tahuu 12. Chuphoo namota biraa sodachuu 13. Degarsa maatii dhabu 14. Kan biro (ibsii) _____
Q602	Kan armaan gadii kessaa sababoota horddooffii karoora nyataa guufuu tahan caqsi.	8. Manaa ala nyachuu (mana nayaata, qophii adda, hojii, mana firaa fi hiriyyaa,) 9. Sirna nyaata sirri hintane 10. humna bittu dhabuu 11. Nyaata fayyaaf filatama argamuu dhabu 12. Of toachuu dhabuu 13. Degarsa maatii dhabu 14. Kan biro (ibsii) _____

Part 6 Hoorddooffii karoora nyaataa sukkaraa

Gaafillen armaan gadii karoora nyaataa sukaaraa kessan sirritti hordofuu fi hordofuu dhabu kessan madaalu.

Lakk	Gaafii	Deebii
Q301	karoora nyaata keetii dursite karorfachuu dagachuu?	1. Eyyee 2. mitii
Q302	Karora nyaata keeti guyaa kallessa dagattetaa?	1. Eyyee 2. mitii
Q303	Torbaan lama darbe kessatti guyyotin karora nraata keeti sirriti hin hordfne jiru?	1. Eyyee 2. mitii
Q304	Yeroo tokko tokko karoora nyaata kee jirenyaa idilee ke waliin ademsisuu ni daggattaa?	1. Eyyee 2. mitii
Q305	Dhukubni sukaaraa kessan toanoo jala kan jiru yoo siniti fakkattu karoora nyaataa kessan ni dhabduu?	1. Eyyee 2. mitii
Q306	Karoora nyaataa kee hordofuu irratti mormii qabaate bekta?	1. Eyyee 2. mitii
Q307	Hirrin nyaata waan qabdan sinitti fakkata?	1. Eyyee 2. mitii
Q308	Karoora nyataa dhukkuba sukarraa kee irratti sirna nyatta linchica hordoftaa?	1. Eyyee 2. mitii
Q309	Nyaata kee irratti fuduraa dabluu ni daggattaa?	1. Eyyee 2. mitii
Q310	Nyaata kee irratti kuduraa dabluu ni daggattaa?	1. Eyyee 2. mitii
Q311	Nyaata kee comaa fi dhadha hirrissuu ni daggattaa?	1. Eyyee 2. mitii
Q312	Nyaata kee irratti sukaraa fi nyata miaawaa dabluu dhisuu ni daggattaa?	1. Eyyee 2. mitii

Kutaa 6 faaa, gafilee hordofii sochii gahumsa qaamaa

Gafileen armaan gaditti argman hordofii sochii gahumsa qaamaa irratti iyyefattuu

1. Sochii gahumsa qaamaa cimma jechunn sochiiwan hoojii humnaa gaafatanidhaa (fakkenyaaf ulfina kassuu, qottuu) rukkkuna onnee , argansuu sombaa kan dabaluudha.

2. Sochii gahumsa qaamaa salpha/giddugallessa jechunn sochiiwan salphaa akk demsa millaa, figgichaa, tapha kubba millaa, funyoo utaaluu, sayikalii hoofuu, jiimii, bishaan daakuu, tea rukkunnaa onnee xiqaan kan jijirani dha.

Sochii gahumsa qaamaa bakka hoojii			
	Gaafiii	Deebii	Gara gaafii itti anuti
31.	Hoojiin kessan xiqaa daqiqaa 10nif Sochi gahumsa qaamaa cimmaa kan qabudha?	1. eyyee 2. mitii	Deebiin kessan miti yoo tahe gara gaafii 34 ti darba
32.	Torbannitti guyaa meqaaf Sochii gahumsa qaamaa cimma hojjettuu	Guyaaaf	
33.	Guyaati saatifi daqiqaa meqaaf Sochii gahumsa qaamaa cimma j hojjettuu	Saaati.....f Daqiqaa.....f	

34.	Hoojiin kessan xiqaaati daqiqaa 10nif Sochi gahumsa qaamaa salpha kan qabudha?	1. eyyee 2.mitii	Deebiin kessan miti yoo tahe gara gaafii 37 ti darba
35.	Torbannitti guyyaa meqaaf Sochii gahumsa qaamaa salphaa hojjettuu	Guyaaaf	
36.	Guyaati saatifi daqiqaa meqaaf Sochii gahumsa qaamaa salphaa hojjettuu	Saaati.....f Daqiqaa.....f	
Bakka bakkatti sosochii godhamu Gaafillen armaan olii hojii kessan irratti kan hundeffatan turan, gaffilen armaan gadii guyya iidiilleti bakkaa bakkatti akkam akka sochotan irrattii hunddefattuu, fkn garra hojji, gara gabbaa, gara iddoo amnattaa fi k.k.f .			
37.	Bakka tokko gara birrat yoo demtan daqiiqqaa 10 niif milaan ykn saykaliidhan demtanuu bektu?	1. eyyee 2.mitii	Deebiin kessan miti yoo tahe gara gaafii 40 ti darba
38.	Torbanittii guyyaa meqaaf milaan ykn saykaliidhan demtuu ?	Guyaaaf	
39.	Guyyaati saatiifii daqiqaa meqaaf milaan ykn saykaliidhan demtuu ?	Saaati.....f Daqiqaa.....f	
Gaafillee sosoochii bakka bashananaa			
40.	xiqaaati daqiqaa 10nif Sochi gahumsa qaamaa cimmaa bashananaaf ni hojjettuu?	1. eyyee 2.mitii	Deebiin kessan miti yoo tahe gara gaafii 43 ti darba
41.	Torbannitti guyyaa meqaaf Sochii gahumsa qaamaa cimma bashananaaf hojjettuu	Guyaaaf	
42.	Guyaati saatifi daqiqaa meqaaf Sochii gahumsa qaamaa cimma bashananaaf hojjettuu	Saaati.....f Daqiqaa.....f	
43.	xiqaaati daqiqaa 10nif Sochi gahumsa qaamaa salpha bashananaaf ni hojjettuu?	1. eyyee 2.mitii	Deebiin kessan miti yoo tahe gara gaafii 46 ti darba
44.	Torbannitti guyyaa meqaaf Sochii gahumsa qaamaa salpha bashananaaf hojjettuu	Guyaaaf	
45.	Guyaati saatifi daqiqaa meqaaf Sochii gahumsa qaamaa salpha bashananaaf hojjettuu	Saaati.....f Daqiqaa.....f	
Yerroo boqqonna			
Gaafileen armaan gadi yeroo boqqonna kessanitti ,mannati, bakka hojiiti, hiriyoota kessaa waliin televisiinii ilaalun, ykn layibrarii kessati yeroo dabarsitan illaallataa, haataa malee yeroo cissicha hin illalatu.			
46.	Guyyaatti saatiifii daqiqaa meqaaf taaun dabarsituu?	Saaati.....f Daqiqaa.....f	

Kutaa 7 faa, fayyadama alkohoolii , tamboo fi caatii

dhugaati 1= biraa buttulle 1 ykn wayiinii, „farsoo“, „dadhiin“ birciqoo 1 ykn alkohoolii baqqee 1
Fayyadama alkohoolii

Gaafii	0	1	2	3	4	Yaadachisa
1.yerro hammam kessati dhugaati alkoohooli fudhatuu?	Tasuma	Jiati	Jiaati yeroo 2-4	Torbaniitii yeroo 2-3	Torbaniitii yeroo 4 fi isa ol	Yoo tassuma tae gara gaaffii QNO.4 Darba
2.guyyaa iddileeti dhugatii alkoholii qabu meq fudhatu?	1 ykn 2	3 ykn4	5 ykn 6	7 hanga 9	10 fi isaa ol	

Tamboo

Gaafiii	Deebii	Yaadachisa
4.tamboo xuxxee bekta?	1.eyyee 2.mitii	Yoo tassuma tae gara gaaffii QNO.8Darba
5. yeroo ammaa tamboo ni xuuxxaa?	1.eyyee 2.mitii	Yoo tassuma tae gara gaaffii QNO.8Darba
6.yerroo meqaaf tamboo xuxxee?	1.jia 6 gadi 2.wagaa 1f 3. waggaa 2 hang 5if 4.waggaa 5ol	
7.guyyati tamboo meeqa xuxxaa?	1.1 2.2-5 3.5-10 4.10 fi isa ol	

Fayyadam caatii

8.caatii qamaatee bekta?	1.eyyee 2.mitii	If no end the interview with thanking the participant
9.yeroo ammaa caatii ni qamata?	1.eyyee 2.mitii	If no end the interview with thanking the participant
10. yeroo meqaaf caati qamaate?	1.jia 6 gadi 2.wagaa 1f 3. waggaa 2 hang 5if 4.waggaa 5ol	
11. guyyaa 30 darban kessatti caatii qamaateta?	1.eyyee 2.mitii	