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DIETARY SELF-CARE AND ASSOCIATED FACTORS AMONG DIABETIC PATIENTS IN JIMMA UNIVERSITY MEDICAL CENTRE, SOUTH WEST ETHIOPIA; APPLICATION OF HEALTH BELIEF MODEL.

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A thesis Submitted to Institute of Health, Faculty of Public Health, Department of Nutrition and Dietetics in partial fulfillment of the requirement for the degree of Master of Science in Human Nutrition.

August, 2020

Dietary self-care and associated factors among Diabetic patients in Jimma university medical Centre, south west Ethiopia; application of Health Belief Model.

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Abstract

Background: - Diabetes Mellitus (DM), a chronic metabolic disorders which caused about 4.2 million deaths and at least USD 760 billion dollars' expenditure in 2019, has been targeted for action by leaders of WHO member countries. In Ethiopia deaths due to DM has reached 34,262 in 2013. Studies show effective lifestyle interventions; particularly medical nutrition therapy reduces HbA1c by 0.5 to 2%. However, practicing self-care, specifically recommended diet is reported to be difficult. Not only Knowledge and practice but also perception studies are therefore necessary to design future health programs.

Objective: -To assess diabetic self-care, dietary practice and associated factors among diabetes patients.

Method: - Institution based cross sectional study design was employed from february15- May15, 2020 in Jimma university medical Centre(JUMC). Systematic sampling of every other patient (K=2.7) was employed to interview 374 participants. previously validated tool was used to collect data through face-to-face interview. Path analysis was used to fit structural model and test the hypothesized Health Belief Model(HBM) relationships.

Result: - Response rate was 94.6%(354). Around fifty-two percent of the participants were male and 76.8% follow diabetic education at least some times. 42.4% and 48% of respondents have good dietary and general self-care practice. Very strong correlation is detected between dietary self-care and general self-care practice ($r=0.827$, $p<0.01$). Self-efficacy being the strongest, cues to action perceived threat and perceived barrier constructs of HBM have significant effect on dietary self-care practice. Knowledge, social support and diabetes distress exert significant indirect effect on dietary practice through health belief constructs with unstandardized total path coefficient (standard error) of 0.22(0.03), 0.02(0.01), and -0.03(0.004) respectively.

Conclusion: - In this study, proportion of good practice is found to be lower for both dietary as well as general self-care. HBM can best fit to explain variability in dietary self-care practice; therefore, future interventions should be designed to address the vast perception and psychosocial factors influencing dietary self-care practices.

Acknowledgment

First, I would like to say Alhamdulillah, and thank the almighty for giving me the strength in preparing this document. I would like to extend my sincere gratitude and appreciation to my advisors Mr. Alemayehu Argaw and Mrs. Abonesh Taye for their unlimited support, guidance, suggestion, comment, and encouragement throughout the process of planning, conducting, and reporting of this thesis. I would like to express my best gratitude to Jimma University, Department of Human Nutrition and Dietetics that has accepted the title and organized the opportunity to conduct this research. Finally, my acknowledgement goes to my friends and instructors who contribute greatly in the whole process.

Table of Contents

List of tables and figures

Abbreviation

Abbreviations	Definition
ADA	American Diabetes Association
BMI	Body Mass Index
CFI	Comparative Fit Index
DKT	Diabetes Knowledge Test
DM	Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
HBM	Health Belief Model
IBMSPSS	International Business Machines Statistical Package for Social Science
IDDM	Insulin Dependent Diabetes Mellitus
IDF	International Diabetes Federation
JUMC	Jimma University Medical Centre
NCD	Non-Communicable Disease
NIDDM	Non- Insulin Dependent Diabetes Mellitus
RMSEA	Root Mean Square Error of Approximation
SDSCA	Summary of Diabetes Self-Care Activities
SE	Standard Error
SEM	Structural Equation modeling
SRMR	Standardized Root Mean square of Residuals
SSA	Sub Saharan Africa
STE	Standardized Total Effect
TLI	Tucker Luwis Index
USD	United States Dollar
UDE	Unstandardized Direct Effect
VIF	Variance Inflation Factor

CHAPTER 1. INTRODUCTION

1.1. Background

American Diabetes Association(ADA) defines diabetes mellitus as "a general term for a group of metabolic disorders with disrupted carbohydrate, fat, and protein metabolism that results from defects in insulin secretion, insulin action, or both commonly characterized by elevated blood glucose" (1).

Type 1, Type 2, other specific type and Gestational diabetes are four categories of Diabetes. Type 1also called Insulin Dependent Diabetes Mellitus (IDDM) results from absolute insulin deficiency whereas type 2 or Non-Insulin Dependent Diabetes Mellitus (NIDDM) results from relative deficiency with background resistance. GDM is Diabetes diagnosed during pregnancy and other specific DM results from other genetic and endocrinological causes. Currently ADA is recommending a diagnostic criteria for diabetes that is Hgb–A1C >=6.5%, or fasting blood sugar ≥ 7.0mmol/l (126mg/dl) or 2–hours plasma glucose tolerance test ≥ 11.1mmol/l (200mg/dl) or a random blood sugar ≥ 200 mg/dl (11.1 mmol/l) in patients with classical symptoms(2).

Diabetes is a chronic illness that needs a complex care, beyond glycemic control, which requires continuing medical care and ongoing patient self-management education and support to prevent acute complications as well as to reduce the risk of long-term complications(2).Effective lifestyle interventions that include healthy diet and exercise can reduce diabetes incidence up to 55% and have shown to be more efficient than antidiabetic medicines(3).

A constantly rising treatment costs for diabetes obliges developing countries, where the resources are limited, to practice diabetic self-care components, in which patients or their families usually carry out about 95% of the disease management, to have a better economic and therapeutic outcomes (4).

Self-care behaviors include performing of well-recognized and specific self-care component activities in multiple domains in order to prevent and/or delay complications and possibility of early death associated with diabetes. The components are self-monitoring of blood glucose level, diet control, optimum physical exercise, adherence to medication/s and proper foot care(5,6).

Though the available guidelines for dietary management of type 2 diabetes do not recommend similar intake, overall findings tend to support that diabetes patients at different stages, have lower risk compared to their friends when they reduce total energy intake, simple sugars, or saturated fat intake and/or increase fiber or protein intake(7). The American Diabetes Association (ADA) recommends that eating fruits, vegetables, whole grains, legumes, fiber-containing foods and minimizing highly sucrose-containing foods are beneficial for secondary prevention of DM(8).

Health Belief Model (HBM), one of value-expectancy theories, originally was developed to explain use of preventive services later modified to explain chronic diseases patient's behaviors. According to this model, a given behavior is associated with conviction of the severity of the disease, belief in the efficacy of the prescribed therapy, and belief that barriers to the successful execution of therapeutic behaviors can be overcomed(9).

1.2. Statement of problem

Steadily increasing both in incidence and prevalence over the past few decades, diabetes has become one of four priority NCDs targeted for action by world leaders (10). According to IDF, in 2019 approximately 463 million adults (20-79 years) were living with diabetes, 79% of them being in low and middle-income countries. This adult prevalence is expected to be 700 million by 2045(11).

Though diabetes as other NCD's was considered as a problem of developed countries, however the increment is faster in low and middle-income countries than in high-income countries(10)**.** In the IDF Africa region, 19million adults were living with diabetes in 2019, which is estimated to increase to 47 million by 2045**.** Preceded by South Africa, Nigeria and DRC in decreasing order Ethiopia is among top five African countries having 1.7 million diabetic patients in 20-79 year old adults by year 2019(12).

In 2019 DM caused about 4.2 million deaths and at least 760 billion US dollars in health expenditure, which is a 10% of total spending on adults(10,11). Similarly in Africa diabetes was the cause for 9.5 billion$ USD spent for health care(12). DM has also been a concern in Ethiopia as death due to diabetes that was over 21,000 in 2007 reached to about 25,000 and 34,262 in 2011 and 2013 respectively(13,14)

Worldwide every ½ an hour lower limb is lost due to diabetes, it is also a leading cause of renal failure making End Stage Renal Disease(ESRD) 10 times higher in diabetics than other peoples. DM patients are also twice to trice at risk of Cardio Vascular Disease(CVD) , in addition to this it is leading cause of vision loss in working age and a reason for 1/3 of retinopathy (15). In addition IDF estimates that 23 million years of life are lost due to disability and reduced quality of life because of complications associated with diabetes(16).

Evidence shows strict glycemic and lifestyle factors control can significantly reduce the risk of developing these long term complications(17,18). Of the essential life style modifications for diabetes management, dietary modification is considered to be one of the cornerstone(19). Different studies showed that Medical Nutrition Therapy(MNT) reduces the HbA1c by 0.5 to 2%(20) However, practicing and adhering to the recommended diet is reported by both health professionals and patients to be the most difficult amongst diabetes self-care areas (21).

In line with WHO global action plan for preventing, and controlling non-communicable disease by the year 2025; Ethiopia has also developed and endorsed the National Strategic Action Plan (NSAP) since 2016(22). However, despite all this efforts diabetes prevalence as well as morbidity and mortality associated with diabetes and its complication is increasing.

It has been suggested that psychological interventions may better improve glycemic control if they address an individual's understanding, perception of control, and perception of chronic nature of the disease (23,24). Not only Knowledge and practice study but also perception studies are therefore necessary to design future programs and techniques for effective health education and promotion program (25).

Although such studies are important in such resource-limited areas, to realize the complex nature of the problem and integrate the clinical approach that will enhance the diabetic self-care practice utilization, most of the studies conducted in Ethiopia generally and Jimma specifically focused on some parts of the recommended self-care practice such as medication adherence and physical exercise. Those available researches also lack psychosocial dimensions that affect self-care activities greatly. In addition to this those which included behavioral model construct lacks appropriate statistical analysis method. This necessitates conducting a research to update the information as well as to provide a full picture explaining the variability in dietary as wel as general self-care behavior. Therefore, the present study aims to show current practice level of self-care in general and dietary practice in particular along with factors associated with it including patient's perception of diabetes and its management.

1.3. Significance of the study

Diabetic self-care is a complex lifetime activity, which requires many behavior changes on the patient part. Though treatment approaches and technologies are advancing, effective control of diabetes is primarily dependent upon patient adherence to therapeutic recommendations. A number of specific internal as well as external factors influence one's ability to perform diabetes self-care 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.

Despite of the fact that there were many studies on diabetes self-care practices in Ethiopia, limited number of studies showed dietary self-care and association of self-care behavior with individual's diabetes as well as self-care perception. Therefore, this study will show level of self-care practice generally and dietary practice specifically. In addition, the study will also show personal perceptions of diabetes patient towards dietary self-care behaviors. Furthermore, with other similar studies the result of this study will be used as an input to design appropriate guideline for diabetes patient education about dietary self-care behaviors and help nurses, physicians, and dietitians in order to counsel their patient by considering patient perception. Program planners and NGO's can also use the finding to guide their health information dissemination plan. Finally, other researchers can use the result of this study as an input for further studies in the future.

CHAPTER 2. LITERATURE REVIEW

2.1. Epidemiology of diabetes

An estimated 463 million adults aged 20–79 years worldwide (9.3% of all adults in this age group) have diabetes in 2019. If current trend continues, by 2030 a projected 578.4 million, and by 2045, 700.2 million adults aged 20–79 years, will be living with diabetes(11).

The International Diabetes Federation (IDF) estimates that total global health-care spending on diabetes more than tripled over the period 2003 to 2013 – the result of increases in the number of people with diabetes and increases in per capita diabetes spending(26). One study estimates that losses in GDP worldwide from 2011 to 2030, including both the direct and indirect costs of diabetes, will total US$ 1.7 trillion, comprising US$ 900 billion for high-income countries and US$ 800 billion for low- and middle-income countries(27).

2.2. Level of diabetic self-care and dietary practice

2.2.1 Diabetes self-care

A cross sectional study in Myanmar had found that more than two third (69.2%) of patients had poor self-care practice (28). Similarly Iranians study showed proportion of self-care was good, intermediate and poor in 15.1%, 58.7%, and 26.2% of patients respectively (29). Another study in Ardakan city, Iran showed that only 47.27% of respondents had good self-care practice (30). A cross sectional study in Malaysia had shown that mean score (±SD) for self-care behavior was 3.76 (±1.87)(31).

A study done in public hospitals of Tigray showed about 62.7% had poor diabetic self-care practice (32). Other cross sectional study in Ayder hospital also showed among the study participants 74.5% of them had poor diabetes self-care practice (33). closer to this result was found from a study conducted in Bahirdar which revealed prevalence of desirable self-care being only 28.4% (34). Other similar result also found from study in Felegehiwot hospital that showed 63.2% participants had poor self-care practice (35). However, in Debre-tabor proportion of poor self-care is a little bit smaller which is 36.9% (36).

A cross sectional study done in Harar and Diredawa hospitals indicated that self-care activities were Good for 38.1%, Fair for 26.3%, and Poor for 35.6% (37). However A research done in

Jimma University previously showed prevalence of poor self-care behaviors toward DM was 49.1% (38). Other study in west shoa also revealed that 45.5% of respondents had poor self-care practice (39).

A cross sectional study in Arbaminch showed that above half (58.8%) had poor self-care behavior (40). A lower result was found from Benishangul that showed 45.7% have poor self-care practice(41). Unlike above studies majority (76.8%) of study participants in Dilla were found to have good practice on the recommended self-care practices(42).

2.2.2. Dietary practice

A cross sectional study in Nepal, showed 56% of respondents adhered to dietary recommendation(3). In another study done in Tribhuwan University, non-adherence to dietary recommendation was 52.9%(43). In Bangladesh hospital 44.8% of respondents were Non-adherent to diet recommendations(44). In cross-sectional study among Yemeni type 2 diabetics 32.3% of them were non adherent with 46.7% being partially adherent and only 21% adhered strictly to recommendations(45). Another study in Auckland, New Zealand also showed that 88% were non-adherent to diet recommendations(46). A closer result to this was found from rural India in which 76% of the study participants don't have good dietary behavior (47).

A cross sectional study in Botswana have revealed that more than 1/3rd of patients were non adherent to dietary recommendations(48). Another study in Nigeria indicated total adherence to dietary recommendations was 67.4%(49).

A study done in Debre-tabor has showed that only 25.7% of the participants had good adherence towards dietary recommendations (50). Slightly higher than this proportion was found from study done in Felegehiwot referral hospital which was about 35.9% (51). A cross sectional study conducted in Ethiopian teaching hospitals showed adherence to dietary recommendation is 44.3% (52). Whereas study in Addis three years before the above study revealed that poor dietary practice was 51.4% (53). Study done in Arbaminch however showed good dietary practice of 58.9%(54).

2.3. Factors associated with dietary self-care practice

Socio-demographic characteristics

In Yemeni cross sectional study, urban residents were 2 times more likely to adhere to diet than rural residents. Employees and homemakers were about 3 times more likely to adhere to diet

compared with unemployed individuals (45). A study in Nepal showed adherence level was lower in female patients, older age, and in those with joint and extended families. Whereas higher level was found among those staying nearer to hospital than far from hospital (55).

Reasons to be non-adherence to diet recommendations found from A cross sectional study in Botswana were poor self-discipline in 63.4%, lack of healthy diet information in 33.3%, eating out, in 31.7% and financial problems in 28.8%.The reason least mentioned was ingesting unhealthy diets when alone 6.7% (48).

A cross sectional study in 3 Addis Ababa public hospitals showed high frequency of food gatherings with family and friends and eating out at restaurants and inappropriate food offers by others affected their healthy dietary plan in 38.7% and 21.8% of participants respectively(52).

In another Addis Ababa study, Patients who had less access to fruits and vegetables as well as patients who thought of cost of foods were >2 times more likely to have poor dietary practice than their counter part. Patients who had difficulty to choose foods were also 9.66 times more likely to have a poor practice than patients who did not. Whereas variables like religion, marital status, and occupation showed no statistically significant association with poor dietary practice in this study (53). However, a study done in Tikur Anbessa hospital revealed, married respondents and respondents with low income were about 10 and 4 times more likely to be engaged in diet management practices when compared with their counterpart respectively (56). As opposed to this result participants with monthly income below $150 were 6.78 times poorly adherent to dietary recommendations than their counter part in Debretabor (50).

Respondents with high level of education were about five times more likely to be engaged in diet management practices compared to lower level education in Tikur Anbessa(56). This is similar with Felegehiwot research that found patients who attended secondary education and above were 1.9 times more likely to have good dietary practice than those who attend less than secondary education (51). A study in Debretabor has also showed among respondents, those who had no formal education, and those who are living in a rural area were >2 times more likely to be non-adherent. However, in this study age group and sex were not significantly associated with dietary practice(50).

Clinical characteristics

A study conducted in Yemen indicated that compared to patients with >5 yr duration those with < 5 yr duration were 1.8 times more likely to adhere to dietary recommendation(45). Similarly Nepal study showed significant decrement in dietary adherence as disease duration increases (55).

Duration of diagnosis and presence of complication also affects adherence to dietary recommendation. A cross sectional study in Tikur Anbessa hospital showed patients without diabetes complication were two times more likely to adhere to dietary advice than their counterpart (56). Similarly in Debretabor those with co morbidities were 7.6 times more likely to be non-adherent to dietary recommendations than those with no co morbidities (50). In a study conducted in three Addis Ababa teaching hospitals the odds of following the recommended dietary plan were three times higher among patients whose diagnosis was received more than ten years ago than less than five year (52). However, another study in Addis Ababa has indicated duration of disease has no significant association with dietary practice (53)

Psychosocial characteristics

A study in Malaysia revealed self-efficacy rather than complications like diabetes distress and depression or medication type had a direct effect on diabetes self-care with path coefficient = 0.438 (57). Another study in Ardakan, Iran showed, HBM constructs with social support predicted 33.5 percent of self-care behaviors. However, only self-efficacy, susceptibility and barriers significantly contributed for observed variance of self-care behaviors; Self-efficacy being the strongest predictor of self-care behavior (30).

A study done in Tribhuwan University(TUTH) showed those who had perception that proper diet plays role in management of diabetes mellitus were 53% less likely to have non adherence to diet (43). In another study conducted on Nepal diabetic patients non-compliant participants were found to have 2.8 times higher odds of difficulty in remembering the advice, and 86% less social acceptability than those compliant to dietary advice, however perceived risk, perceived severity, perceived benefit, and self-efficacy were non-significant predictors (3). Another study in Boston showed significance mean difference of 0.81day in general diet practice between diabetes distress patients and those with unlikely individuals(58). Another systematic review study also indicated a significant negative correlation of dietary practice and distress ranging from −0.21 to −0.53(59) A prospective study, conducted in Riyadh, Saudi Arabia, showed a significant increment (from 12.5 to 39.4%) in proportion of patients eating as recommended after participated in diabetes

education program (60). In Nepal, adherence to dietary advice was higher among those advised by physicians than others. In this study Knowledge about diabetes mellitus score was also found to be positively correlated with dietary self-care adherence (55).

Patients who have received diabetic nutrition education were nearly 3 times more likely to adhere to the recommended dietary practices than patients without nutritional education in selected Addis Ababa teaching hospitals (52). This result is supported by a study in Debretabor that showed patients who had not received any education about dietary recommendations were 8.1 times more likely to not follow dietary recommendation (50). Similarly the odds of having good dietary practice was 2.6 times higher among respondents who had awareness on diabetes diet than patients who had no awareness in Felegehiwot(51).

A study in Benishangul showed odds of poor diabetes self-care practice was 5 times more for respondents who had poor diabetes knowledge than those who had good diabetes knowledge (41). Other similar result was found from west shoa in which having higher diabetes knowledge makes likelihood of good self-care 2.4 times higher than poor diabetes Knowledge (39). In Nekemt Similarly, respondents who had poor knowledge were 59% less likely to perform self-care activities as compared to those who were knowledgeable (61).

In Harar, Subjects who had a high-perceived benefit were nearly 2 times more likely to perform self-care than less perceived benefits of self-care. Among patients who had moderate perceived barriers, self-care was 72% less than those with less perceived barriers. Though perceived susceptibility was not found to be significantly associated to self-care practices, subjects who had high-perceived severity was 3 times more likely to perform self-care than those with low perception. Cues to action was another significantly associated variables, showed subjects who had got information occasionally about the disease was 83%less likely performed self-care than subjects who heard information always (62).

Similar to above study, a study in Tigray showed respondents with favorable attitudes to perceived barriers were less associated with good self-care practice than to their counterpart by 52.9%. Patients with favorable attitudes to perceived benefit were 2.4 times more associated than those with unfavorable attitudes to good self-care practice. However, both perceived susceptibility as well as perceived severity were non-significant (32).

A study in Felegehiwot revealed participants who had family support were 2.6 times more likely to have good dietary practice than patients who did not have family support (51).

2.4. Gap identified

There are a number of researches done regarding self-care however; most of them fail to cover psychosocial dimension factors associated with self-care practice. In addition to this while, dietary practice is the most under practiced component, only few literatures are available in Ethiopia in general and there is no study done in Jimma in particular regarding dietary practice. In addition, some of studies which have tried to include psycho-social factors don't follow statistical analysis as proposed by well thought models.

2.5. Health belief model and conceptual frame work

Health Belief Model(HBM) is used in predicting likely hood of taking health related actions. It was initially developed in 1950s in U.S. There after studies showed successful application of HBM in explaining and predicting preventive health behavior. Similarly different literatures approved the efficiency of Health Belief Model in predicting self-care behaviors among diabetic patients (63). The model hypothesizes that likelihood of action (dietary self-care practice in this case) increases as a function of the patient 's perceptions of:

- Greater susceptibility to the illness and greater disease severity, including related complications.
- More benefits of adherence at fewer/acceptable costs, be they emotional, physical, or financial.
- More social cues or prompts to adherence, and greater self-efficacy-i.e. perceived ability to actually do the various regimen tasks.

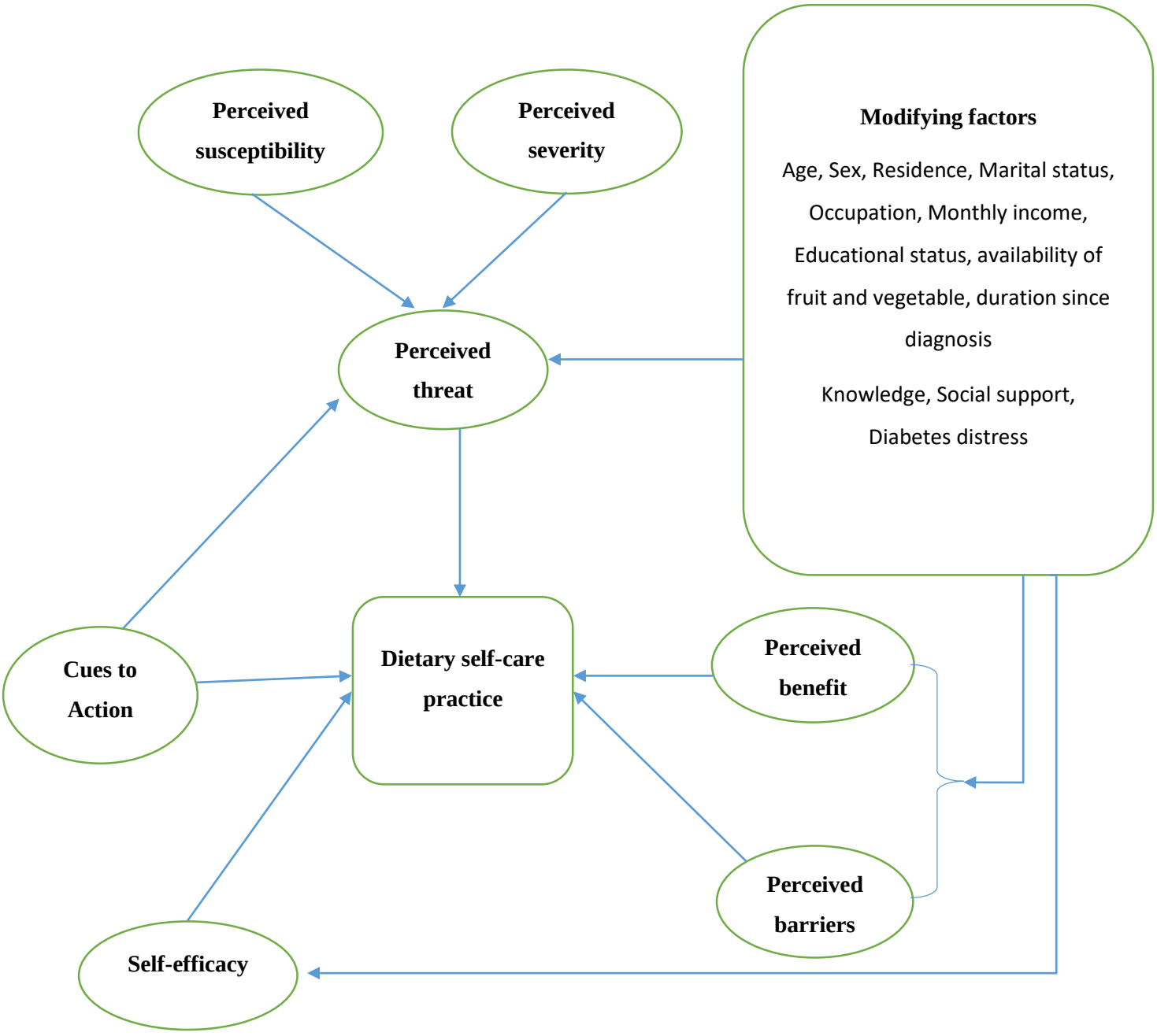

Figure 1 :- conceptual framework showing association of variables based on health belief model and different literatures to assess dietary self-care practice and associated factor among diabetic patients in JUMC, 2020.

CHAPTER 3. OBJECTIVE

3.1. General objective

- To assess self-care, dietary practice and associated factors among diabetes patients who are on follow up in JUMC, Jimma, Southwest Ethiopia, 2020.

3.2. Specific objective

- To determine level of diabetic self-care among diabetic patients who are on follow up in JUMC
- To determine level of dietary self-care practice among diabetic patients who are on follow up in JUMC
- To assess factors associated with dietary self-care practice among diabetic patients who are on follow up in JUMC

CHAPTER 4. METHODS AND MATERIALS

4.1. Study area and period

This study was conducted from February 15 to May 15, 2020 G.C in JUMC. JUMC is located in Jimma City, 357 km Southwest of Addis Ababa. It serves as a referral center for Southwestern part of Ethiopia covering a catchment population of about 15 million people. There are more than 750 staffs of both supportive and health professionals. It provide services for approximately 15,000 in patient and 160,000 outpatient attendants annually(64). A chronic care clinic in the medical center provides follow up service for DM and other chronic disease patients.DM follow up service is delivered on two days per week on Monday and Tuesday. There are 3038 diabetic patients registered in this clinic. Internists, medical residents, medical interns, and nurses provide health care. There are no routine diabetic health education program as well as health promotion experts in the hospital providing health education. The hospital also lacks dietitian. General practitioners and nurses give dietary and other self-care advice. There is no formal diabetes association as well as organization, which works on Diabetic patients in the hospital or in Jimma town in general.

4.2. Study design

Institution based cross sectional study was carried out.

4.3. Population

4.3.1. Source population

The source populations were all diabetic patients who attend follow up at JUMC chronic care clinic.

4.3.2. Study population

The study populations were DM patients who visited JUMC diabetes outpatient department clinic during data collection period and fulfilled the study inclusion criteria.

4.3.3. Study unit

Representatively sampled individual DM patients.

4.3.4. Inclusion criteria

A patient was included in the study if he/she was ≥18 years of age and had been receiving follow up services for at least 6 months at the time of data collection and consented to participate in the study.

4.3.5. Exclusion criteria

Psychiatric patients, who were unable to communicate with the interviewer, patients with hearing impairments or any other serious health problems (acute diabetes complication) during data collection period were excluded from the study.

4.4. Sample size and Sampling technique

4.4.1. Sample size determination

Sample size was determined using single population proportion formula

$$\boldsymbol{n = \frac{(Z\alpha/2\ )2\ *\ p(1-P)}{d2}}$$

Given that 95% confidence level $Z_{95\%}$=1.96

P is proportion of good self-care practice taken to be 50.9% from previous study (38). It was selected to have the maximum possible sample size from recent studies in similar setting.

d is margin of error which is 5%

it becomes

$$\boldsymbol{n = \frac{(1.96)2\ *.49(.51)}{0.05*0.05}}\textbf{=384}$$

Since total registered population is 3038, which is less than 10,000, correction formula was needed as follows

$$\boldsymbol{n = \frac{no}{1+no/N} = 340}$$

The final sample size had become **374,** after adding 10% non-respondent rate.

This sample size is also checked whether it is sufficient or not for parameters estimated. There were 47 estimated paths, 6 error terms of endogenous variables and 10 exogenous variables, and 1 covariance, 64 parameters in total. This is above the minimum requirement of five subject per parameter assumption for path analysis.

4.4.2. Sampling procedure

Systematic sampling technique was used to select samples. The expected number of patient flow to diabetes clinic in two days of the week Monday and Tuesday was 170 per week. The total expected data collection period was 1 month and 2 weeks, and the average number of patients expected to visit the clinic during this period were 1020. Dividing this expected number by total sample size gave sampling fraction K=1020/374 =2.7, thus every other patient was planned to be interviewed in order of arrival. However, since the weekly average number of patients who visited the clinic during this period were less than 170 due to COVID-19 pandemic the data collection period was extended for additional one month and two weeks to get the calculated sample size while keeping the sampling fraction as planned.

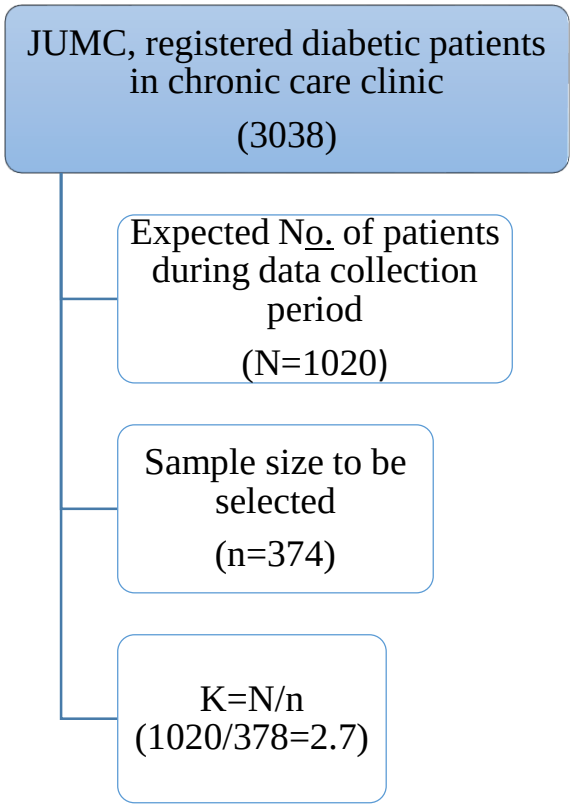

Figure 2 sampling procedure to assess dietary self-care practice and associated factor among diabetic patients in JUMC, 2020.

4.5. Data collection tool and procedure

Structured questionnaire was used to conduct face-to-face interview of study subjects. The questionnaire was prepared in English, translated into Amharic and Afan Oromo, and then translated back to English to check its consistency. The Amharic and Afan Oromo versions were used for data collection after pretesting was done on 10% (37 DM patients) of the sample size attending Jimma higher 2-healthcenter. The questionnaire was developed by adapting various relevant tools from previous studies. Two multilingual nurses with previous experience in a similar study did the data collection and one public health officer supervised the data collection. The principal investigator made supervision and continuous follow up throughout the data collection period.

Measurement

The tool contains questions assessing general self-care and dietary practice questions, socio-demographic characteristics, clinical characteristics and patient's knowledge as well as perception towards dietary practice.

Expanded Version of the Summary of Diabetes Self-Care Activities (SDSCA) adapted for Ethiopian context was used to assess self-care behaviors(65).The adaptation included changes in some foodstuffs, for instance food types with high fat content, and terminologies used in the original version to fit Ethiopian context. The SDSCA contains a set of items that measures frequency of various self-care activities in the last 7 days for each domain. The items are grouped into five domains including dietary practice, foot-care, physical exercise, SMBG and taking medication. It is presented in terms of mean days for each domain. The overall mean score was calculated by adding the score of each item then dividing by the sum of the number of items. Internal consistency was checked during pre-test and was found Cronbach alpha of 0.8, 0.75, 0.83, and 0.76 for the diet, exercise, self-monitoring of blood glucose (SMBG), and foot care respectively.

The modified Diabetes Knowledge Test (DKT) adapted for Ethiopian context was used to measure general diabetes knowledge including self-care(65). DKT is a 23-item multiple-choice questionnaire designed to assess knowledge about diabetes and self-care activities. It has originally 23 question, 14 for both type of DM patients and 9 for those who took insulin only. Omitting the

latter nine questions,14 questions were selected for this research. Pre-testing has yield Cronbach alpha of 0.74.

Dietary practice perception was measured by using questionnaire developed by the investigator after reviewing different questionnaires that have been used in previously published researches(9,62) and conducting interview with patients, health professionals, and public health experts to ensure its face validity. The questionnaire included 25 questions for all HBM constructs perceived susceptibility, severity, benefit, barrier and self-efficacy as well as cues to action. During pretesting internal consistency was checked and Cronbach alpha was 0.83, 0.73, 0.78, 0.85, 0.75, and 0.74 for the constructs perceived susceptibility, severity, benefit, barrier, self-efficacy and cues to action respectively. Perception questions was measured with 5-point Likert scale, 1-strongly disagree 2-disagree 3-neutral 4-agree and 5-strongly agree. Cues to action was measured using Yes/No response. The possible range of score was 4-20 for perceived susceptibility, 4-20 for severity, 3-15 for benefit, 4-20 for barrier and 5-25 for self-efficacy. Cues to action was measured by five yes or no questions. Regarding the interpretation of scoring, higher scores indicates a good level of perception except for barrier which indicate bad perception(62).

Social support was measured using Multidimensional Scale of Perceived Social Support (MSPSS) questionnaire developed in USA and validated in Uganda(66). Pre-testing has yielded Cronbach alpha of 0.76. It contains 12 items rated on a 5-point Likert type scale, 1-strongly disagree 2-disagree 3-neutral 4-agree and 5-strongly agree. After adding up individual item score with possible range from 12 to 60, it was treated as a continuous variable for analysis. Higher scores indicate a good level of social support.

The other variable diabetes distress was measured by Diabetes Distress Scale(DDS) that was validate in Malaysia(57). The scale has internal consistency with Cronbach alpha of 0.84 during pre-testing. The scale has 17 items, measuring distress in four domains; emotional burden, physician related distress, regiment related distress and interpersonal distress. The possible answer range from one to six (1= not a problem 2= slightly a problem 3= a moderate problem 4= somewhat a serious problem 5= serious problem 6= A very serious problem). Mean score was computed and treated as a continuous variable for analysis. higher scores indicate a high level of distress.

4.6. Study Variables

4.6.1. Dependent variable

Diabetic self-care and Dietary practice

4.6.2. Independent variable

Socio-demographic; -Age, sex, place of residence, marital status, educational status, occupation, average monthly income, family size, and availability of fruit and vegetable in a nearby market.

Clinical characteristic; -Type of diabetes, time since diagnosis of DM, types of treatment, comorbidity, family history of diabetes, attending diabetic education, membership in diabetes association, and access to self-monitoring of blood glucose(glucometer).

Psychosocial variables; - Diabetic knowledge, diabetes health belief i.e. Perceived susceptibility, severity of Diabetes complications, perceived benefits, Perceived barrier, cues to action, and self-efficacy. Family and social support as well as diabetes distress.

4.6.3. Association of variables

The two dependent outcome association is shown by checking their correlation coefficient and regressing general self-care practice on specific self-care domains to see how much of variability is explained by dietary-practice.

The second is association of independent variables to predict dietary self-care. There are two blocks, diabetic health belief block (perceived susceptibility, severity, benefit, barrier, self-efficacy, and cues to action) and modifying factor block (socio-demographic and socio-psychological variables). Diabetic health belief has direct effect on dietary practice, whereas modifying factors affect dietary practice through diabetic health belief constructs. In fact, some of modifying factors have additional direct path to dietary practice.

4.7. Operational definition

Good diabetic self-care: - good self-care practice recorded for patients scored a mean day of self-care practice ≥3 day(34).

Poor diabetic self-care: - poor self-care practice recorded for patients scored a mean day of self-care practice <3 day(34).

Good Dietary practice: - if the patient strictly follows dietary regimen ≥3 days per week(34).

Poor Dietary practice: - if he/she did not follow the regimen at all or follow for less than 3 days per week(34).

Knowledge: - Patients correct response for the 14 questions were summed up to provide a continuous variable. Higher scores indicate a good level of knowledge.

Perceived threat: -Cognitions about a danger or harm that exists in an environment. Perceived threat comprises two underlying dimensions: perceived severity and perceived susceptibility summed up to create threat perception. Higher scores indicate a high level of perception.

Perceived susceptibility: -An individual assessment of his or her chance of getting diabetes complication(62). The response was summed up and total score was treated as continuous variable. Higher scores indicate a high level of perception.

Perceived severity: -An individual ‘s belief about the seriousness or severity of diabetes and diabetes related complication(62). The response was summed up and total score was treated as continuous variable. Higher scores indicate a high level of perception.

Perceived benefits: –is a person’s opinion of the value or usefulness of dietary self-care behavior in decreasing the risk of developing diabetes complication(62).Total score was treated as continuous variable after the response for individual items were summed. Higher scores indicate a high level of benefit perception.

Perceived barriers: - patients perceived obstacle to perform dietary self-care(62). item responses were summed up and total score was treated as continuous variable. Higher scores indicate a high level of barrier perception.

Self-efficacy: –is the beliefs in one ‘s own ability to do dietary self-care(62). The response was summed up and total score was treated as continuous variable. Higher scores indicate a good level of self-efficacy.

Cues to actions: -an information that patient heard about self-care and able to perform diabetes self-care practice(62). Item scores were summed and total score was treated as continuous variable. Higher scores indicate a high level of cues.

Social support: - participants score for individual items were summed up and treated as a continuous variable. Higher scores indicate a good level of social support.

Diabetes distress; - patient's response for items were added and the composite variable is treated as a continuous variable. Higher scores indicate a high level of distress.

Smoker: Respondent who has smoked 100 cigarettes in his or her lifetime and who currently smokes cigarettes(67).

Non-smoker: Respondents who has never smoked, or who has smoked less than 100 cigarettes in his or her lifetime(67).

Ex-smoker: Respondent who has smoked 100 cigarettes in his or her lifetime and who currently are not smoking cigarettes(67).

Alcohol drinker: consumption of at least one standard alcohol using local conventional measures during the reporting periods otherwise not(68).

4.8. Data processing and Statistical analysis

Data entry was performed using Epi data version 3.1; then transported to IBM SPSS software and data cleaning, coding and recoding as well as checking for missing value was done. Before the final regression a measurement model, with exploratory factor analysis, was done for constructs measuring perception, knowledge, social support, and diabetes distress questions to ensure measured items represent their respective constructs and ensure all items share variances attributable for the latent variable. Initially the number of questions collected during the survey was 20 for perception constructs. Using eigenvalue of 1 for extraction and varimax rotation 5 components were extracted. Perceived susceptibility and severity questions loading four and two items respectively. Two items loaded on perceived benefit of dietary self-care, four items on perceived barrier and four items on perceived self-efficacy towards dietary self-care practice. Total variance explained using those items was 72.79%. similar procedures were followed for knowledge, social support and diabetes distress variables. Values for continuous quantitative data were presented using descriptive statistics; including mean, median, standard deviations, and inter quartile range (IQR). percentage with frequency tables was used for categorical data. Tables and graphs were used to present data as required. A path analysis model with maximum likelihood estimation was fitted using STATA version 14 statistical software package to test the hypothesized

structural relationships. Model fitness was evaluated using absolute measures like Chi-Square statistic, and Root Mean Square Error of Approximation (RMSEA). Indices such as Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and SRMR were also used to test model fitness.

4.9. Data quality control

Quality of data was assured through careful translation and back translation of questionnaire. A two-day training on instrument, about data collection and supervision was given for data collectors and supervisor by principal investigator. A week before the actual data collection pretesting of the tool was done on 37 individuals (10%) of sample size in Jimma higher 2-healthcenter. Ambiguity in questions and clarity was discussed with data collectors every day during the pre-testing. Reliability of knowledge, social support, diabetes distress, and perception questions were checked for internal consistency by calculating Cronbach alpha values as reported above. Data were checked for completeness in the hospital during actual data collection and on daily basis before entry.

4.10. Ethical considerations

The study was approved by the ethical Committee of Jimma University. Before the start of each interview, verbal consent was asked from each respondents after an information session detailing the study, voluntary participation, and withdrawal from the study. Confidentiality was maintained by not writing respondents name and using the data only for research purpose. Precautions for COVID-19 were in place, data collection was made keeping the recommended physical distance as well as masks and sanitizers were provided for data collectors.

4.11. Dissemination plan

The result of this study will be submitted after final thesis presentation for Jimma University, Institute of Health. In addition, report on the study findings will be submitted to director of JUMC. Efforts will be made to publish the study in an international journal as well as to present the findings in academic conferences.

CHAPTER 5. RESULTS

5.1. Participants characteristics

5.1.1. Socio-demographic characteristics

From the 374 individuals planned to be interviewed 354 individuals responded which yields about 94.6% response rate. Of those 354 patients, 52% were male. The mean ± SD age of respondent is 41.4±13.7years. About fifty-five percent of respondents are married currently. About 9.9% of respondents are rural residents; the family member of respondent ranges from minimum of 1 to maximum of 9 household members. Regarding educational status of respondents 49(13.8%) respondent can't read and write, while 193(54.5%) participants had secondary and above schooling. Around 23% of participants are unemployed while the rest were employed including self-employed. The median ± IQR of average family monthly income was 3600±2700 Ethiopian birr. 70.3% of individuals have fruit and vegetables available in their nearby market (see table 1).

Table 1:- Socio-demographic characteristics of diabetic patients in JUMC, 2020.

Variable category	Frequency	Percentage
Sex		
Male	184	52.0%
Female	170	48.0%
Age		
18-35	136	38.4%
36-50	126	35.6%
51-65	77	21.8%
>65	15	4.20%
Residence		
Rural	35	9.90%
Urban	319	90.1%
Marital status		

Currently single	158	44.6%
Currently married	196	55.4%
Educational status		
Primary& below schooling	161	45.5%
Secondary and above schooling	193	54.5%
Occupation		
Unemployed	81	22.9%
Government employee	73	20.6%
NGO employee	40	11.3%
Self-employee	160	45.2%
Monthly income(Eth Birr.)		
<=3500	175	49.4%
>3500	179	50.6%
Family size		
<4	101	28.5%
>=4	253	71.5%
Availability of fruit and vegetable		
Yes	249	70.3%
No	105	29.7%

5.1.2. Clinical characteristics

From the total participants in the study 75(21.2%) and 145(41%) participants had Type 1 and Type 2 DM patients respectively, while the rest didn't know to which type they correspond. mean± SD of disease duration since diagnosis is 4.59±2.70 year. Concerning medication history 103(29.1%) participants took injectable and 164(46.3%) were on oral hypoglycemic agent. About thirty-five percent of respondents were diagnosed for at least one diabetes complication such as Cardio

Vascular Disease (CVD), renal or nerve disorder. Only 33(9.3%) individuals are members of diabetes association. About 272(76.8%) respondents participate in diabetic education at least some times (see table 2).

Table 2:- clinical and relevant characteristics of diabetic patients in JUMC, 2020.

Variables	Frequency	Percentage
Type of DM		
Type 1	75	21.2%
Type 2	145	41.0%
Don't know	134	37.9%
Type of medication		
Injectable	103	29.1%
Oral	161	45.5%
Both	90	25.4%
Duration since diagnosis		
<=5 year	229	64.7%
>5 year	125	35.3%
Presence of diagnosed complication		
Yes	130	36.7%
No	224	63.3%
Follow diabetes education		
Never	82	23.2%
Yes, sometimes	238	67.2%
Yes, usually	34	9.6%
Member of diabetes association		

Yes	33	9.3%
No	321	90.7%
Family member with DM		
Yes	93	26.3%
No	261	73.7%
Presence of glucometer at home		
Yes	119	33.6%
No	235	66.4%
Alcohol drinking		
Drinker	103	29.1%
Non-drinker	251	70.9%
Smoking status		
Smoker	37	10.5%
Non-smoker	280	79.1%
Ex-smoker	37	10.5%
Khat chewing		
Yes	146	41.2%
No	208	58.8%

5.1.3. Psychosocial characteristics

Concerning knowledge about general Diabetes Mellitus as well as self-care practices, the mean ± SD is 7.26±3.13 with minimum and maximum score of 1 and 14respectively. Regarding diabetes distress scale (DDS) result, mean score ranges from 1.53 to 5.06 with overall mean ± SD score of 2.85±0.68. Though majority (57.6%) of respondents were considered to have mild diabetes distress of lower clinical significance, however a significant proportion (42.4%) of respondents scored 3 and above that contained them into level of distress worthy of clinical attention. Social support

also ranges from minimum score of 22 to maximum score of 59 with 151(42.7%)of participant scoring above the mean value of 43.95.

Health belief model constructs were measured and the five constructs developed as explained above in data processing and measurement model part of methodology. The mean ± SD score is 15.4 ± 3.57 and 8.46±1.45 for perceived susceptibility and severity constructs respectively. For analysis purpose susceptibility and severity constructs summed up to create new variable called perceived threat. With regard to self-efficacy respondents scored for question ranging from four a minimum score, to twenty which is a maximum score with mean ± SD value of 11.5±3.67 (see table 3).

Table 3:- Psychosocial characteristics of diabetic patients in JUMC, 2020.

Variables	**Possible range**	**Observed range**	**Mean**	**SD**
Knowledge	0-14	1-14	7.26	3.13
Diabetes distress***	1-6	1.53-5.06	2.85	0.68
Social support	12-60	22-59	43.95	7.59
HBM constructs				
Perceived threat###	6-30	9-30	23.96	4.22
Perceived susceptibility	4-20	5-20	15.43	3.57
Perceived severity	2-10	2-10	8.46	1.45
Perceived Dietary benefit	2-10	2-10	7.53	1.53
Perceived Dietary barrier	4-20	4-20	11.81	4.23
Self-efficacy	4-20	4-20	11.56	3.67
Cues to action	0-5	0-5	2.22	1.62

*** DDS is a mean score obtained by dividing sum of individual item score by 17.

Susceptibility and severity scores summed up to create new threat variable for analysis.

5.2. Level of self-care behavior

Regarding self-care behavior, the mean ± SD of overall self-care behavior is 3.16±0.98 day. Concerning individual self-care activities, the mean ± SD for dietary practice is 3.14±1.01. Medication intake is an activity that has quit higher mean day of practice followed by foot care practice, while self-monitoring of blood glucose is the least practiced self-care behavior.

Table 4:- general and domain diabetic self-care practice of diabetic patients in JUMC, 2020.

Self-care activities	**Possible Range**	**Observed Range**	**Mean**	**SD**
Overall self-care	0-7	1.17-5.67	3.16	0.98
Specific activities				
Dietary activities	0-7	1.2-5.6	3.14	1.01
Medication intake	0-7	1-7	6.08	1.31
Self-blood glucose monitoring	0-7	0-7	1.14	1.67
Physical exercise	0-7	0-7	3.10	1.57
Foot care	0-7	0-7	3.83	1.84

Based on the cut-off of 3 and above mean days of practice, proportion of participant having good general self-care practice is 48.0% (P=48.0%, 95%CI=42.7%-53.4%). Categories for each domain is also examined and practice with smallest proportion of good self-care is self-monitoring of blood glucose and largest proportion is observed for drug-intake accounting for 20.3% and 97.2% respectively. Dietary practice is good for 42.4% of respondents (P=42.4%, 95%CI=37.2%-47.7%).

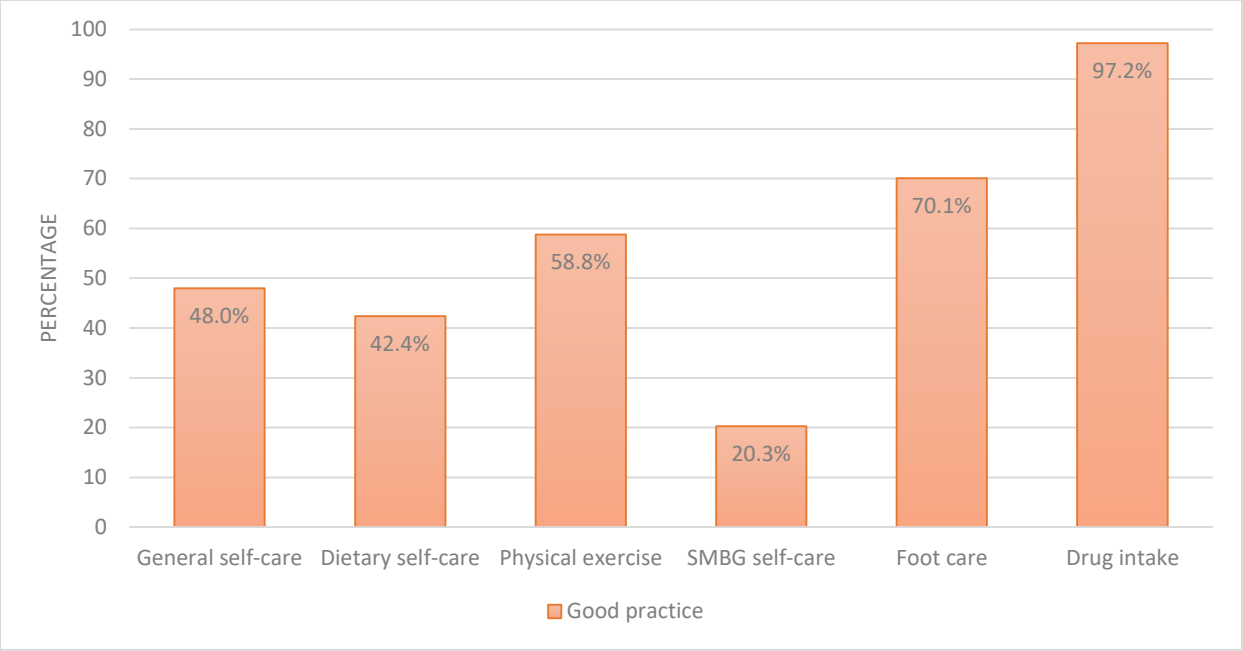

Figure 3:- Proportion of general and specific self-care practice, among diabetic patients in JUMC, 2020.

5.3 Predictors of dietary practice

5.3.1. Model fit information

Table 5:- A path model fit indices of dietary self-care practice, health belief model

Indices	Value
χ^2 statistics (degree of freedom)	42.528 (21)
$P > \chi^2$	0.004
χ^2/df	2.02
RMSEA (90% CI)	0.054 (0.030, 0.077)
$P \leq 0.05$	0.358
CFI	0.980
TLI	0.933
SRMR	0.022

CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation; TLI: Tucker Lewis Index; SRMR: Standardized Root Mean squared Residual.

Model fitness was tested using absolute as well as comparative fit tests. Though χ^2 value was significant, however its value is divided by degree of freedom which gave <5. In addition, RMSEA value is 0.054 and 90%CI upper bound is 0.077 which is less than one. CFI and TLI value is also above the recommended >0.9 value. SRMR is also bellow the recommended value of 0.08. modifications from original model was done by adding covariance term between self-efficacy and perceived benefit constructs, and adding some direct paths from modifying factors to dietary practice which were not initially planned.

5.3.2. Bivariate association of variables

Pairwise correlation association of variables was done to see association of variables with general self-care and dietary practice. Mean dietary self-care has weak correlation with socio-demographic variables except for educational status (r=0.34), and monthly income (r=0.31) that has moderate significant correlation. Age, place of residence, marital status and family size are found to have non-significant correlation with dietary practice. Regarding clinical characteristics while having family member with diabetes has no significant correlation; duration since diagnosis has showed weak significant correlation with r=0.27. From psycho-social variables perceived threat (r=0.47), perceived benefit (0.39), perceived barrier (r=-0.54), self-efficacy (r=0.60), and cues to action (r=0.53) have showed significant strong correlation. In addition, knowledge, social support and diabetes distress is correlated with dietary self-care with moderate and above strength. All HBM constructs have significant correlations to each other. (Annex 1 additional table)

5.3.3. Predictors of dietary practice

Age, sex, educational status, monthly income, availability of fruit and vegetable, duration since diagnosis, knowledge, social support, and diabetes distress, along with all HBM constructs are entered in to the path model to find independent predictors of dietary self-care practice according to previously specified path. Some variables that were not in original HBM, like duration since diagnosis and fruit availability, were added after examining their correlation with dietary self-care.

Patients perception of threat of diabetes significantly predicted dietary self-care practice (UTE±SE=0.02±0.01). Perceptions regarding barrier to dietary self-care (UTE±SE=-0.08±0.01) is found to predict dietary self-care practice significantly. Self-efficacy is the strongest construct among diabetic belief that has highest standardized direct effect and the second construct with standardized total effect after cues to action (UTE±SE=0.10±0.01). cues to action has both direct

and indirect significant on dietary self-care practice (UTE±SE=0.17±0.05) however it is indirectly through perceived barrier construct of HBM that the effect is signifcant and not direct effect.

Other variables which significantly predict dietary self-care are knowledge (UTE±SE= 0.22±0.03), social support (UTE±SE= 0.02±0.01), diabetes distress (UTE±SE= -0.03±0.004), and duration since diagnosis (UTE±SE= 0.05±0.01). male sex as well as secondary and above schooling level are also significantly associated variable with higher dietary self-care practice with UTE±SE of 0.10±0.04 and 0.27±0.06 respectively. Age and average monthly income are also variables with significant total effect on dietary self-care (see table 6).

Table 6:- Total, direct and indirect effects of dietary self-care practice, JUMC 2020.

Variables	**Unstandardized effects / Path coefficient(SE)**		
	Direct Effect(SE)	**Indirect Effect(SE)**	**Total Effect(SE)**
HBM constructs			
Perceived threat	**0.02(0.01)****	**NP**	**0.02(0.01)****
Perceived benefit	0.04(0.03)	NP	0.04(0.03)
Perceived barrier	**-0.08(0.01)****	NP	**-0.08(0.01)****
Self-efficacy	**0.10(0.01)****	NP	**0.10(0.01)****
Cues to action	0.07(0.05)	**0.10(0.02)****	**0.17(0.05)****
Modifying factors			
Knowledge	**0.08(0.03)***	**0.09(0.02)****	**0.22(0.03)****
Social support	NP	**0.02(0.005)****	**0.02(0.01)****
Diabetes distress	NP	**-0.03(0.004)****	**-0.03(0.004)****
Duration since diagnosis	NP	**0.05(0.01)****	**0.05(0.01)****
Income	NP	**0.20(0.05)****	**0.20(0.05)****
Age	NP	**0.007(0.002)****	**0.007(0.002)****

Sex	NP	**0.10(0.04)***	**0.10(0.04)***
Educational status	NP	**0.27(0.06)****	**0.27(0.06)****
Fruit and vegetable availability	NP	0.06(0.04)	0.06(0.04)
Covariance		**Coef.(95%CI)**	**P-value**
e. perceived benefit, e. self-efficacy		**1.15(0.77-1.53)**	**<0.001**

NP: - No Path**.** * Association is significant at the 0.01 level (2-tailed). ** Association is significant at the 0.01 level (2-tailed).

Effect decomposition of important variables

Further analysis was performed by effect decomposition of modifying factors indirect effect. While the direct effect is insignificant cues to action has shown significant indirect effect on dietary self-care practice through perceived barrier (UDE±SE=-1.14±0.26). In addition to its significant direct effect indirect effect of knowledge is significant through perceived threat (UDE±SE=1.09±0.14), perceived barrier (UDE±SE=-0.63±0.17), and self-efficacy (UDE±SE=0.35±0.12); however, path through diabetes distress is non-significant. Social support affects dietary practice via perceived threat (UDE±SE=0.23±0.03), self-efficacy perception (UDE±SE=0.13±0.003), and diabetes distress (UDE±SE=-0.33±0.05). Perceived threat (UDE±SE=-0.08±0.03), perceived barrier (UDE±SE=0.21±0.04) and self-efficacy (UDE±SE=-0.10±0.02) are paths through which distress affect dietary self-care.

Indirect effect of age is significant through self-efficacy (UDE±SE=0.05±0.01); where as its effect through perceived threat, perceived benefit and barriers are non-significant. Being male increase dietary self-care behavior through self-efficacy (UDE±SE=0.56±0.28); whereas average monthly income of >3500 birr showed statistically significant indirect effect via increasing self-efficacy(UDE±SE=1.47±0.31). Secondary and above schooling is also found to affect dietary practice through increasing one's self-efficacy perception (UDE±SE=1.70±0.36), and reducing diabetes distress (UDE±SE=-2.28±0.58). Duration since diagnosis appears to affect dietary self-care indirectly via reducing perceived barrier (UDE±SE=-0.20±0.08) while increasing perceived threat (UDE±SE=0.15±0.07), and self-efficacy (UDE±SE=0.27±0.06). (table 7 for detail)

Table 7:- Decomposition of modifying factors indirect effects on dietary practice, JUMC 2020.

Variables	**Effect/ Path coefficient**		
	Standardized	**Unstandardized(SE)**	**P-value**
Cues to action affects via			
Perceived threat	0.04	0.21(0.22)	0.352
Perceived barrier	**-0.21**	**-1.14(0.26)**	**<0.001**
Knowledge affects via			
Perceived threat	**0.33**	**1.09(0.14)**	**<0.001**
Perceived benefit	0.19	0.21(0.06)	<0.001
Perceived barrier	**-0.19**	**-0.63(0.17)**	**<0.001**
Self-efficacy	**0.13**	**0.35(0.12)**	**0.003**
Diabetes distress	-0.06	-0.29(0.22)	0.197
Social support affects via			
Perceived threat	**0.33**	**0.23(0.03)**	**<0.001**
Perceived benefit	0.33	0.08(0.01)	<0.001
Perceived barrier	0.10	0.07(0.04)	0.074
Self-efficacy	**0.21**	**0.13(0.03)**	**<0.001**
Diabetes distress	**-0.35**	**-0.33(0.05)**	**<0.001**
Diabetes distress			
Perceived threat	**-0.11**	**-0.08(0.03)**	**0.016**
Perceived benefit	-0.15	-0.04(0.01)	0.004
Perceived barrier	**0.29**	**0.21(0.04)**	**<0.001**
Self-efficacy	**-0.17**	**-0.10(0.02)**	**<0.001**

Age			
Perceived threat	0.08	0.02(0.01)	0.095
Perceived benefit	0.06	0.01(0.005)	0.243
Perceived barrier	-0.04	-0.01(0.01)	0.431
Self-efficacy	**0.18**	**0.05(0.01)**	**<0.001**
Sex			
Perceived barrier	-0.06	-0.52(0.41)	0.199
Self-efficacy	**0.08**	**0.56(0.28)**	**0.044**
Educational status			
Perceived threat	0.05	0.43(0.43)	0.319
Perceived benefit	-0.04	-0.12(0.17)	0.476
Perceived barrier	-0.03	-0.25(0.50)	0.613
Self-efficacy	**0.23**	**1.70(0.36)**	**<0.001**
Diabetes distress	**-0.20**	**-2.28(0.58)**	**<0.001**
Income			
Perceived threat	0.03	0.25(0.37)	0.506
Perceived benefit	-0.02	-0.06(0.15)	0.670
Perceived barrier	-0.07	-0.56(0.43)	0.197
Self-efficacy	**0.20**	**1.47(0.31)**	**<0.001**
Duration since diagnosis			
Perceived threat	**0.09**	**0.15(0.07)**	**0.032**
Perceived barrier	**-0.13**	**-0.20(0.08)**	**0.013**
Self-efficacy	**0.19**	**0.27(0.06)**	**<0.001**

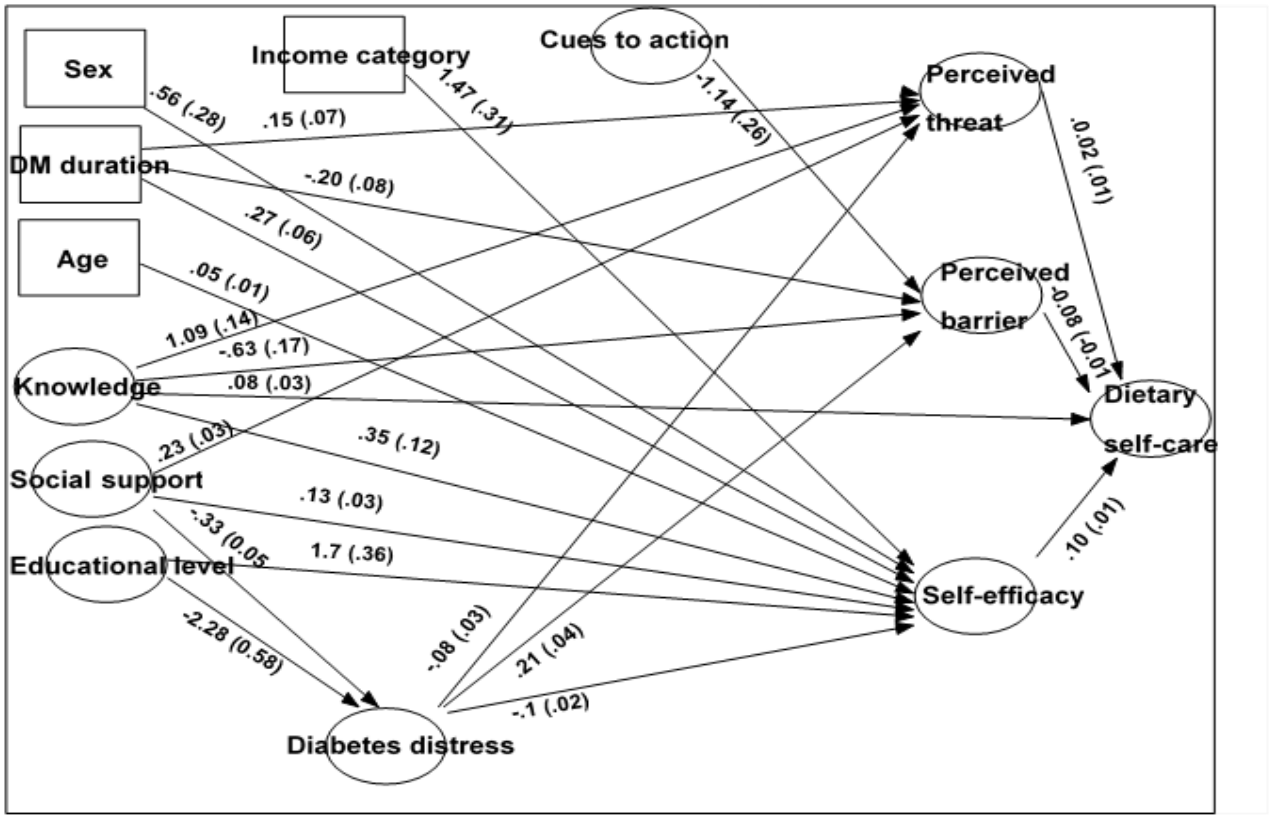

Figure 4:- unstandardized path coefficient(Standard error) of significant paths predicting dietary self-care practice among DM patients in JUMC, 2020.

5.4. Association of dietary practice and general diabetes self-care

As shown in the descriptive statistics above dietary self-care is the 3rd least performed self-care domain. Correlation analysis has also showed significantly very strong association between dietary self-care practice and general self-care behavior ($r=0.827$, $p<0.01$). Patient's general self-care is also regressed on domain specific self-care practice to examine the relative contribution of dietary self-care practice to general self-care. Regression coefficient of 0.42 with the highest standardized coefficient was obtained for dietary self-care. Dietary self-care practice alone has explained 68.4% of variability in general self-care behavior.

CHAPTER 6. DISCUSSION

In this study, mean (SD) of general self-care was 3.16(0.98) and that of dietary self-care was 3.14(1.01) resulting good self-care proportion of 48% and 42.4% for general self-care and dietary practice respectively. Very strong significant correlation was also detected between them. While this finding on good general self-care practice is closer to findings from west shoa(69), Arbaminch(40), and Benishangul(41), however higher than this proportion has been recorded in Dilla(42), Harar and Dire(37), and Debretabor studies(34). This study has also reported proportion of good dietary practice lower than results found from Nepal study(55), and a study done in Tribhuwan University(43), while closer result was recorded in Bangladesh(44). This could be due to the fact that in these countries socio-economical and health care facilities are somehow more improved than Jimma. It is also lower than findings from Nigeria(49) and Botswana(48) in which 2/3rd of patients adhered to dietary self-care. While two studies done Addis Ababa(52) and study from Arbaminch(54) revealed higher result of good dietary practice than here, however current study result is higher than studies in Debre-tabor(50) and Felegehiwot hospitals(51). This difference might be attributed to the method of dietary practice assessment tool since most of them used Moriski adherence tool, PDAQ, and others where as SDSCA was used in this study.

Individuals with high threat perceptions have more practice days than those with lower perception. This is similar with the study in Harar which showed patients with high severity perceptions more likely practice self-care than those with lower perception(62). This is also in accordance with the basic assumptions of health belief model that individual's likelihood of engaging in healthy behavior is higher as their perceived susceptibility and severity gets higher. This is because healthy behaviors are practiced to prevent complications and this complication should be perceived or one need to think that he or she is at risk of harboring illness conditions before acting to prevent them.

Participant who had higher unit barrier perception are found to have less days of dietary practice than participants with lower perceived barrier to dietary self-care. Similar result was found from a study in Yekatit hospital(53) that patients who think about cost of good dietary practice are twice more likely engage in poor dietary practice. Studies in Harari(70) and Tigray(32) have also showed that patients with high barriers have less odds of practicing good self-care in general than patients with low barrier perceptions. As Rosenstock and others have said this might be due to the reason that a kind of cost-benefit analysis is thought to occur wherein the patients prefer action's

effectiveness over feelings that it may be expensive, unpleasant (e.g., painful, difficult, upsetting), inconvenient, time-consuming, and the like(71).

Regarding self-efficacy perception, it is found not only significantly effecting dietary perception but also it is the strongest predictor among constructs predicting dietary practice. This is in line with result found in Malaysia study(57) as well as Ardakan city, Iran that Self-efficacy was the strongest predictor of self-care behavior (30). This is also in accordance with core assumptions of HBM that individuals should believe that they are self-efficacious in successfully executing the behavior required to produce the outcomes(71).

In this study as patients receive more cues to action, they tend to have more mean days of dietary practice. This finding is in line with Nepal(3) study as well as core assumptions of HBM that is as individuals have more cues to action they are less likely to forget advices, since readiness to take action could only be potentiated by cues to inaugurate it(71).

In this study, higher knowledge was found to increase dietary practice significantly. others like west Shoa(39), Benishangul(41) and Nekemt studies(61) also reported an association of dietary knowledge and dietary practice. The reason might be that patients having more knowledge regarding diabetes had less barrier and more self-efficacy perception that could lead them to higher practice score.

Those with higher diabetes distress were found to practice lesser days than those with lower distress score. this finding is in line with result from study in Boston(58) and other systematic review study(59) which reported negative association of diabetes distress and dietary practice. This might be due to the reason that diabetes distress reduce self-confidence while increasing barrier perception to perform recommended dietary practice. Additionally, depressed mood could inhibit adherence by decreasing the desire to seek treatment, thus making mediator of the link between depression and poor diabetes outcomes.

Social support is another significantly associated factor, which increases dietary self-care, as it gets higher and higher. This finding is similar with study in Nepal(3), Iran(30), and Felegehiwot(51) hospitals which found dietary practice is associated with social support. As shown in the path, this might be due to the reason that since social support helps in coping self-care fatigue, as social support increases diabetes distress decreases, whereas self-efficacy increase thereby improving patients dietary practice indirectly.

Increased age as well as duration since diagnosis were also related with good dietary practice in this study. This finding is in contrast with Nepal study(55). This could be because of experiencing symptoms of both acute as well as chronic complication in both factors and exposure for repeated counseling and health educations in longer duration might act as cues to act healthily.

In this study, females are found to have low dietary practice by decreasing self-efficacy. This is similar with Nepal study(55). This might be due to the reason that in developing countries females have less access to education and income generating activities, which both have important relation with once self-confidence of engaging in good dietary activities.

Attaining secondary and above schooling also increased dietary practice of patients in this study. This finding is similar with studies in Ethiopia(50,52,56) and other African countries(48,49) that found higher educational level is associated with good dietary practice. As shown in the path, this might be due to the reason that educated ones are capable of being informed and self-efficacious in interpreting as well as performing recommendations.

Those with >3500 Birr monthly income is associated with good dietary practice than those with lower monthly income. This is consistent with Debre-tabor and in contrast from Tikur Anbessa study that found high monthly income is associated with good dietary practice(50,56). The reason might be having high income makes patients more concerned to their health status as well as increase self-confidence to perform this behavior to reduce their likelihood of complication.

The above results and discussion all culminates to and implies that dietary practice is a very important however, very under practiced self-care domain in which its improvement makes general self-care practice good. In addition, health belief model especially self-efficacy and cues to action constructs can best explain dietary practice variation there by used to design appropriate health promotion intervention for improved dietary practice.

Limitation

First the study is cross sectional and it is institution based. As institution based studies don't give full picture and cross sectional studies temporality issue is a concern cautions should be taken when interpreting and using results of this study. Second practice level was measured using self-report, that desirability may arise and trustworthiness could not be ensured.

CHAPTER 7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

In JUSH only 42.4% and 48% of patients have good dietary and general self-care practice respectively. Self-efficacy being the strongest, cues to action, perceived threat, and perceived barrier constructs of health belief model are found to predict dietary self-care. Knowledge, social support, diabetes distress and other socio-demographic characteristics modify patients' perception thereby exerting significant influence on their dietary self-care practice. Therefore, individualized, perception based counseling, and patient centered problem solving care is needed to address these vast socio-psychological factors in order to improve dietary as well as general self-care practice.

7.2. Recommendations

Based on the above findings the following recommendations are forwarded

For health care professionals working in DM clinic

- Medical advices should include not only what knowledge but also how to knowledge on dietary practice to overcome barrier perceptions and increase self-efficacy.
- Dietary advices should consider intake of local foods that are easily available and affordable for consumption.
- Meal planning is important barrier faced by most of respondents; therefore, counselor should give clear directions and easy methods convenient for patients on meal planning.
- Diabetes distress is an undermined factor affecting dietary practice, therefore physicians and nurses should give due attention to their patients distress status during counseling and communicate to identify and solve barrier and self-confidence problems of those patients with distress of clinical attention.
- Females as well as those in lower educational level should be given a due attention in relieving their self-efficacy problems and counseling should take these characteristics in to consideration.
- Care should be comprehensive and inclusive of families and friends so as to strengthen social support to improve patient's adherence through improving self-efficacy and relieving distress.

For JUMC

- Cues have significant role on modifying perceptions and self-care practices the hospital should use leaflets and other Health Learning Materials (HLM) which can easily remember patients about self-care practices.
- Messages need to be delivered though mini-medias and Programs in the hospital compound targeting diabetes threat, ways to overcome possible barriers, and increase patient's confidence.
- Dietary recommendations need experts in its science and counseling is broad concept with science and art; therefore, the hospital should seek the way of recruiting professionals in these respective fields.

For MOH, DM association and other high level decision makers

- Since DM is chronic disease with long term care and management, messages should be designed and developed to increase patient's confidence to perform behavior.
- It is necessary to prepare diabetic nutrition guidelines at a national level.
- Further research on messages and their response should be conducted to design appropriate and comprehensive counseling guide and prepare effective message.

Reference

1. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2008;31(SUPPL. 1):62–7.
2. Standards of Medical Care in Diabetes—2016 Abridged for Primary Care Providers. Clin Diabetes. 2016;34(1):3–21.
3. Ghimire S. Barriers to Diet and Exercise among Nepalese Type 2 Diabetic Patients. 2016;1–9.
4. Loganathan A, KR J. Economic burden of diabetes in people living with the disease ; a field study. J Diabetol. 2013;3(October 2013):4.
5. Peyrot M., Rubin R., Lauritzen T., Snoek F., Mathews D., Skovlund S. Psychosocial problems and barriers to improved diabetes management: Results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study. Diabet Med. 2005;22(10):1379–85.
6. Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Haak T. The Diabetes Self-Management Questionnaire (DSMQ): Development and evaluation of an instrument to assess diabetes self-care activities associated with glycaemic control. Health Qual Life Outcomes. 2013;11(1):1.
7. Alison E, Michelle D, Christopher G, Timothy G, Janice M, etal. NutritionTherapyforAdultsWith Diabetes or Prediabetes: A Consensus Report. 2019;22(29):1–24.
8. Sylvia H. Ley, PhD, RDa, Osama Hamdy, MD, PhDb, V. Mohan, MD P, Hu and FB, MD, PhDa D. Nutrition Recommendations and Interventions for Diabetes A position statement of the American Diabetes Association AMERICAN. Lancet. 2016;383(9933):61–78.
9. Given C, Given B, Gallin R, Condon J. Development of Scales to Measure Beliefs of Diabetic Patients. 1983;127–41.
10. WHO. Global Report on Diabetes. 2016;978:5–10.
11. International Diabetes Federation. IDF Diabetes Atlas 9th edition. 2019. 1–25 p.
12. International Diabetes Federation. Diabetes in Africa [Internet]. 2019 [cited 2020 Jan 5].

Available from: https://www.idf.org/our-network/regions-members/africa/diabetes-in-africa

13. Nigatu Haregu T, Kiflie Alemayehu Y. Diabetes Management in Southwest Ethiopia: A Cross-Sectional Study. Public Heal Res. 2010;2(5):162–6.

14. Ethiopian Diabetes Association. Diabetes in Ethiopia [Internet]. [cited 2020 Jan 5]. Available from: https://www.diabetesethiopia.org.et/about_eda.html#intro

15. International Diabetic Federation. Complication of diabetes [Internet]. [cited 2020 Jan 5]. Available from: https://www.idf.org/aboutdiabetes/complications.html

16. Mensing C, Boucher J, Kathryn W, Cypress M, Kopher W, etal. National standards for diabetes self-management education. Diabetes Care. 2012;35(SUPPL. 28):72–9.

17. Rury R. Holman;, Angelyn B, David M, Andrew N. 10-Year Follow-up of Intensive Glucose Control in Type 2 Diabetes. N Engl J Med. 2008;1577–89.

18. Diabetes Control and Complication Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. 1993;329:977–86.

19. Ekor R, Ikeoluwapo A, Ekore J. Dietary management of diabetes: a practical approach for primary care physicians in Nigeria. Mera Diabetes Int. 2008;475–80.

20. Bekele H, Asefa A, Getachew B, Belete AM. Barriers and Strategies to Lifestyle and Dietary Pattern Interventions for Prevention and Management of TYPE-2 Diabetes in Africa , Systematic Review. 2020;2020.

21. Muchiri JW, Gericke GJ, Rheeder P. Needs and preferences for nutrition education of type 2 diabetic adults in a resource-limited setting in South Africa. Heal SA Gesondheid. 2009;17(1):1–13.

22. Federal Democratic Republic of Ethiopia Ministry of health. national strategic action plan (nsap) for prevention & control of non-communicable diseases in Ethiopia. 2016. 10–15 p.

23. Martinez K, Lockhart S, Davies M, Lindsay JR, Dempster M. Diabetes distress, illness perceptions and glycaemic control in adults with type 2 diabetes. Psychol Heal Med [Internet]. 2018;23(2):171–7. Available from:

https://doi.org/10.1080/13548506.2017.1339892

24. Mc Sharry J, Moss-Morris R, Kendrick T. Illness perceptions and glycaemic control in diabetes: A systematic review with meta-analysis. Diabet Med. 2011;28(11):1300–10.

25. Saadia Z., Rushdie, Alsheha M SH. Study of knowledge, Attitude and Practices of Saudi Women towards Diabetes Mellitus a (KAP) study in Al- Qassim Region. Intern J Heal. 2010;

26. International Diabetes Federation. IDF Diabetes Atlas, 6th edition. 2013. 1–10 p.

27. Bloom DE., Cafiero ET., Eva J, Shafika A, Sana F, etal. The Global Economic Burden of Noncommunicable Diseases. Geneva: World Economic Forum. 2011;

28. Nyunt SW, Howteerakul N, Suwannapong N. self-efficacy , self-care behaviors and glycemic control among type-2 diabetes patients attending two private clinics in. 2010;41(4):943–51.

29. Zahra Yekta, Reza Pourali, Mohammad Reza Aghassi, Nastaran Ashragh, Leila Ravanyar MYRP. Assessment of Self-Care Practice and Its Associated Factors among Diabetic Patients in Urban Area of Urmia, Northwest of Iran. J Res Health Sci. 2010;

30. Abbasali D tafti, Mahmoodabad M, Morowatisharifabad MA, etal. Determinants of Self-Care in Diabetic Patients Based on Health Belief Model. 2015;7(5):33–42.

31. Tharek Z, Ramli AS, Whitford DL, Ismail Z, etal. Relationship between self-efficacy , self-care behaviour and glycaemic control among patients with type 2 diabetes mellitus in the Malaysian primary care setting. 2015;1–10.

32. Mariye T, Tasew H, Teklay G, Gerensea H, Daba W. Magnitude of diabetes self - care practice and associated factors among type two adult diabetic patients following at public Hospitals in central zone , Tigray Region , Ethiopia , 2017. BMC Res Notes [Internet]. 2018;1–6. Available from: https://doi.org/10.1186/s13104-018-3489-0

33. Niguse H, Belay G, Fisseha G, Desale T, Gebremedhn G. Self-care related knowledge, attitude, practice and associated factors among patients with diabetes in Ayder Comprehensive Specialized Hospital, North Ethiopia. BMC Res Notes. 2019;12(1):1–7.

34. Abate TW, Tareke M, Tirfie M. Self - care practices and associated factors among diabetes

patients attending the outpatient department in Bahir Dar , Northwest Ethiopia. BMC Res Notes [Internet]. 2017;4–8. Available from: https://doi.org/10.1186/s13104-018-3874-8

35. Feleke SA, Alemayehu CM, Adane HT. Assessment of the level and associated factors with knowledge and practice of Diabetes Mellitus among Diabetic Patients attending at FelegeHiwot Hospital , Northwest Ethiopia. 2012;2(6):110–20.

36. Tiruneh S, Ayele A, Emiru Y, Tegegn H, Ayele B, Engidaw M GA. Factors influencing diabetes self-care practice among type 2 diabetes patients attending diabetic care follow up at an Ethiopian General Hospital, 2018. J diabetes Med Disord. 2018;

37. Ayele BH, Mengesha MM. Predictors of self-care activities of outpatient diabetic residents in Harar and Dire Dawa : A hospital-based cross-sectional study. 2017;1–10.

38. Kassahun T, Gesesew H, Mwanri L, Eshetie T. Diabetes related knowledge , self-care behaviours and adherence to medications among diabetic patients in Southwest Ethiopia : a cross-sectional survey. BMC Endocr Disord [Internet]. 2014;1–11. Available from: http://dx.doi.org/10.1186/s12902-016-0114-x

39. Gurmu Y, Gela D. Factors associated with self-care practice among adult diabetes patients in West Shoa Zone , Oromia Regional State , Ethiopia. 2017;1–8.

40. Mende SM, Tesfahun C, Lamessa D. Levels and Predictors of Adherence to Self-care Behaviour among Adult Type 2 Diabetics at Arba Minch General Hospital, Southern Ethiopia. 2015;1–11.

41. Chali SW, Salih MH, Abate AT. Self - care practice and associated factors among Diabetes Mellitus patients on follow up in Benishangul Gumuz Regional State Public Hospitals , Western Ethiopia : a cross - sectional study. BMC Res Notes [Internet]. 2018;1–8. Available from: https://doi.org/10.1186/s13104-018-3939-8

42. Addisu Y, Akine Eshete and EH. Assessment of Diabetic Patient Perception on Diabetic Disease and Self-Care Practice in Dilla University Referral Hospital, South Ethiopia. J Metab Syndr. 2013;03(04):1–8.

43. Pandey A. Non-adherence to Lifestyle (Diet and Exercise) Modification Recommendations among the Type 2 Diabetes Mellitus Patients in a Tertiary Level Hospital. 2014;39–45.

44. Saleh F, Mumu SJ, Ara F, Hafez A, Ali L. Non-adherence to self-care practices & medication and health related quality of life among patients with type 2 diabetes : a cross-sectional study. 2014;1–8.

45. Alhariri A, Daud F, Almaiman A, Ayesh S, Saghir M. Factors associated with adherence to diet and exercise among type 2 diabetes patients in Hodeidah city , Yemen. 2016;7:264–71.

46. Elizabeth B., Liesje D., Julia C. Stroh D. Illness and Treatment Perceptions Are Associated With Adherence to Medications, Diet, and Exercise in Diabetic Patients. 2011;34:338–40.

47. Dinesh PV, Kulkarni AG, Gangadhar NK. Knowledge and self - care practices regarding diabetes among patients with Type 2 diabetes in Rural Sullia , Karnataka : A community - based , cross - sectional study. 2015;847–52.

48. Ganiyu AB, Mabuza LH, Govender I, Ogunbanjo GA. Non-adherence to diet and exercise recommendations amongst patients with type 2 diabetes mellitus attending Extension II Clinic in Botswana. 2008;1–6.

49. Emmanuel OO, Otovwe A. Patterns of adherence to management among patients with type 2 diabetes mellitus in South-South Region of Nigeria. 2015;3(2):115–9.

50. Ayele AA, Emiru YK, Tiruneh SA, Ayele BA, Gebremariam AD, Tegegn HG. Level of adherence to dietary recommendations and barriers among type 2 diabetic patients : a cross-sectional study in an Ethiopian hospital. 2017;7:1–7.

51. Yeshalem Mulugeta Demilew, Abiot Tefera Alem and AAE. Dietary practice and associated factors among type 2 diabetic patients in Felege Hiwot. BMC Res Notes. 2018;1–7. Available from: https://doi.org/10.1186/s13104-018-3531-2

52. Mohammed Akibu Mohammed NTSD. Adherence to dietary recommendation and associated factors among diabetic patients in Ethiopian teaching hospitals. 2017;1–11.

53. Worku A, Abebe SM, Wassie MM. Dietary practice and associated factors among type 2 diabetic patients : a cross sectional hospital based study , Addis Ababa , Ethiopia. 2014;1–8.

54. Mende SM. Levels and Predictors of Adherence to Self-care Behaviour among Adult Type 2 Diabetics at Arba Minch General Hospital , Southern Ethiopia. 2016;7(6).

55. Parajuli J, Saleh F, Thapa N, Ali L. Factors associated with nonadherence to diet and physical activity among nepalese type 2 diabetes patients ; a cross sectional study. 2014;

56. Kalayou KB, Asrat Demissie, Alemayoh Kahsay. diabetes self care practices and associated factors among type 2 diabetic patients in tikur anbessa specialized hospital, addis ababa, ethiopia- a cross sectional study. 2012;3(11):4219–29.

57. Devarajooh C, Chinna K. Depression , distress and self-efficacy : The impact on diabetes self-care practices. 2017;1–16.

58. Jeffrey S. Depression, Self-Care, and Medication Adherence in Type 2 Diabetes Relationships across the full range of symptom severity. 2007;30(9).

59. Brown SA. Depression and Adherence to Lifestyle Changes in Type 2 Diabetes. 2014;731–44.

60. Hayek AA Al, Robert AA, Dawish MA Al, Zamzami MM, Sam AE, Alzaid AA. Impact of an education program on patient anxiety , depression , glycemic control , and adherence to self - care and medication in Type 2 diabetes. 2012;20(2):77–82.

61. Tadele A., Tefera B., Endalew Hailu NB. self care practice and its predictors among adults with diabetes mellitus on follow up at nekemte hospital. 2013;2(3):1–16.

62. predictors of adult self care behaviors among diabetes patients in harari, eastern ethiopia: the health belief model perspective. 2011;

63. Karimy M, Araban M, Zareban I, Taher M. Determinants of adherence to self-care behavior among women with type 2 diabetes : an explanation based on health belief model. 2013;1–8.

64. Jimma University official website [Internet]. [cited 2020 Jan 28]. Available from: https://www.ju.edu.et/?q=article/specialized-hosptial&page=5

65. Fitzgerald J, Funnell M, Hess G, Barr P, etal. The Reliability and Validity of a Brief Diabetes Knowledge Test. 1998;21(5):706–10.

66. Nakigudde J, Musisi S, Ehnvall A, Airaksinen E, Agren H, Nakigudde J. Adaptation of the multidimensional scale of perceived social support in a Ugandan setting. Afr Health Sci. 2009;9:35–41.

67. CDC. National health interview survey [Internet]. [cited 2019 Jan 5]. Available from: https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm

68. Ethiopian Public Health Institute. ETHIOPIA STEPS REPORT ON RISK FACTORS FOR NON-COMMUNICABLE DISEAES AND PREVALENCE OF SELECTED NCDs. 2016;68(1):25–31.

69. Gurmu Y, Gela D. Factors associated with self-care practice among adult diabetes patients in West Shoa Zone , Oromia Regional State , Ethiopia. 2018;4–11.

70. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E. Self care behavior among patients with diabetes in harari, eastern ethiopia: The health belief model perspective. PLoS One. 2012;7(4).

71. Karen G, Barbara KR, Viswanath K. health behavior and health education theory, research, and practice. 4th ed.

Annex 1. Table showing correlation of variables

variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1.Dietary self-care	1																						
2.General self-care	.827**	1																					
3.Age	0.016	-0.059	1																				
4.Sex	.119*	.190**	-0.026	1																			
5.residence	0.07	-0.033	-.209**	-0.011	1																		
6.Educational_level	.339**	.365**	-.473**	.107*	.167**	1																	
7.income_catagory	.305**	.300**	-.237**	.160**	0.023	.343**	1																
8.Family_size	0.074	.117*	.144**	0.1	-.622**	-0.09	0.039	1															
9.Fruit_access	.172**	.194**	0.079	.187**	-.143**	-0.025	0.026	.128*	1														
10.Diabetes Duration	.271**	.245**	.284**	.126*	-0.061	-0.009	0.029	.196**	.142**	1													
11.Complication	.160**	.149**	.339**	0.038	-0.047	-.137*	-0.092	.121*	-0.034	.197**	1												
12.DM_association	.182**	.117*	.189**	0.07	0.101	0.072	-0.004	-0.011	0.035	.165**	0.088	1											
13.Family histo	0.006	-0.026	-0.053	-0.05	0.098	0.073	0.026	-.190**	-.223**	0.008	-.193**	-0.098	1										
14.Threat	.469**	.498**	-0.03	.117*	-0.024	.271**	.194**	.113*	0.074	.226**	.198**	0.008	0.073	1									
15.Susceptability	.491**	.508**	-0.026	.110*	-0.026	.246**	.187**	.118*	0.094	.251**	.186**	0.031	.136*	.950**	1								
16.Severity	.176**	.223**	-0.025	0.073	-0.008	.196**	.112*	0.043	-0.014	0.049	.130*	-0.055	-.120*	.621**	.345**	1							
17.Benefit	.387**	.394**	-0.002	.106*	0.004	.135*	0.097	0.063	0.087	0.099	.112*	0.003	-0.008	.410**	.420**	.181**	1						
18.Barrier	-.537**	-.501**	0.011	-.127*	-0.092	-.182**	-.147**	0.063	-.116*	-.176**	-.126*	-.120*	-.161**	-.198**	-.257**	0.05	-.171**	1					
19.Self-efficacy	.597**	.583**	0.012	.209**	-0.014	.384**	.365**	.186**	.156**	.318**	.174**	.133*	-0.02	.488**	.509**	.188**	.479**	-.297**	1				
20.Cues to action	.163**	.115*	-0.082	-0.044	0.089	.118*	0.07	-.144**	-.156**	-0.027	-.130*	-0.089	.817**	0.074	.133*	-.111*	0.04	-.221**	0.028	1			
21.Knowledge	.425**	.401**	-.137*	0.086	.149**	.299**	.136*	-0.066	0.096	.157**	0.072	0.049	0.064	.504**	.505**	.247**	.316**	-.293**	.350**	0.082	1		
22.Social support	.420**	.492**	-.132*	0.062	0.004	.327**	.284**	.134*	0.099	.161**	0.086	-.126*	-0.004	.527**	.483**	.372**	.434**	-.152**	.477**	0.016	.342**	1	
23.Diabetes distress	-.405**	-.421**	.124*	-0.069	-0.012	-.330**	-.179**	-0.001	-0.094	-0.023	-0.086	0.002	-0.022	-.356**	-.385**	-0.105	-.320**	.332**	-.392**	-0.035	-.245**	-.439**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Annex 2: - questionnaire

Jimma University, Institute of Health Science

This questionnaire assesses Socio-demographic characteristic, diabetes knowledge, self-care practice, social-support, diabetes distress, and diabetes perception among diabetic patients in JUMC. Jimma, Southwest Ethiopia, 2020

Consent form

Good morning/ good afternoon!

My name is _____. I am here to collect data on behalf of Musa Jemal 2nd year masters of Science in Human Nutrition student. He is conducting a research in diabetic follow up clinic of Jimma University Medical Center to assess dietary self-care behaviors and Associated factors in diabetic patients. You have been chosen to participate in this study by chance and you will help me by answering the questions. I only ask questions because the study doesn't need to do any experiments or apply any invasive procedure up on you except your will to spent some time for interview.

I assure you that whatever answers you give it is kept strictly secret. I do not need your name and address. I also inform you that you have the right to withdraw from the study or stop the interview at any time if there is any discomfort before completing the study.

The interview takes approximately 20-25 minutes. if you have any questions you can ask.

Thank you very much!

Are you willing to participate in this study?

Yes_____ No_____

If yes, go to the next page, completing the questionnaire

Questionnaire

Part I Socio-demographic characteristics questions

No	Question	Response
101	Age	_____ Years
102	Sex	1.male 2.female
103	Residence	1.Urban 2.Rural
104	Marital status	1.single 2.married 3.divorced 4.separated 5.widowed
105	Educational level	1.can't read and write 2.can read and write 3.primary school 4.secondary and preparatory school 5.college /university/ technique
106	Occupation	1.unemployeed 2.government employee 3.NGO employee 4.self-employee
107	Average monthly income	_____birr
108	Family size	_____
109	Is there fruit and vegetable in a nearby market around your home ?	1.Yes 2.No

Part II Clinical characteristics

201	Type of DM (self)	1.Type 1 2.Type 2 3.i don't Know

202	Duration since diagnosis (in month if <1 yr)	_____yr/month
203	Type of treatment	1.injectin 2.tablet 3.both 4.no medication
204	Comorbidity (from record/registration)	1.yes 2.no
205	Do you attend diabetic education	1.no never 2.yes sometimes 3.yes regularly
206	Are you a member of diabetic association	1.yes 2.no
207	Are there any one who is diabetic patient in your family	1.yes 2.no
208	Do you have your own glucometer at home	1.yes 2.no

Part III: Summary of diabetes self-care activities questionnaires:

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

S.No	**Questions**	**Response in number of days**							
	Diet	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
301	How many of the last SEVEN DAYS have you prepared a healthful eating plan?								
302	On average over the past month, how many DAYS PER WEEK have you followed your eating plan?								
303	On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?								

304	On how many of the last SEVEN DAYS did you eat high fat foods Such as red meat or full fat dairy products?								
305	On how many of the last SEVEN DAYS did you space carbohydrates evenly through the day?								
	Physical Activity								
306	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity?(total minutes of continuous activity, including walking)								
307	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?								
	Blood Sugar Testing								
308	On how many of the last SEVEN DAYS did you test your blood sugar?								
309	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?								
	Foot care								
310	On how many of the last SEVEN DAYS did you check your feet?								
311	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?								
	Medication								
312	On how many of the last SEVEN DAYS did you take your recommended diabetes medication?								

Part IV: diabetic health belief question

1 = strongly disagree 2 = disagree 3= Neutral 4= agree 5= Strongly disagree

S.No	**Perceived susceptibility**	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
PT01	As a diabetic patient, I am at risk of getting diseases like (kidney , heart and hypertension)					
PT02	As a diabetic patient, it is possible through process that I will get diseases like (kidney, heart, hypertension)					
PT03	As a diabetic patient, I have a chance of getting foot ulcer/gangrene					
PT04	As a diabetic patient, I have a chance of experiencing hypoglycemia					
	Perceived severity					
PT05	Experiencing diseases like kidney, heart and hypertension is a serious problem to diabetic patient.					
PT06	Getting diseases like kidney, heart and hypertension is life threating to diabetic patient					
PT07	Getting foot ulcer/gangrene leads diabetic patients to loss of body parts.					
PT08	Experiencing hypoglycemia can lead diabetic patient to sudden deaths					
Perceived benefit						
PB01	The diabetes diet make me feel better					
PB02	If I change my eating habit it will probably help me					
PB03	I believe that my diet will control my diabetes					

Perceived barrier						
PB04	The foods on the diabetic diet taste horrible					
PB05	It has been difficult what the doctor told (prescribed) for me about diet					
PB06	I cannot understand what my doctor told me about my diet.					
PB07	following the recommended diet interferes with my normal daily activities					
Self-efficacy						
SE01	As a diabetic patient, it is easy for me to consume foods [like vegetables, fruits, low salt etc.] to prevent risks from diseases like kidney, heart and hypertension					
SE02	As a diabetic patient I have confidence to consume foods [like vegetables, fruits, low salt etc.] to prevent risks from diseases like kidney, heart and hypertension					
SE03	I am confident that I can stay on my meal plan when people around me don't know that I have diabetes.					
SE04	I am confident that I can eat meals at the same time every day.					
SE05	I am confident that I can avoid overeating or missing meals when I feel happy or angry.					

Cues to action questions

		1. Yes	2. No
CA01	Do you have a family member with diabetes complication?		
CA02	Have you ever seen /heard about a person who follow recommended self-care practice in last one month		

CA03	Have you ever seen /heard of person having diabetes complication in the last one month		
CA04	Have you ever heard though media /newspaper about follow recommended self-care practice during last one month?		
CA05	Have you ever received leaflets post cards or anything else from hospital which reminds you of diabetes		

Part V: social support question

Now I am going to ask you about social support that you receive from families, friends and significant others. Please follow statement carefully and check "√" your response to what degree you agree or dis agree with it.

S.No	**Question**	**Response**				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Family					
SS01	I get emotional help and support from my family					
SS02	My family really tries to help me					
SS03	My family is willing to help me make decision					
SS04	I can talk about my problem with my family					
	Friends					
SS05	My friends really try to help me					
SS06	I can count on my friends when things go wrong					

SS07	I can talk about my problem with my friends					
SS08	I have friends with whom I can share my joys and sorrows					
	Significant others					
SS09	There is special person in my life that cares about my feeling					
SS10	I have special person who is real source of comfort to me					
SS11	There is a special person who is around when I am in need					
SS12	There is a special person with whom I can share my joys and sorrows					

Part VI: Diabetes and self-care Knowledge question

Here are 14 question to measure Knowledge on diabetes and self-care please choose the correct answer after following both the question and answer attentively

601 The diabetes diet is:

a. The way most Ethiopian people eat b. A healthy diet for most people

c. Too high in carbohydrate for most people d. Too high in protein for most people

602 Which of the following is highest in carbohydrate?

a, Baked chicken b. Ergo

c. Baked potato d. Peanut butter

603 Which of the following is highest in fat?

a. Milk b. Orange juice

c. Corn d. Honey

604 Which of the following is a “sugar free food”?

a. Any unsweetened food b. Any dietetic food

c. Any food that says “sugar free” on label d. Any food that has less calories

605 Fast blood sugar is a test that is a measure of your blood glucose level for the past:

a. Day b. Week

c. 6 weeks d. 6 months

606 Which is the best method for testing blood glucose?

a. Urine testing b. Blood testing

c. Both are equally good

607 What effect does unsweetened fruit juice have on blood glucose?

a. Lowers it b. Raises it

c. Has no effect

608 Which should not be used to treat low blood glucose?

a. 3 hard candies b. 1/2 cup orange juice

c. 1cup soft drink d.1cup milk

609 For a person in good control, what effect does exercise have on blood glucose?

a. Lowers it b. Raises it

c. Has no effect

610 Infection is likely to cause:

a. An increase in blood glucose b. Decrease in blood glucose

c. No change in blood glucose

611 The best way to take care of your feet is to:

a. Look at and wash them each day b. Massage them with alcohol each day

c. Soak them for one hour each day d. Buy shoes a size larger than usual

612 Eating foods lower in fat decreases your risk for:

a. Nerve disease b. Kidney disease

c. Heart disease d. Eye disease

613 Numbness and tingling may be symptoms of:

a. Kidney disease b. Nerve disease

c. Eye disease d. liver disease

614 Which of the following is usually not associated with diabetes?

a. Vision problems b. Kidney problems

c. Nerve problems d. Lung problems

Part VII Diabetes associated distress question

Below are 17 questions regarding diabetes-associated distress. Follow the statements attentively and answer to what degree the statements apply to you as a problem then check "√" it on the response space.

1= Not a problem 2= slightly a problem 3= A moderate problem 4= somewhat a serious problem 5= Serious problem 6= A very serious problem

S.No	Question	Response					
		1	2	3	4	5	6
701	Feeling that diabetes is taking up too much my mental and physical energy						
702	Feeling that my doctor doesn't know enough about diabetes and diabetes care						
703	Feeling angry, distressed or depressed when I think about living with diabetes						
704	Feeing that my doctor doesn't give me clear enough direction on how to manage diabetes						
705	Feeling that I am not testing my blood sugar frequently enough						
706	Feeling that I am often failing with my diabetes routine						
707	Feeling that families or friends are not supporting enough of self-care effort (eg. Planning activities that conflict with my schedule, encouraging me to eat the 'wrong'food						
708	Feeling that diabetes controls my life						

709	Feeling that my doctor doesn't take my concern seriously enough						
710	Not feeling confident in my day to day ability to manage diabetes						
711	Feeling that I will end up with serious long term complication, no matter what I do						
712	Feeling that I am not sticking enough to a good meal plan						
713	Feeling that friends or family don't appreciate how difficult living with diabetes can be						
714	Feeling overwhelmed by the demand of living with diabetes						
715	Feeling that I don't have a doctor who I can see regularly enough about my diabetes						
716	Not feeling motivated to keep up my diabetes self-management						
717	Feeling that family or friends don't give me the emotional support that I would like						

PartVIII behavioural questions

S.No	Question	Response	Remark
D01	Have you ever smoked?	1.Yes 2.No	If no go to D05
D02	Do you currently smoke?	1.Yes	

		2.No	
D03	If yes do you smoke daily?	1.Yes 2.No	
D04	How many days do you smoke per week?	_____	
D05	Did you chew Khat in the last 12 month?	1.Yes 2.No	If No go to D07
D06	If yes how many days per week do you chew per week?	_____	
D07	Have you ever drink an alcohol?	1.Yes 2.No	If No leave the remaining
D08	Did you drink alcohol in the last 12 months?	1.Yes 2.No	
D09	If yes how many days per week do you drink at least one?	1.Daily 2.5-6 days per week 3.1-4 days per week 4.1-3 days per month 5.Less than one day per month	

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Part IV: diabetic health belief question

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□□□ **VIII :-** □□□□□ □□□□□□□ □□□□□□

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D01	□□□□□ □□□□□	1. □□ 2. □□	□□ □□□□ □□ D05

D02	□□□□ □□ □□□□ (□□□□ □□)	1. □□ 2. □□	
D03	□□□□ D02 □□□ □□ □□□, □□□□ □□ □□□□ □□□□?	1. □□ 2. □□	
D04	□□□□□ □□□ □□ □□□ □□ □□□□?	_____□□	
D05	□□□□ 12 □□□ □□ □□□ □□□□?	1. □□ 2. □□	□□ □□□ □□ D07
D06	□□ □□□, □□□□□ □□□ □□ □□□ □□ □□□□?	_____□□	
D07	□□□□□ □□□ □□□□ □□□□/ □□□ □□□ □□□/? (□□□□□□ □□□□□□□ □□□)	1. □□ 2. □□	□□ □□□ □□ □□□□□ □□□□□ □□□□□
D08	□□□□ 12 □□□ □□□□□ □□□ □□□□ □□□□?	1. □□ 2. □□	
D09	□□□□ □□ □□□, □□□□ □□□ □□□□□ □□□ □□ □□□ □□ □□□□?	1. □□□□ 2. □□□□□ □5-6 □□ 3. □□□□□ □1-4 □□ 4. □□□ □1-3 □□ 5. □□□ □ □□□ □□ □□□	

Affann orromiiffa version of questionainre

Dabalata I: Gaaffiiwwan

Yuuniverrsiitii Jimmaa, kolleejii fayyaa hawaasaa fi saayinsii fayyaa, muummee human nutrition Gaaffiiwwan dhimmoota Dhibee sukkaaraa, amala kunuunsa ofii fi to'annoo sukkaara dhiigaa quubsaa/gahaa hin taane kan dhukkubsattoota dhibee sukkaaraa Hospitaala Yuniversiitii Jimmaa Hordofan;

Jimmaa, Kibba Dhiha Itiyoophiyaa**.**

Dabalata II: Unka Walii galtee

Unka Walii galtee Hubannoo Jechamaa osoo daataa hin funaaniin guutamu

(Qajeelfama deebii kennitootaaf).

Harkafuune!

Maqaan koo _____ jedhama. Hojii qorannoo keessatti akka barataa digirii lammaffaatti yommuun hojjedhu amma kana Kilinikii dhibee sukkaaraa Hospitaala yuuniversiitii Jimmaatti waa'ee dhimmoota Dhibee sukkaaraa, amala kunuunsa ofii fi to'annoo sukkaara dhiigaa quubsaa/gahaa hin taane kan dhukkubsattoota dhibee sukkaaraa hojjechaan jira. Ati/isin qorannoo kana keessatti akka hirmaattaniif akka carraa waan filatamtaniif gaaffilee kiyyaaf deebii naalaachuun akka nagargaartan isin gaafadha. Qorannoon kun yaalii addaa fi kanneen qaama namaa irraa fudhatamu waan hin taaneef yeroo keessan aarsaa gootanii gaaffiwwaniif deebii akka naa kennitan isi gaafadha. Deebii isin laattan kamiyyuu dhoksaa/iccitiin qabuuf waadaan isinii seena. Maqaa fi teessoo keessan haala kamiin iyyuu hin caqasu. Akkasumas yeroo barbaaddanitti yoo isinitti toluu dideef gaffilee addaan kuttanii dhiisuuf/dhaabuuf mirga guutuu qabdu. Gaafii fi deebiin kun daqiiqaawwan 20-25 qofa tura. Gaaffii yoo qabaattan gaafachuu nii dandeessu.

Guddaa Galatoomaa!

Qorannoo kana keessatti hirmaachuuf fedhii qabduu?

Eeyyee/tole Lakki

Yoo Eeyyee/tole jedhame, fuula itti aanu deemuun gaaffiiwwan guuti/guutaa

Kutaa I Ibsitoota dhimmoota hawaasummaa

Gaaffii filannoo qabuuf, deebii kee itti marii, akkasumas akkuma barbaachisaa ta'etti deebii kee iddoo duwwaa kenname irrattii barreessi.

lakk	Gaaffii	Deebii
SD01	Umrii	_____
SD02	Saala	1. Dhiira 2. Dhala
SD03	Iddoo jiregnaa	1. magaalaa 2. badiyyaa
SD04	Haala gaa'ilaa	1. Kan hin fuune /heerumnee 2. Kan fuudhee/heerumte 3. Kan hikee/te 4. Kan jalaa du'ee
SD05	Sadarkaa barnoota	1. Kan dubbisuu fi barrressuu hin dandeegne 2. Kan dubbisuu fi barrressuu hin dandayuu 3. Kutaa 1-8 4. Kutaa 9-12 5. Yuniversity/college
SD06	Hoojiin kee maali	1. Qootee bulaa 2. Daldalaa 3. Haadha manaa 4. Hojjetaa motummaa 5. Ka biraa_____
SD07	Galii ji'aan	_____
SD08	Bayyinaa matii	_____
SD09	kuduraa fi fuduraa gabaa dihoo kessaan jiraa	1. eyyeen 2. lakii

Kutaa II dhukubaa wajjin kan walqabatuu

CC01	Dhukkuba suukkaaraa isa kamtu sii qabee	1. dhukkuba sukkaaraa gosa tokkoffaa 2. dhukkuba sukkaaraa gosa lammaffaa 3. hin beekuu
CC02	dhukubni sukkaaraa ogeessaan Erga sitti argamee haammam tureeraa(ji'aan/waggaan	_____ wagaa/jiaa
CC03	Gosa qoricha fuudhachaa jirtuu	1.lilmoo 2.kinini 3.lammanuu 4.qoricha fuudhachaa hin jiruu
CC04	Dhukkuba sukkaaraan walqabatuu qabdaa	1. eyyee 2. miti
CC05	Barumsa dhukkuba sukkaaraa ni hordoftaa	1. gonkuma 2. eyyee yeroo tokko tokko 3. eyyee yeroo hunda
CC06	miseensa waldaa sukkaaraa keessa jirtaa	1. eyyee 2.miti
CC07	Maatii kee keessa nama dhukkuba sukkaaraa qabuu jiraa	1.eyyee 2.miti
CC08	Mana kee keessatti meeshaa sukkaara dhiiga keessa safaruu qabdaa	1. eyyee 2.miti

Kutaa III: Gochoota of eeggannoo nama dhibee sukkaaraa qabuun ofiif raawwataman

Ajaja: amma gaaffilee Gochoota of eeggannoo nama dhibee sukkaaraa qabuun ofiif raawwataman wajjiin wal qabatee isin gaafachuufi ,mallattoo (√) kana iddoo gaaffii waliin deemu keessa kaa'uun deebiisii

Lakk	Gaaffii	Deebii							
		0	1	2	3	4	5	6	7
301	Torban darbee kessatti guyyaa meeqaaf nyaata fayyaaf ta'uu hordoftee								
302	Ji'a darbee keessatti ,torbanitti guyyaa meeqaaf karoora nyaata keetii hordoftee								

303	Torban darbee keessatti guyyaa meqaaf kuduraa fi fuduraa yeroo shan ykn oli nyaattee								
304	Torban darbee keessatti guyyaa meeqaaf nyaata cooma qabuu nyaattee								
305	Torban darbee keessatti guyyaa meeqaaf nyaata sukkaara qabuu qixxee qodee nyaattee								
306	Torban darbee keessatti guyyaa meeqaaf sosocho'insa qaamaa yoo xiqqaatee daqiiqaa soddoomaaf hoojjettee								
307	Torban darbee keessatti hojii manaa fi hojii keetiin ala guyyaa meeqaaf akka (bishaan daakuu,karaa adeemuu,biskileetii oofuu,)irratti hirmaatte ,								
308	Torban darbee kessatti guyyaa meeqaaf qabiyyee sukkaaraa dhiiga kee ofiif safartee								
309	Torban darbee kessatti akka ogeessii fayyaa sitti himeetti guyyaa meeqaaf qabiyyee sukkaaraa dhiiga kee kessaa ofiif safartee								
310	Torban darbee kessatti guyyaa meeqaaf miila kee hordoftee								
311	Torban darbee kessatti guyyaa meeqaaf kophee kee keessa isaa ilaalte								
312	Torban darbee kessatti guyyaa meeqaaf qorichaa kee aka ajajamtee fudhaatee								

Kutaa IV ilaalcha waa'ee miidhaa dhibee sukkaaraa walxaxaa ta'een qabamuu fi hammeenyaa dhukkuba sukkaara walxaxaa

amma gaaffilee ilaalcha balaa dhukkuba sukkaaraa walxaxaa ta'een qabamuu fi hammeenyaa dhukkuba sukkaaraa walxaxaa sii gaafachuufi,Mallattoo (√) kana iddoo gaaffii waliin deemu keessa kaa'uun deebisi.

Lakk	**Gaaffii**	**Deebii**				
		BM	**M**	**HM**	**W**	**BW**

		1	2	3	4	5
ilaalcha waa'ee miidhaa dhibee sukkaaraa walxaxaa ta'een qabamuu						
PT01	Dhibee sukkaaraa waan qabuuf ,dhukkubni akka (kalee,onnee,dhibbaa dhigaa) na qabuu danda'a					
PT02	Dhibee sukkaaraa waan qabuuf yeroo dheeraa keessatti dhukubni akka (kalee,onnee,dhibbaa dhigaa) na qabuu danda'a					
PT03	Dhibee sukkaaraa waan qabuuf dhukkubni madaa milaa yookiin gaangriiniin na qabuu danda'a					
PT04	Dhibee sukkaaraa waan qabuuf ,hir'ina sukkaara dhiiga na mudachuu danda'a					
Ilaalcha hammeenyaa dhukkuba sukkaaraa walxaxaa						
PT05	Dhibee (kalee,onnee,dhibbaa dhigaa) dhaan qabamuun nama dhukkuba sukkaaraa qabuuf rakkoo guddaa dha					
PT06	Dhibeen akka(kalee,onnee,dhibbaa dhigaa) dhaan qabamuun lubbuu namaa saaxiiluu danda'a					
PT07	Nama dhibee sukkaaraa qabuuf Madaa milaa yookiin gaangriini dhaan qabamuun hir'ina qaamaaf saaxiluu danda'a					
PT08	Hir'inni sukkaara dhiigaa, nama dhibee sukkaaraa qabu du'a tasaaf saaxiluu danda'a					
PB01	Nyaanni dhukkuba sukkaaraaf nyaatamuu akka fayyyaan natti dhagahamuu na goodha					
PB02	Bartee nyaata kooti yoon jijjiree na fayyaduu danda'a					
PB03	Nyaanni dhukkuba sukkaaraaf nyaatamuu dhukkuba koo to'achuuf akka fayyaduu nan amanaa					
PB04	Nyaata dhukkuba sukkaaaraaf nyaatamuu natti hintoluu					
PB05	Ajajni Ogeessi fayyaa waa'ee nyaata dhukkuba sukkaaaraaf nyaatamuu ajajee hoordofuun cimaa dha					
PB06	Ajajni Ogeessi fayyaa waa'ee nyaata dhukkuba sukkaaaraaf nyaatamuu ajajee naaf hin gallee					
PB07	nyaata dhukkuba sukkaaaraaf nyaatamuu ajajamuu hoordofuun hojii/sochii guyyaa guyyaa kootiif gufuu ta'uu danda'a					
SE01	Akka nama dhukkuba sukkaaraa qabuutti nyaata akka fuduraalee,kuduraalee fi sogidda bicuu qabuu					

	nyaachudhaan dhukkuba akka kalee,onnee fi dhibbaa dhigaa ittisuun anaaf salphaa dha					
SE02	Akka nama dhukkuba sukkaaraa qabuutti nyaata akka fuduraalee,kuduraalee fi sogidda bicuu qabuu nyaachudhaan dhukkuba akka kalee,onnee fi dhibbaa dhigaa ittisuuf ofittan amanaa					
SE03	Namootni naannoo kottii jiraatan osoo dhukkuba sukkaaraa akkan qabuu hin beekiin karoora nyaata koo irratti akkan turuu ofittan amanaa					
SE04	Guyyaa guyyadhaan sa'ati walfakkaatuun nyaata nyaachuu danda'a jeedhee ofiittan amanaa					
SE05	Yeroo gammachuu ykn gaddii natti dhagahamu humnaan olii nyaachuu ykn ciruma nyaachuu dhisuu akkan danda'u ofittan amana					

Lakk	Gaaffii	**Deebii**	
		eyye	**miti**
CA01	Maatii dhibee sukkaara walxaxaa ta'een qabame qabdaa		
CA02	Ji'a darbee keessattii Nama of eeggannoo dhibee sukkaaraaf ofiin godhuu argite yokiin dhageesse beektaa		
CA03	Ji'a darbee keessatti nama dhibee sukkaaraa walxaxaa ta'een qabamee argite/dhageesse beektaa		
CA04	Ji'a darbee keessatti Waa'ee of egganno dhibee sukkaaraaf ofiin godhamu dhageesse/argite beektaa		
CA05	Hospitalaa irra wareqaa yadachisaa fudhatee bekta		

Part V: gaaffilee gargaarsa hawaasaa

Amma gaaffilee maatii,hiriyaa fi namoota siif barbaachisaa ta'an gargaarsa siif keennanuu waliin wal qabate sii gaafachuufi.deebii kee bakka qophaa'etti sirritti kaa'ii

BM=baayyeen mormaa

M=mormaa

HM=hin murtessine

W=waligalaa

BW=baayyee waligalaa

lakk	**gaaffi**	**deebii**				
		BM	M	HM	W	BW
	maatii					
SS01	Gargaarsa miiraa matii irraa nan argadhaa					
SS02	Maatiin kiyya na gargaaruuf sirritti yaaluu					
SS03	Maatiin kiyya murti irratti na gargaaruuf feedhii qabuu					
SS04	Rakkoo kiyya maatii wajjin haasa'uun danda'a					
	Hiriyaa					
SS05	Hiriyaan kiyya na gargaaruuf sirritti yaaluu					
SS06	Rakkoon umamnaan hiryoonni koo anaaf jiruu					
SS07	Rakkoo kiyya hiriyaa koo wajjiin hasa'uun danda'a					
SS08	Gaddaa fi gammachuu kiyya hiriyaa hiruun qabaa					

	Nama anaaf barbaachisaa ta'an					
SS09	Nama adda ta'e tokko jiruu kiyya keessa jira Kan miraa koof cinqamuu					
SS10	Nama adda ta'e tokko jira anaaf madda qanani kooti kan ta'e					
SS11	yommu waan barbaadu Nama adda ta'e tokko na bira jira					
SS12	Gaddaa fi gammachuu kiyya kan hiruuf nama adda ta'e tokko jira					

Kutaa VI beekumsa waa'ee dhibee sukkaaraa fi dhukkuba sukkaaraa walxaxaa

Ajaja 5: amma gaaffilee beekumsaa waa'ee dhibee sukkaaraa fi dhibee sukkaaraa walxaxaa si gaafachuufi

K01. Nyaatni dhukubsatoota sukkaratin nyatamu qabu?

a. Kan yeroobay'ee hawasni biyyatin nyatajiru b. Nyaata nyaata madaalawag

c. Nyaata qabiyye sukkaara heddu qabu d. Nyaata qabiyye pirotini heddu qabu

K02. Kannen armaan gadii kessa kamtu qabiyye sukkaara gudda qaba?

a. Foon bilchaate b. itittuu

c. Dinnicha affeelamaa d. Dhaadha ocholoonii

K03. Kannen armaan gadii keessa kamtu qabiyye cooma heddu qaba?

a. Annaan b. Cuunfa Birtukana

c. Boqqollo d. Damma

K04. Kannen armaan gadii kessa kamtuu of kessa sukkara hin qabne?

a. Nyaata hin mi'oofne kamiyyuu b. Nyaata dhukkubsataa sukkaaraa kamiyyuu

c. Nyaata sukkara hin qabu jedhame irrati barrefame d. Nyaata sukkaara xiqqa of kessa qabu

K05. Yaalin sukkara safisan sukkara kanan dura ture kan yeroo hangami agarsiisa?

a) Guyya tokko b) Torbaan tokko

c) Torban 4 d) Ji’a ja’a

K06. Yallii armaan gadii kessa isa kamtuu irra gaarii dha

a) Yaalii finca’anii b) Yaalii dhiiga

c) Lamanuu wal-qixxe dha

K07. Cuunfaan mudura hin mi’oofnee dhiiba maali sukkara dhiiga irratti fiida?

a) Ni hir’isa b) Ni dabala

c) Dhiiba hinqabu

K08. Kannen armaan gadii kessa kamtu sukkara dhiiga hir’suuf hin fayyadne

a) Karamella gogaa sadii b) 1/2 cuunfa burtukana

c) 1/2 dhugatti lallafa d) 1/2 annaan

K09. Sossochin qaama (spoortiin) sukkara dhiiga irrati dhiiba maali fida?

a) Ni hir’isa b) Ni dabala

c) Dhiiba hin qabu

K10. Dhukubni sukkara dhiiga irrati dhiiba maali fida?

a) Ni hir’isa b) Ni dabala

c) Dhiiba hin qabu

K11. Kannen armaan gadii kessa kamtu barreche miilakee akka hin miidhamne garagara?

a) Guyya guyya dhaan miila dhiqachu b) Alcoholi dhaan sukkumu

c) Bishaan kessa cuphu dhan kahu d) Kophee bal’a kayachu

K12. Nyaata cooma heddu hin qabne nyaachuun maal fayyada?

a) Dhukuba nervihi r’isa b) Dhukuba kale hiri’sa

c) Dhukuba onne hi’irsa d) Dhukuba ija hir’isa

K13. Qaamni nama hadoodun mallatto maliti

a) Dhukuba kalee b) Dhukuba nervi

c) Dhukuba ijaa d) Dhukuba tiruu

K14. Kannen armaan gadii keessa kamtuu dhukuba sukkaratiin wal hin qabanne?

a) Rakkoo ijaan arguu b) Rakkoo kale

c) Rakko nervi d) Rakko somba

Part VII Dhiphachuu dhibee sukkaaraa waliin walqabatee dhufuu

Gaaffiin 17n armaan gadii kun Dhiphachuu dhibee sukkaaraa waliin walqabatee dhufuu

Kan gaafatani dha. deebii kee bakka qophaa'etti sirritti kaa'ii

1= rakkoo miti 2= rakkoo bicuu dha 3= A rakkoo gidduu galaa 4= haamma ta'ee rakkoo jabaa dha 5= rakkoo jabaa dha 6= A rakkoo baayyee jabaa dha

Lakk	Gaaffii	Deebii					
		1	2	3	4	5	6
701	Dhibeen sukkaaraa humna qaamaaf sammuu kiyya baayyee fudhataa jira jidheen yaadaa						
702	Dooktorri kiyya waa'ee dhibee sukkaaraa fi kununsa dhibee sukkaaraaf goodhamu ni beekaa jedhe hin yaaduu						
703	Dhibee sukkaara waliin jiraachu kiyya yommuun yaaduu aarii,mukaa'uu fi dhiphachuun natti dhagahama						
704	Doktorri kiyya dhibee sukkaaraa yaaluuf kallatti gaha ta'e naaf kenna jedhe natti hin dhagahamu						
705	Qabiyyee sukkaara dhiiga kiyya keessa jiruu yeroo yeroon akka hin safarreen natti dhagahama						
706	Wantoota dhibee sukkaaraaf yeroo yeroodhaan goodhaman akka hin goonee natti dhagahama						

707	Maatii fi hiryooni kiyya kununsa dhibee sukkaaraaf ofin godhamuuf gargaarsa gaha naaf godhaa jiruu jedhe hin yaaduu						
708	Jiruu kiyya dhibeen sukkaara akka to'ate natti dhagahama						
709	Doktorri kiyya yaaddoo kiyya akka sirritti hin fudhanne natti dhagahama						
710	Dandeetti guyyaa guyyaa kootiin dhibee sukkaaraa yaaluuf ofitti hin amanamuun natti hin dhagahamu						
711	Yoo maal iyyuu hojadhe,dhukkuboota walxaxaa dhibee sukkaaraa waliin walqabate dhufan na qabuu jedheen yaada						
712	Karoora nyaata gaarii akka hordofaa hin jirree natti dhagahama						
713	Maatii fi hiriyyonni kiyya dhibee sukkaaraa waliin jiraachuun akkam rakkisaa akka ta'e hin beekanuu jedheen natti dhagahama						
714	Dhibee sukkaara waliin jiraachu waliin wal qabate na ciinqa						
715	Doktora yeroo yeroodhaan kan na yaaluu hin qabuu jedheen natti dhagahama						
716	Dhibee sukkaara ofiif yaaluuf wantoota na kakaasan qaba jedhe hin yaaduu						
717	Maatii fi hiriyoonni kiyya miraa an barbaadu naaf gochaa jiru jedheen natti hin dhagahamu						

kutaa VIII gafiwaan qorichotaa fayadamu illallatee

Lakk.	Gafiiwaan	debii	yaadaa
D01	Xuxxee bektaa	1.eyyee 2.laakii	
D02	Yerroo ammaa nixuxxaa?	1.eyee 2.laakii	
D03	Eeyee yoo taee guyya gyyaadhan xuxaa?	1.eyyee 2.laakii	
D04	Torbanittii Guyyaa meqaa tuttaa?	_____	
D05	Jiootaa 12 darbaan jimaa qamtee bektaa?	1.eeyee 2.laakii	
D06	Eeyee yo tae torbanittii Guyyaa meqaa?	_____	
D07	Alcoholii dhugdee bektaa?	1.eeyee 2.laakii	
D08	Jiootaa 12 darbaan kessaa dhugdee bektaa?	1.eeyee 2.laakii	
D09	Yoo xinatee dhugati tokoo halaa kamin dhugdaa ?	1.guyyuuma guyyan 2.torbanittii guyaa 5-6 3. torbanittii guyaa 1-4 4. jiaatii guyaa 1-3 5.jiaatii Guyyaa 1 gadii	

Annex 3. Approval of the thesis

I, the undersigned, Master of Science in Human Nutrition student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Science in Human Nutrition.

Name:Musa Jemal

Signature: _____

Place of submission: Department of Nutrition and Dietetics, Faculty of Public Health, Institute of Health, Jimma University.

Date of Submission: _____

This thesis has been submitted for examination with our approval as university advisor(s).

ADVISORS NAME	**SIGNATURE**
1. Mr Alemayehu Argaw (MSc, PHD fellow)	_____
2. Mrs Abonesh Taye (MSc)	_____