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Dietary Pattern and Associated factors Among Type 2 Diabetes Mellitus Patients in Felege Hiwot Comprehensive Specialized Hospital Bahirdar, Ethiopia.

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ABSTRACT

Background: Diabetes mellitus is a chronic disease with a high prevalence and a growing concern worldwide. Dietary management is considered to be one of the cornerstones of diabetes care. There is a lack of data on the dietary pattern of diabetic patients, which underestimates its role in the management of diabetes. Information concerning the dietary pattern among type 2 diabetic patients is limited though the prevalence of DM and its complications are on the rise. there is no recent study conducted about dietary pattern and associated factors in the study area, so this study will fill this gap.

Objective: The objective of the study was to assess the dietary pattern and its associated factors among type 2 diabetes mellitus patients in Felege Hiwot Comprehensive Hospital.

Methods: Institutional based cross-sectional study was conducted among type 2 diabetes patients from March 2021 to May 2021. Systematic sampling technique was used to select the study participant. A binary logistic regression model was fitted to determine independent predictors of dietary pattern among Type 2 DM patients. Adjusted odds ratio at 95%CI and p value of 0.005 was used to declare statistically significant association of each variable on the outcome variable.

Result- A study showed that 47.7% [95%, CI: (42.6, 52.8)] of patients had good dietary pattern. Attained secondary school and above [AOR=2.2, 95% CI (1.3,3.5)], having family history of DM [AOR=2.0, 95%, CI (1.2, 3.2)], having family support [AOR=2.2, 95% CI (1.3, 3.7)], have fruit availability [AOR=2.4, 95%CI (1.1, 5.6)], being a member of diabetes mellitus association [AOR=1.8,95%CI(1.2, 2.9)], and having good diabetic knowledge about recommended diet[AOR=1.8,95%CI(1.1,2.8)] were independent predictors for good dietary pattern.

Conclusion and recommendation: Majority of type 2 diabetic patients in Hospital had poor dietary pattern due to poor knowledge about recommended dietary pattern . Factors associated with dietary pattern of type 2 diabetes patients were attending secondary school and above, having comorbidity, being diabetes association member, the fruits being available, having family support and knowledgeable have positive association with good dietary pattern. Therefore, creation of awareness about recommended dietary pattern and diversification of feed types for the patients should be conducted that may help them to control their blood sugar level.

Therefore, Concerned bodies better to develop health information dissemination programs and strategies that consider the importance of management of DM with diet, Family members should be informed about their important roles in encouraging patients to undergo DM management with diet.

Key words: Dietary pattern, Type 2 Diabetes mellitus, glycemic control.

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LIST OF ABBREVIATIONS/ACRONYMS

ARHB	Amhara regional Health Bureau
AFR	IDF African region
DDS	Dietary Diversity Score
DM	Diabetes Mellitus
EFCT	Ethiopian Food Composition Table
FBG	Fasting Blood Glucose
FFQ	Food Frequency Questionnaire
FHCSH	Felege Hiwot Comprehensive Specialized Hospital
FMoH	Federal Ministry of Health
IDF	International Diabetes Federation
NCD	Non Communicable Disease
NIDDM	Non-Insulin Dependent Diabetes Mellitus
RDA	Recommended Daily Allowance
T2DM	Type 2 Diabetes Mellitus
UAE	United Arab Emirates
USA	United States of America
USD	Unites States Dollar
USDA	United State Department of Agriculture
WHO	World Health Organization

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1. INTRODUCTION

1.1 Background

The term diabetes mellitus defines a metabolic disorder of multiple etiology, which is characterized by chronic hyperglycemia with disorders of the carbohydrate, fat and protein metabolism due to defects in insulin secretion, insulin action or both(1,2). Diabetes is a major health concern that has reached alarming levels: today, more than of half a billion people are living with diabetes worldwide and this number is projected to increase by 46%, reaching 783.2 million by 2045(2).

American diabetic association classifies DM in to four which is type 1, type 2, gestational DM and Specific types of diabetes due to other causes. Type 1 indicates the process of beta cell destruction that can ultimately lead to diabetes mellitus, where insulin is needed for survival to prevent the development of ketoacidosis, coma, and death. Gestational diabetes develops during gestation (pregnancy) (4,5). Type 2 diabetes (due to a progressive loss of sufficient B-cell insulin secretion, often against a background of insulin resistance) (5). It is the most common type of diabetes is characterized by disorder of insulin action and insulin secretion either of which may be the predominantly features(6). There are several important risk factors that may lead to type 2 DM. These includes increasing urbanization, dietary changes, reduced physical activity , obesity, increasing age, a family history of diabetes , ethnicity and change in lifestyle changes(7,8).

One important goal of diabetes treatment is to keep the blood glucose levels near the normal range of 70 to 120 mg/dl before meals and under 140 mg/dl at 2 hours after eating. The American Diabetes Association recommends routine self- monitoring blood glucose (SMBG) for diabetic patients(5).
The treatment of diabetes should begin with non-pharmacological therapies such as lifestyle interventions. A healthy lifestyle with regular physical activity and a healthy diet are very important tools for achieving and maintaining adequate blood sugar control in patients with type 2 diabetes (9). Dietary patterns represent the entirety of the foods and drinks that a person consumes over a certain period; therefore, they are considered to be the most realistic measure of food intake(10,11). In recent years, they have proven useful in explaining the relationship between diet and chronic illness(12–14). Ethiopia is still registering increasing numbers of people being diagnosed with the disease(9,15,16).

1.2 Problem Statement

Diabetes is a major cause of morbidity and mortality (3,17). It is one of the biggest global public health problem. Globally, the prevalence of type 2 diabetes is high and increasing across all countries(3,18). This increase is driven by population aging, economic development and increasing urbanization leading to more sedentary lifestyles and greater consumption of unhealthy foods linked with obesity(3) . The prevalence is estimated to increase from 425 million people in 2017 to 783.2 million by 2045, more than 34 million in Africa, in Ethiopian 1.733 million people have diabetes with linked health, social, and economic costs(19–21). According to International Diabetic Federation (IDF) 2015 the prevalence of diabetes mellitus in Ethiopia is 3.2% and there are 23,145 diabetes related deaths every year(3).

Ethiopia has shown limited progress towards achieving the diet-related non-communicable disease (NCD) targets(23). Diabetes is estimated to affect 5.0% of adult women and 5.8% of adult men(24). Since Diabetes is becoming a serious public health problem it requires continuous medical care, patients' self-management, education, and adherence to prescribed medication to reduce the risk of long-term complications(9).

African countries focus primarily on restricting foods high in carbohydrates, with eating varied foods as recommended and developing regular eating habits of little value (14,25,26). Injera, a high-carbohydrate food, is also the most dominant food served in Ethiopia and East African countries. Therefore, even on a more traditional diet, changes in carbohydrate utilization should be made to adhere to guidelines for the prevention and management of diabetes. The cultural diet and eating habits of the general public are difficult to change according to doctors' recommendations for diabetic diet (9).

In developing countries like Ethiopia when lifestyles are changing urbanization is expanding, literacy rate is low, and people still exist in poverty, DM and its impact on development and health is particularly critical. In Ethiopia inadequate routine health information and shortage of data on the proper dietary pattern of diabetic patients affect the long term management of diabetes. These diabetic patients are dealing with difficulty in choosing food items when they feel experiencing eating. They also fail to decide how much to eat whenever necessary. At the same time their caregivers additionally fail to detect food items to be included in the diabetic meal and how to prepare them(9,27,28).

Different studies conducted in Ethiopia showed poor self-care practice which in turn indicates poor dietary management (16,29–31). Diabetic patients should maintain a diversified dietary pattern and a regular eating habit for good glycemic control, prevention of complications and a good quality of life.

The recommended dietary pattern for T2DM patients is almost similar with general population achieving the minimum dietary diversity score of five (5) food groups from ten (10) food groups in a day(32). But patients especially in Ethiopian situation, Even though there are studies conducted on self-care practice, information concerning the dietary pattern among type 2 diabetic patients is limited though the prevalence of DM and its complications are on the rise.

Therefore these patients should be targeted for specific assessment and interventions to overcome any challenges and obtain adequate health awareness about type 2 DM and understanding of lifestyle behavior modifications which play an important role in the ability to successfully control of disease, its symptoms and prevent short and long term complications.

Thus the aim of this study was focused on the assessment of dietary pattern and associated factors in the study area due to little known about the dietary pattern of type 2 diabetic patients and the factors having a relation with the dietary pattern despite the fact that it is crucial for optimal self-care management and delaying diseases progression.

1.3 Significance of the study

The study gives first line information about actual dietary pattern and associated factors of on type 2 diabetic patients in the study area. Intern; this should enable relevant health administrators to develop comprehensive and appropriate community-based health promotion strategies to encourage healthy lifestyles and appropriate dietary pattern for prevention and control of type 2 diabetes among its population. This document will also serves as a comprehensive evaluation for the nature of dietary pattern of type 2 diabetic patients.

Above all, since there is no recent research conducted in similar area of the interest in the study area, the finding of this study could be used as a reference line data for those who are interested in carrying out further research.

2. LITERATURE REVIEW

2.1 Dietary pattern of type 2 DM patients

The assessment of food intake using dietary patterns based on foods and food groups is becoming more common in nutritional epidemiological studies(23). A population based cross sectional study done by FFQ among type 2 diabetes in the city of Hangzhou, Zhejiang Province, China indicated that the western dietary pattern was associated with an elevated risk, whereas the grains-vegetables dietary pattern was associated with a reduced risk of T2DM(33). A cross-sectional study done by FFQ in Brazil identified two eating patterns: unhealthy high consumption of refined carbohydrates, highly processed foods, sweets and desserts high intake of whole carbohydrates, dairy products, white meat, fish, fruits and vegetables. The healthy group was more likely to achieve therapeutic goals for fasting plasma glucose, HbA1c, and LDL cholesterol than the unhealthy group(34).

In another cross-sectional survey of 486 Iranian women between the ages of 40 and 60, three dietary patterns were identified using the factor analysis method: this result showed that there was a positive correlation between adherence to the Western pattern and insulin levels. It has also been mentioned that eating a healthy diet can reduce the risk by 45%, while following the Western diet increases that risk to 15% (35).

A large amount of evidence shows that Mediterranean diet produces significant cardio metabolic benefits in type 2 diabetes. Increased consumption of high-quality foods, i.e., those rich in whole grains, healthy lipids, natural anti- oxidants and fiber, may cool down the activation of the innate immune system, by reducing the production of pro inflammatory cytokines and increasing that of anti- inflammatory cytokines(36,37).

The Eating patterns in Africa consist mainly of two different eating patterns: a buying-eating pattern that positively relates to the consumption of sweets, rice, meat, fruits and vegetables; and a traditional diet that correlates with intake of fruits, plantains, leafy green vegetables, fish, fermented corn products, and palm oil. Traditional dietary patterns are inversely linked to type 2 diabetes. The influence of western culture resulted in a nutritional transition from traditional dietary patterns to high carbohydrate consumption and the emergence of prepackaged food(38).

Most early studies as well as current work indicated that the role of appropriate dietary intake to control type 2 DM is crucial. Consumption of diversified food from different food groups are important to decrease high blood glucose level and to slow progress of the disease(39–41). However, dietary pattern of type 2 diabetes patients differ across and within countries even within

regions. In Addis Ababa two studies, and one study in Bahir Dar, Ethiopia shows 48.6%, 22.2% and 35.9% of type 2 diabetes patients had good dietary practice respectively (29,30,42). Even though Dietary pattern is culture, season and marketing day based. .

Studies done in different parts of Ethiopia showed that the dietary practice was poor. For example study done in Yekatit 12 Medical College Hospital was found to be 51.4%(43), Adare General Hospital Hawassa was found to be (44.2% (9), Debre tabor general Hospital(15) and Felege Hiwot comprehensive Specialized Hospital 35.9% (30). Generally Dietary patterns are influenced by demographic, socio-economic status, environment, cultures, availability of foods, traditions and personal preferences(11).

2.2 Factors that affect the dietary pattern of type 2 DM patients

2.2.1 Knowledge and related factors of type 2 DM patients on the recommended diet

According to different literatures, different knowledge and knowledge related factors associated with dietary pattern of type II DM patients. A cross sectional study showed in 49.2 % of the patients have poor knowledge about the recommended diet which in lines with a study done in USA in low socioeconomic participants where 40% of the respondents didn't know what food to eat(44,45). In contrast a study done in Sudan majority of the respondents (93.3%) had good knowledge about use of vegetable in a diet. Sources of dietary advice were found to be mainly from doctors and sometimes through social communication with friends and neighbors(46).

Certain dietary patterns significantly increase the risk of diabetes while other patterns significantly decrease the risk. However, little is known about the relative contribution of these dietary patterns to the development or mitigation of diabetes. Lack of awareness is a major hindrance to adopting healthier eating patterns to reduce one's diabetes risk(47).

A descriptive cross sectional study conducted by FFQ in Bangladesh among type 2 DM patients showed that sustainable health and nutrition education on proper dietary pattern and health practices are recommended for better diabetic prevention and management among population(48).

A cross sectional survey conducted among Kenyan type II diabetic patients showed that educational status and level of dietary knowledge have an association with dietary pattern.(49). Another base line cross sectional study among Latinos type 2 diabetes showed that diabetes related knowledge and English speaking were positively associated with dietary pattern(50).

An institutional based cross-sectional survey conducted on systematically sampled 405 type 2 diabetes patients in Debre Tabor showed that diabetic related knowledge have an association with self-care practice(27).

In a study done in India, Ambo, Jimma, Felege study subjects have poor knowledge about dietary self-care management. The above result mentioned in this paragraph in line with similar study done in South Africa which 73.3% of the patients has poor knowledge about healthy diet (30,39,51–53).

2.2.2 Life style factors that affect the dietary pattern of type 2 DM patients

This ongoing and projected change in diet has caused in populations consuming more calorie dense foods with increased fat and sugar and less fiber compared with the traditional diets of previous generations(54). For example, research has provided evidence for an association between the adherence to a 'healthy' pattern and lower incidence of diabetes, emphasized that the diet significantly improves glucose metabolism when combined with a healthy lifestyle, such as the practice of physical activities, and the regular consumption of the dietary pattern. These lifestyle-related diseases are sometimes referred to as "diseases of affluence," and it is reported that the increase in their prevalence is due to changes in dietary patterns (such as the development of fast food culture) and decreased physical activity(55–58).

2.2.3 Health and health related factors that affect the dietary pattern of type 2 DM patients

Non-diabetic health problems, financial problems, emotional difficulties, family stress, and problems from drug side effects were other factors influencing study participants in the US Food Consumption Study. All these additional problems appear to affect this population group and can contribute as obstacles to adequate dietary behavior(21). A cross-sectional study conducted on 399 type 2 diabetes mellitus (T2DM) subjects from Ahmedabad, Western India showed that family history of diabetes was independent predictors for diabetic dietary pattern(51).

An institutional based cross sectional study conducted among type 2 diabetes in Nekemte Referral Hospital using a structured interview showed that years of suffering from diabetes was associated with diabetic self-care practices(59).

In most of Ethiopia's hospitals, patient care and medical admission costs for diabetic management are increasing. Access to diabetes care in the country, however, does not match the rising incidences and complications of the disease. A condition where diabetic patients regularly visit clinics and their

blood sugar levels still remain high despite the treatment they are receiving is a problem that requires attention. It is the patient's responsibility to maintain their quality of life(9).

2.2.4 Socio demographic factors that affect type 2 DM patient's dietary pattern

The total intake of vegetables and fruit in the male group was significantly lower and the intake of white vegetables was lower in the female group. Study done on diabetic patients in Brazil unhealthy food consumption was more common in men while women consume healthy food more frequent (60). A cross-sectional study conducted on 399 type 2 diabetes mellitus (T2DM) subjects from Ahmedabad, Western India showed that level of education was independent predictors for diabetic dietary pattern(51). A number of factors can contribute to good dietary pattern. Evidences show that many factors including education status, diabetic knowledge on recommended diet, having family support sociocultural and socioeconomic status could act as factors to good dietary pattern(30,31,61).Moreover, patient's knowledge, health status and season could influence dietary pattern.

Another cross sectional study conducted in Malaysia and Nepal study showed that the male subjects had sufficient intake of all nutrients while the female subjects did not have sufficient intake of calcium, vitamin A and niacin. However in study done on UAE there was no statistically significant difference between males and females; neither was there a difference in terms of age or level of education(44,62,63). Another cross sectional study done by FFQ in Malaysia showed that a direct association between level of education and dietary pattern. This finding found that lower education was associated with less diversified and poor diet quality. These results may be explained by the fact that certain literacy level is required to comprehend the available health information. Less-educated subjects may find it hard to make use of written materials, like newspaper articles and leaflets, to gain nutritional and health-related knowledge(64)

Advancing age is a possible factor that might positively influence the dietary pattern. Factors such as age, marital status & level of education had a significant relationship with the dietary pattern. In another study done in Nekemete and Harari significant associations between self-care practice and educational status, monthly income, occupation, years of suffering from diabetes, knowledge level, attitude level, living condition and age of the respondents was seen (42,63,65,66).

2.2.5 Other Factors that affect the dietary pattern of Type 2 DM patients

In a study done in the united Arab Emirates it was not clear why patients violates dietary recommendation there is no financial barrier to follow the recommended dietary guideline and it shows poor awareness on the aspects of diet in diabetic patient management(63). However in a study done in Addis Ababa 77% of the patient's think of the high cost of food when it comes to following the recommended diet(43).

In similar study done in USA on identification of Barriers to Appropriate Dietary Behavior in Low-Income Patients with Type 2 Diabetes Mellitus 59.57% of the patients say they have difficulty of paying for healthy foods .One study done in Bahrain also shows 31.7 % of the patients have reported the cost of healthy food affects their dietary habit(67).

A cross-sectional analysis of the Survey of Lifestyle, Attitudes and Nutrition done by FFQ in Ireland showed that Dietary quality was associated with social class, educational attainment, food poverty and related core determinants of health(68). Anther cross sectional survey conducted among Kenyan type II diabetic patients showed that educational status, occupation, monthly income and level of dietary knowledge have an association with dietary pattern(49).

One study done in Bhutanese people on factors influencing eating behavior of people with type 2 Diabetes, accessibility and choice of food could be one factor prohibiting selection of healthy food among the participants, 75% of the participant didn't consume fruits and vegetables due to transportation and lack of supply, this study in line with the study done in yekatit hospital A.A in which 14.4 % of the study group mentioned non availability of fruits and vegetables and majority of the patients has difficulty of resisting temptation to unhealthy foods(7,43).

Family and social support are important aspects of adherence to diabetes management. Numerous correlation studies have shown a positive and significant relationship between social support and adherence to diabetes treatment(16,21,30,61). In study done in USA, Bahrain and A.A(Ethiopia) ,over half of the patients had good family support which leads to better long term self-management and better health outcomes (36,43,67). In contrast in UAE study only 45 % of the patients has family support(21).

The study conducted at yekatit 12 hospital in Addis Ababa, Ethiopia showed not getting nutrition education in hospitals , despondency, facing difficulty to choose foods , non-availability of fruits and vegetables , thinking about the high cost of foods were factors associated with poor dietary practice(43).

2.2.6 Conceptual frame work

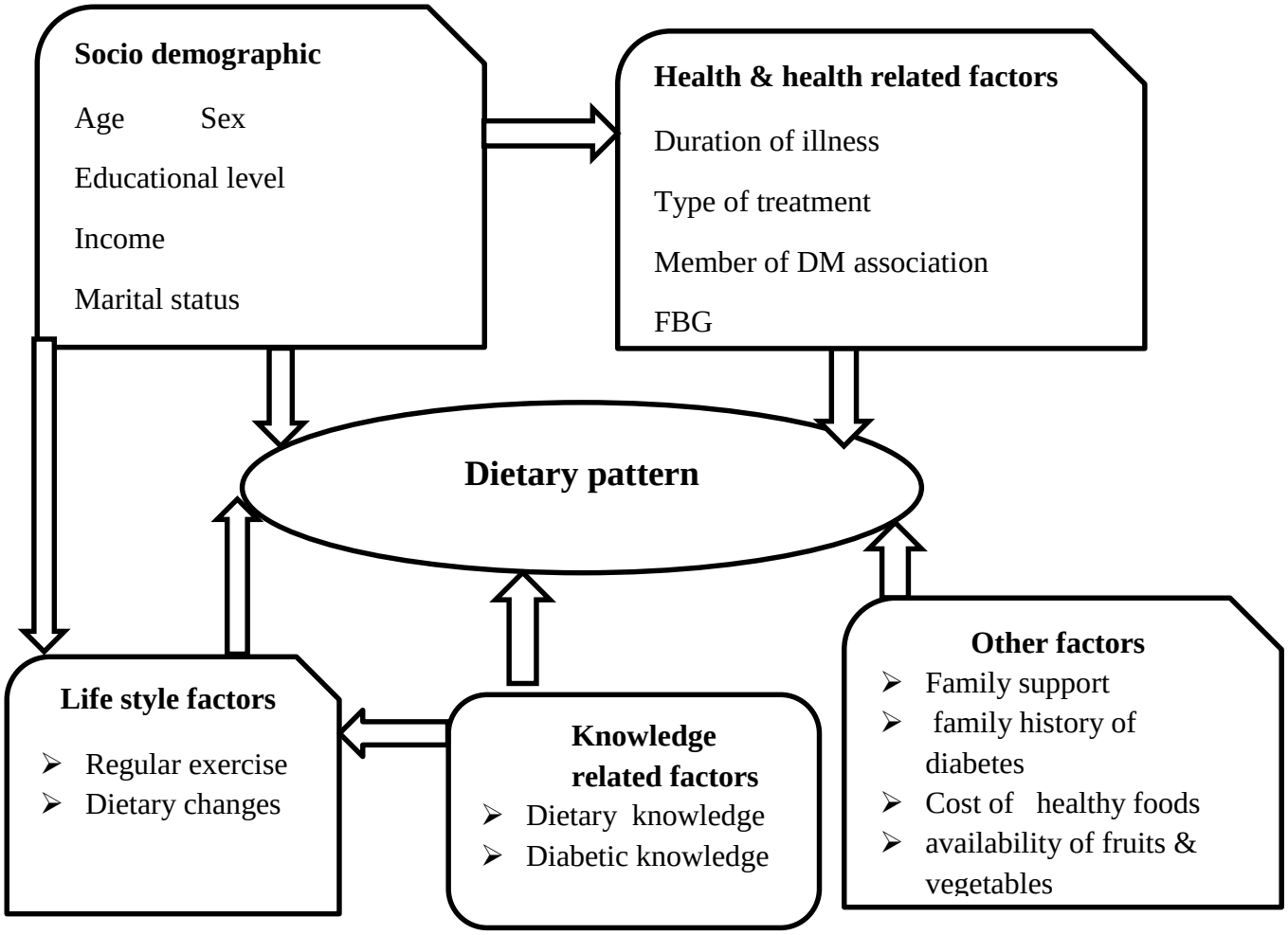

Figure 1: Conceptual framework indicating factors associated with dietary pattern among type 2diabetes at FHCSH Northwest, Ethiopia, 2021. Adapted from pervious literatures (17,30,34,45,58,69–74).

3. OBJECTIVE

3 .1 General objective

- To assess the dietary pattern and its associated factors among type 2 DM patients on follow-up in FHCSH Hospital, 2021.

3 .2 Specific objective

- To determine the dietary patterns of type 2 diabetic patients on follow up in Felege Hiwot Comprehensive Specialized Hospital.
- To identify the factors that affect the dietary patterns of type 2 DM patients on follow up in in Felege Hiwot Comprehensive Specialized Hospital.

4. METHODS AND MATERIALS

4.1. Study design and period

An institutional based cross sectional study design was conducted at Felege Hiwot Comprehensive Specialized Hospital (FHCSH) Bahir Dar city from March 30 up to May 1, 2021.

4.2. Study setting

Bahir Dar is found 565 kilometers away from Addis Ababa and located on the Southern shore of Lake Tana, the source of the Blue Nile. The total population size is 218,513 and ranks 7 in terms of population in Ethiopia from 40 cities. In Bahir Dar city administrative, a total of 156 health institutions are found, 3 hospitals,10 health centers,10 health posts and 134 private(primary, medium, specialty clinics and pharmacies) health institutions.

This study was conducted at FHCSH, which is the Comprehensive Specialized Hospital for Amhara Regional State, located in the central of the region Bahir Dar. The Specialty Hospital was founded in 1962 since that time it has served about 5 million people being as the referral hospital for many decades. The DM patients department is among the five inpatient departments in FHCSH. There are 7110 type 2 DM patients who had follow-up in the hospital of DM ward log book. Around 840 type 2 DM patients are accounted per month.

4.3 Population

4.3.1 Source population

All those type 2 diabetic patients in FHCSH who have registered for treatment and presenting to a follow up DM clinics.

4.3.2 Study population

All those type 2 diabetic patients who were on treatment follow up at outpatient department during the study period were included in the study.

4.4The inclusion and exclusion criteria

4.4.1. The inclusion criteria

All type 2 diabetes patients that had at least one follow up prior to data collection time and who came at time of data collection from March 30 up to May 1, 2021.

4.4. 2. The exclusion criteria

Patients who came for follow up for first time was being excluded

4.5. Sample size and sampling procedure

4.5. 1 Sample size determination

Sample size was calculated using single population proportion with the assumption; for the first objective.

95% confidence interval

5% margin of error (d)

35.9 % prevalence(30).

10 % non-response rate

$n = \frac{\left(Z_{\alpha/2}\right)^2 p(1-p)}{d^2}$, Where z= the standard score corresponding 95% confidence level

P=proportion of diabetic patients with good dietary practice (35.9%)

d=margin of sampling error (0.05) & n= sample size derived from estimation formula

Zα /2 = the value of Z at confidence level of 95%= 1.96

$$n = \frac{(1.96)^2 * 0.359(1-0.359)}{(0.0025)} \qquad n = 354$$

Considering 10% non-response rate contingency (%) = 354×10/100≈36

Therefore the final sample size for first objective was 354 +36=390. Sample size for the associated factors was determined using Epi info 7.0 by considering monthly income(9), family support(75) and educational status(43) as significant factors the sample sizes was as follow:

Table 1:- Sample Size Determination Using associated Factors of dietary pattern of type 2 diabetic patients at FHSH, 2021.

Relevant factor	AOR	CI at 95%	% Outcome in unexposed	%out come in exposed	Final Sample size
Monthly income >3000ETB	2.3	(1.2–4.6)	53.6%	72.7%	220
Family support	2.90	(1.65, 5.10)	35.34%	61.3%	130
Educational status	2.65	(1.62, 4.32)	34.48%	58.2%	154

Because the sample size calculated using good dietary pattern prevalence was higher than that of associated factors, 390 was the final sample size for this study.

4.5.2. Sampling procedure

Systematic sampling technique was used to select the study participant among type 2 diabetic patients, based on the flow rate that come for follow up during a month preceding the data collection. The list of patients (sampling frame) was obtained from the DM ward registration book of the patients registered for follow up in the hospital. Then the data collection was done using every Kth and selected cases were parts of sampling unit. The sampling interval 'k' was obtained by dividing the sampling proportion in one month's(N) to the number of sample(n) at data collection site (n') i.e. k = N' /n'. Type 2 DM case flow in preceding month was 840 cases, sampling interval 'k" =840/369 ~ 2.

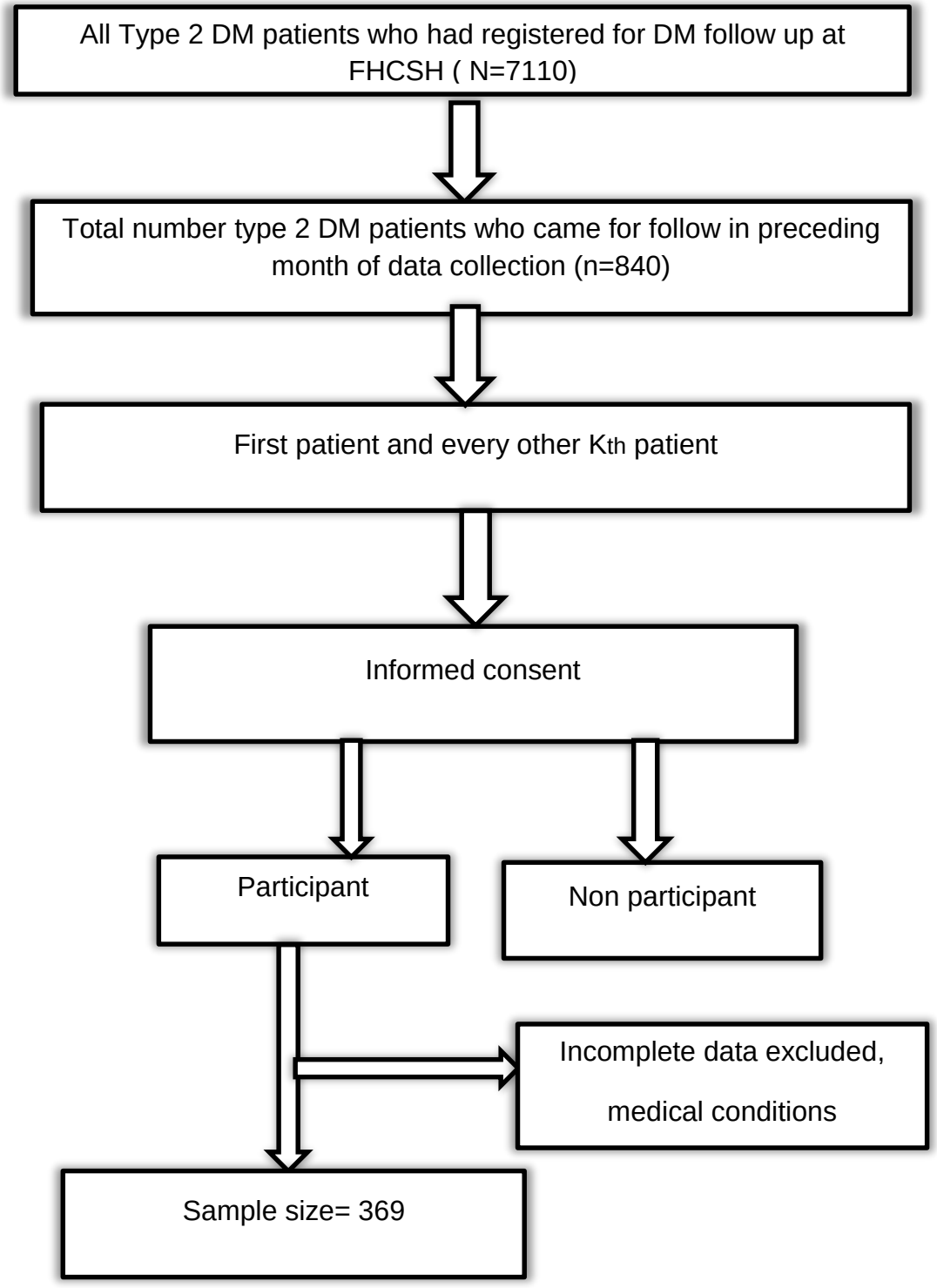

Figure 2: Flow chart showing the sampling technique.

4.6 Study variables

4.6.1 Dependent variable

Dietary pattern (good/poor)

4.6.2 Independent variables

Socio-demographics:- age, sex, religion, income, and educational status

Knowledge related factors:- nutritional knowledge, diabetic knowledge

Health and health related factors:- duration of illness, way of treatment, member of association, comorbidity and FBS.

Life style factors:- regular physical activity, dietary changes

Other factors:- Family support, family history of DM, cost of healthy foods, source of information, and availability of fruits and vegetables.

4.7 Operational and Standard definitions

1. Dietary pattern –"Quantities, proportions, variety or combination of different foods and beverages in diets and the frequency with which they are habitually consumed".

1.1 Good dietary pattern: - study participants who consumed 5 and above food groups from 10 food groups(32).

1.2 Poor dietary pattern: - study participants who consumed below 5 food groups from 10 food groups(32).

4. Fasting test results: the result of fasting test with respect to glucose level in the body in which the result is normal if it is between 3.9 to 5.5mmol/l (70 to 100mg/dL) and more than 7.0mol/l (126mg/dl) will be poor. It has been rated high, optimal, and low according to the range provided by the International Diabetes Federation(3).

6. Comorbidities- "the presence of one or more additional disease occurring with primary disease".

7. Good knowledge: - when patients respond the mean or above the mean score on knowledge questions.

8. poor knowledge: - when patients respond below the mean score on knowledge questions.

9.Doctor's advice:- emphasizes the intake of less fat, more fiber, less sodium and more foods that have health-promoting properties such as fish, soy products, fruits and vegetable, and doing physical activity(77).

4.8 Data Collection tools and procedure

4. 8. 1 Data Collection tools

Data were collected using structured questionnaire which was developed and contextualized from different literatures and guidelines. The questionnaires included questions covering diabetic risk factors, demographics, monthly income, duration of diabetes, lifestyle, health profiles of the participants, barriers to adherence to good dietary patterns, diabetic knowledge and sources of information from the study participants using an interview-based structured questionnaire adapted from the WHO manual and reviewing different literature (16,30,31). Dietary knowledge of the patient was adapted from a development of a general nutrition knowledge questionnaire for adults(78).

Dietary data: The questionnaire also included a non-quantitative FFQ. The list of food items in the FFQ is created from locally consumed foods. For obtaining the dietary pattern, a value of one was given if participants have consumed from the food group and a value of zero was given if not consumed from the food group, with a maximum value of 10 if consumed from all 10 food groups. Dietary pattern was termed as low if the minimum DDS is below five and high if it is five and above. The standard questions were adopted from guidelines for measuring individual dietary diversity from FAO 2016 guidelines (32).

Fasting test results: the result of fasting test with respect to glucose level in the body in which the result is normal if it is between 3.9 to 5.5mmol/l (70 to 100mg/dL) and more than 7.0mol/l(126mg/dl) will be poor. FBS data was taken from the patient's file. The last FBS value was recorded for analysis. It was rated poorly controlled or good controlled according to the range provided by International Diabetes Federation(3).

4.8.2 Data collection procedure

Structured questionnaires were filled up via face to face interview by trained data collectors after the questionnaire pretested and relevant modifications were made before the start of the actual data collection. The study participants were invited to participate voluntarily by explaining the rationale of the study at the time of data collection. Two clinical nurses (degree) holder were recruited as data collectors and one public health officer and principal investigator were worked as supervisors. Data collectors and supervisor were trained for two days before and after pretest by the principal investigator on the questionnaire to be familiar with data collection tool. Editing and sorting of the questionnaires were done to determine the completeness and consistency of data every day during the data collection. The completed questionnaires were cross checked and made correction on daily basis.

4.9 Data quality management

The quality of the data was assured by proper designing and pre testing of the questionnaire in other hospital with similar socio-demographic characteristics to ensure its reliability. The questionnaire was prepared in English then translates to local language Amharic and back translated to English to check for its consistency. Pre-testing of the assessment tool was done on 39 type 2 DM patients at Tibebe Ghion Specialized Hospital. Modifications were made on the questionnaire based on the feedback found from the pre-test. The completeness of the data would check every day by supervisor and principal investigator, and the data collectors were asked to refill the data if incomplete data are found.

4.10 Data management and analysis

Data were checked for fulfillment and clean physically. Incomplete and inconsistent data were excluded from the analysis. The collected data is enter to EPI Data version 3.1 and then exported to SPSS version 23 for further analysis. Descriptive statistics were used to describe the sample. The results of the descriptive statistics were expressed as percentages and frequencies. Associations between independent and dependent variables were first analyzed using bivariable analysis to identify factors associated with the outcome variable. Those variables which were found to have an association with the outcome variable at $P<0.25$ were used in multivariable logistic regression to test for independent association. The magnitude of the association between different independent variables in relation to the dependent was measured using odds ratios, 95% confidence interval (CI) and *P*-values <0.05 were considered to be statistically significant.

4.11 Dissemination of results

Result will be submitted to Bahir Dar University School of Public Health. The result shall be disseminated to Amhara regional Health Bureau, Federal Ministry of Health (FMoH) and Ethiopian diabetic association and shall be presented to different workshops and Publication in peer-reviewed journals.

4.12 Ethical Consideration

Ethical clearance is obtained from institutional board of Bahir Dar University School of public health research ethical committee. The permission letter was obtained from Amhara Public Health Institute (APHI) and Felege Hiwot Comprehensive Specialized Hospital medical director office. The nature of the study was fully explained to the type 2 DM patients to obtain their oral consent. The participants had also the right to refuse or terminate their participation at any point of time. The information provided by each respondent was kept confidential through anonymous recording and coding of questionnaire.

5. RESULTS

5.1 Socio demographic characteristics

A total of 369 diabetic patients were participated in this study, yielding a response rate of 94.6%. Among them, 220 (59.6 %) patients were males. The age of the study subjects was 20 to 83 years with mean (±SD) age of 55.5(±12.4) years. Three hundred fifty one (95.1%) of the study participants were Amhara in Ethnicity and Orthodox Christians followers were 279(75.6%).

Three hundred (81.3%) patients attended formal education. Regarding monthly income of the study participants, 95 (25.7%) of them had below 1,100 Ethiopian birr per month whereas 56(15.2%) of the respondents got more than 10,149 Ethiopian birr. One fourth of the respondents were housewives 94(25.5%) and retired 93(25.2%) (Table 1).

Table 2: Socio demographic characteristics of type 2 Diabetes patients who were on follow up at Felege Hiwot Comprehensive Specialized Hospital Bahir Dar, Ethiopia (n=369)

Variables	Category	Frequency	%(percentiles)
Age	Under 40	46	12.5
	40-60	203	55
	Above 60	120	32.5
Sex	male	220	59.6
	female	149	40.4
Religion	Orthodox	279	75.6
	Muslim	84	22.8
	Other	6	1.6
Marital status	Married	297	80.5
	Unmarried	21	5.7
	Widowed	51	13.8
Ethnicity	Amara	351	95.1
	Other*	18	4.9
Educational status	Illiterate	148	40.1
	Can read and write	37	10.0
	Primary education	2	0.5

	Secondary education	93	25.2
	College and above	89	24.1
Occupation	Gov't employee	64	17.3
	Merchant	68	18.4
	Retired	93	25.2
	House wife	94	25.5
	Private	28	7.6
	Others**	22	6.0
Income(ETB) #	1100 and below	53	14.4
	1101-2799	130	35.2
	2800-7071	136	36.9
	7072 and above	50	13.6

*In Ethnicity Other includes Tigrie and Oromo

**In occupational status "others" included Farmers, daily laborers, and derivers.

Income is categorized in quartile based on Ethiopian civil service salary scale of 2019/ 2011 E.C.

5.2 Health profile of type 2 DM patients

Less than half, 160 (43.4%) patients were on follow up for less than 5 years while 34(9.2%) patients were on follow up for above 15 years. One hundred seventy eight (48.2%) patients reported that they had family history of DM. Nearly two third, 237 (64.2%) patients had co-morbidity. Majority of the study subjects 347(94%) used oral hypoglycemic agents while 52 (14.1%) used insulin to control blood sugar level. Three fourth, 205 (55.6%) respondents said they had made change of dietary habit when they knew they have diabetes (Table 2).

Table 3: Health profile of type 2 Diabetes patients who were on follow up at Felege Hiwot Comprehensive Specialized Hospital Bahir Dar, Ethiopia (n=369).

Variables		**Frequency**	**%(percentiles)**
Duration of disease since diagnosed (years)	Below 5	160	43.4
	5-10	123	33.3
	11-15	52	14.1
	16-20	25	6.8
	21 and above	9	2.4
duration of follow up (years)	Below 5	160	43.4
	5-10	123	33.3
	11-15	52	14.1
	16-20	25	6.8
	21 and above	9	2.4
Family history of DM	Yes	178	48.2
	No	191	51.8
Having comorbidity	Yes	237	64.2
	No	132	35.8
dietary change after having DM	Yes	205	55.6
	No	164	44.4
Type of treatment modalities*	Insulin injection	52	14.1
	Oral hypoglycemic agent	347	94.0
	Controlled Diet	120	32.5

	Physical Exercise	104	28.2
Advice from Doctor	Yes	352	95.4
	No	17	4.6
DM association	Yes	185	50.1
member	No	184	49.9
Fasting blood	Poorly controlled	266	72.1
sugar	glycemia		
	Good controlled	103	27.9
	glycemia		

***%** more than 100 because some patients used more than one treatment options.

5.3 Dietary knowledge of type 2 DM patients

With respect to knowledge about the recommended diet majority of the patient (53.7%) had poor dietary knowledge. The Mean ± SD knowledge score was 7.0 ± 1.65. Majority (81.3 %) of the respondent knew dietary modification as one of the ways to control blood glucose level. Only 45(12.2%) patients knew that consumption refined grains have immediate effect on blood glucose level. Two hundred fifty two (68.3%) of patients knew that consumption of vegetables used to achieve good glycemia. Majority 249(67.5%) of participant knew that skipping meal time couldn't help to control blood sugar level (Table 3).

Table 4: Dietary knowledge of type 2 DM patients on follow up in Felege Hiwot comprehensive specialized Hospital, Ethiopia 2021 (n=369).

Questions	Yes (%)	No (%)
Know the benefit of exercise for glycemic control	164(44.4)	205(56.6)
Know the benefit of dietary modification for glycemic control	300(81.3)	69(18.7)
Know the benefit of weight reduction for glycemic control	66(17.9)	303(82.1)
Know taking refined carbohydrate increase blood glucose level	45(12.2)	324(87.8)
Know taking whole grains decrease blood glucose level	123(33.30	246(66.7)
Know the benefit of mixed eating from different food groups control blood glucose	216(58.5)	153(41.5)
Know fast foods raises blood sugar level	194(52.6)	175(47.4)
Know taking fat raises blood sugar level	300(81.3)	69(18.7)
Know the benefits of eating fruit daily helps to achieve good glycemia	133(36)	236(64)
Know the benefits of eating vegetables daily helps to achieve good glycemia	252(68.3)	117(31.7)
Know eating fiber daily helps to achieve good glycemia	79(21.4)	290(78.6)
Know drinking soft drinks raises blood sugar level	18(4.9)	351(95.1)
Know fat of meat raises blood sugar level	255(69.1)	114(30.9)
Know eating fruit as Not juicing/whole fruit	226(61.2)	143(38.8)
Know half of the plate should covered by vegetable and fruit	109(29.5)	260(70.5)
Know skipping meal couldn't help to control blood sugar level	249(67.5)	120(32.5)
Knowledge score (mean± SD)	**7.0 ± 1.65**	

5.4 Dietary pattern of type 2 DM patients

About 47.7%, (95% CI: 42.5-52.8) had had good dietary pattern. The most frequently consumed food groups were starchy staples (grains) (100%) and pulses (85.6%). The least consumed food groups were nuts and seeds (6.7%) and followed by diary product food groups (13%). Among 10 food groups' grains and pulses are the major food groups that were consumed by the study participants daily. About one hundred thirty eight (35.8%) and two hundred thirty one (59.8%) of participants consumed fruits and vegetables respectively. Around half of the respondents did not consume any dark green leafy vegetables or any meals fortified with vitamin A substances and other fruits. Among those who consumed fruits 62 of them consume once per day and the rest consumed twice per week. Among those who consumed vegetables, 80% consumed twice per week and 20% consumed once per day (Table).

Table 5: Distribution of the respondents by consumption of food from different groups (n=369)

Food groups	Response(yes/No)	**Frequency(n=369)**	**%(percentiles)**
Starchy staples	Yes	369	100.0
	No	0	0.0
Pulses	yes	318	85.6
	No	53	14.4
Nuts and seeds	Yes	24	6.5
	No	345	93.5
Dairy products	yes	48	13.0
	No	321	87.0
Meat, Poultry and Fish	yes	142	38.5
	No	205	55.6
Eggs	yes	164	44.4
	No	341	92.4
Dark green	yes	123	33.3
vegetables	No	264	66.7
Other Vitamin A	Yes	140	37.9
	No	229	62.1
Other vegetables	yes	219	59.3
	No	150	40.7
	Yes	132	35.8
Other Fruits	No	237	64.2

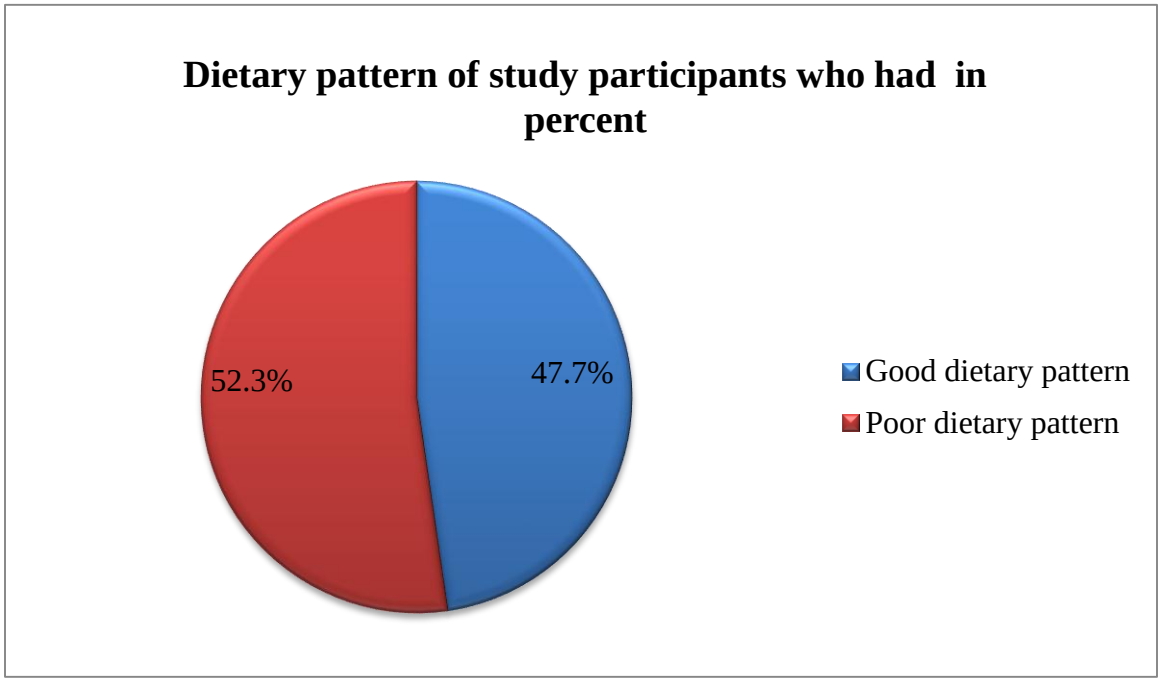

Figure 3: Dietary patterns of type 2 diabetic patients in percent at Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar Ethiopia 2021 (n=369).

5.5 Factors affecting the dietary pattern of type 2 diabetic patients

The bivariate logistic regression analysis showed that marital status, educational status, monthly income, comorbidity, diabetic knowledge on recommended diet, family history of DM, regular physical activity, family support, cost of healthy foods, availability of fruits and vegetables and , dietary knowledge were statistically associated with dietary pattern of type 2 Diabetic mellitus patients.

From the multivariable logistic regression analysis type 2 Diabetic patients who attended secondary education and above had 2.2 times higher odds of having better dietary pattern than those who attended less than secondary school[AOR=2.2, 95% CI (1.3,3.5)]. Patients who had family support were 2.2 times more likely to have better dietary pattern than patients who had no family support [AOR=2.2, 95% CI (1.3, 3.7)]. Likewise patients who have fruit availability had 2.4 times higher odds of having better dietary pattern than their counterparts [AOR=2.4, 95%CI (1.1, 5.6)]. Patients who were a member of Diabetic Association were 1.8 times more likely to have better dietary pattern than those who were not a member[AOR=1.8,95%CI(1.2, 2.9)]. Diabetic patients who had good knowledge about recommended diet were 1.8 times more likely to have better dietary pattern than that of patients who have poor knowledge about recommended diet[AOR=1.8,95%CI(1.1,2.8)]. Similarly patients who had comorbidity1.8 times more likely to have better dietary pattern than those who had not [AOR=1.8, 95% CI (1.1, 2.9]. (Table 5).

Table 6: Factors associated with dietary pattern of type 2 diabetic patients at Felege Hiwot Referral Hospital, Bahir Dar, Ethiopia, 2021(n=369).

Variables	**Category**	**Dietary pattern**		**COR (CI, 95%)**	**AOR (CI, 95%)**
		Good	**Poor**		
Sex	Male	116	104	1.00	0.8(0.5-1.3)
	Female	60	89	1.6(1.1,2.5)	1.00
Marital status	Unmarried	34	48	1.00	1.00
	Married	142	145	1.4(0.8,2.3)	1.01(0.58-1.8)
Educational status	Primary and below	66	127	1.00	1.00
	2ndary and above	97	79	2.4(1.6,3.6)	**2.2(1.3,3.5)****

Regular physical activity	Inactive	108	141	1.00	1.00
	Active	68	52	1.7(1.1,2.7)	0.87(0.47-1.6)
Family history of DM	Yes	76	107	1.5(0.9,2.3)	0.4(0.3-0.9)
					1.00
	No	100	90	1.00	
Have not	yes	38	69	1.00	1.00
Family support	No	138	124	2.0(1.3,3.2)	**2.2(1.3,3.7)****
Cost of healthy foods	Yes	78	105	1.00	1.00
	No	98	88	1.5(0.9,2.3)	0.83(0.5-1.35)
Unavailability of fruits	Yes	11	22	1.00	1.00
	No	165	171	2.2(1.4,3.3)	**2.4(1.1,5.6)***
Being DM ass. member	Yes	99	86	1.0(1.1,2.4)	**1.8(1.2,2.9)****
	No	77	107	1.00	1.00
Knowledge	Good know.	78	123	1.00	**1.8(1.1,2.8)***
	Poor know	98	70	2.2(1.4,3.5)	1.00
	Very low	30	65	1.00	1.0
	low	57	69	1.8(1.0,3.1)	0.9(0.39-2.01)
Income#	Average	21	20	2.3(1.1,4.8)	1.4(0.66-2.89)
	High	28	23	2.6(1.3,5.3)	1.1(0.42-2.66)
	Very high	40	16	5.4(2.6,11.1)	1.3(0.59-3.16)
Comorbidity	Yes	103	134	1.6(1.1,2.5)	**1.8(1.1,2.9)***
	No	73	59	1.00	1.0

*= Significant during multivariable analysis (p< 0.05), 1.0 =reference, Backward logistic regression was done. Hosmer and lemeshow goodness of fit of the model p-value=0.859. **Unmarried^** includes single, divorced and widowed. COR= crude odd ratio, AOR= adjusted odd ratio, and CI =confidence interval.

6. DISCUSSION

The study was conducted with the intention to assess dietary pattern and associated factors among type 2 diabetic patients. The study showed that more than half proportion of type 2 diabetic patients have poor dietary pattern. In this study 47.7% [95%, CI: (42.6, 52.8)] of the participants had good dietary pattern(≥ 5 food groups). The finding on good dietary pattern in this study is better than the study finding in Riyadh Saudi Arabia (41.7%) (79), United Arab Emirates (40%) (63), Tikur Anbessa Specialized Hospital Addis Ababa (22.2%) (29), Dilchora General Hospital Dire Dawa (37.5%) (16) and Felege Hiwot Hospital, Bahir Dar (35.9%) (30). This difference might be because of the time gap between the studies conducted, socioeconomic status, and difference in diet habit of the patients. At this time the means of getting information about healthy dietary pattern and diabetes management mechanisms disseminated through different Media. Now there is also high internet coverage than before so they can get information easily and in understandable manner. Nutrition education is given through different media on diabetes patients diet than do earlier, so this plays a crucial role for improving knowledge on diabetes diet.

But it is lower than studies done in Ahmadabad district of Gujarat state of India (73%) (21), in five health regions of Bahrain (89.5%) (67), and Adare General Hospital Hawassa, Ethiopia (55.2%) (9) . The difference might be due to differences in the study setting and population, data collection tools, socioeconomic status as well difference in diet habit of the patients. Additionally, the differences also might be due to having different information, education, and the availability of a healthy diet in the area and communication strategies in those countries. So this implies the need for sustained effort to promote healthy dietary pattern for diabetes patients in this study area is crucial.

Another study also done in Uganda on the factors affecting adherence to nutrition therapy found that the practice of recommended nutrition therapy only 27.1% of the diabetic patients had good dietary pattern(80). The difference could be explained by the time gap between study conducted, the variation in the settings of the study, difference in the socioeconomic and socio-demographic characteristics, number of study participants, study design used as well as difference in the types of foods available in the two regions.

Educational status of respondents had an association with their dietary pattern. Study participants who are attended secondary school and above had 2.2 times more likely to have good dietary pattern than counterparts. This is in line with two study findings in Iran(37,81), Bahrain(67), Tikur Anbesa Specialized Hospital, Addis Ababa, Ethiopia(43), Dilchora general Hospital, Dire Dawa, Ethiopia(16) and FHCSH(30). The association between higher educational attainment of respondents and fitting dietary pattern might be described by the fact that patients with better education have better access to information from books, leaflets, newspaper and social media than uneducated patients. In addition, educated participants were better able to understand nutrition education provided by professionals or through the mass media than uneducated people.

Being an association member of Diabetes Mellitus was also another factor that had positive association with good dietary pattern which had 1.8 times more likely to have good dietary patter than who were not a member. This is due to patients who become an association member they have received diabetes education are more likely to use primary care and preventive services, take medications as prescribed, control their blood glucose level and have lower health costs.

In this study, patients who had family support were 2.2 times more likely to had good dietary pattern as compared with patients who had not family support. Having family support is a crucial to promoting good dietary pattern. This study is supported by the study done in Bahrain(67),Systematic review on Thailand(82), Nepal(44), Jimma medical center, south west Ethiopia(83), Adare Hospital, Hawassa South Ethiopia(9), Felege Hiowt Comprehensive Specialized Hospital(30) ,and Debretabor General Hospital, North west, Ethiopia(15). This might be due to being busy and did not understand what to do, may be due to lack of awareness and insufficient knowledge about dietary regimen of diabetes among families and friends. Family support has a major impact on the patient's ability to manage their chronic illness on their own. Friends and families can promote good health by influencing a person's daily behavior, and the loss or reduction of that support can have negative health effects(84). Family members are key foundations of both instrumental and emotional support. Instrument support includes assisting patients' complete specific responsibilities, such as making an appointment with health care providers or helping with insulin injections while, emotional support can include providing

comfort and encouragement when patients face distress or frustration over the long course of their diabetes care(82)

On the other hand, the findings from this study contradict the study conducted in Yekatit 12 Medical College Hospital, Addis Ababa(43). These researchers, who examined nutritional practices and related factors in type 2 diabetes, found that social support was not linked to poor nutritional practices in diabetic patients. The differences in results between this study and the present study could be due to variation in the settings of the study and difference in socio-demographic characteristics.

Patients who got nutritional education from doctors on diabetes diet were more likely to have good dietary pattern than those who didn't get. This result is similar to the study result in Dilla University referral hospital, Southern Ethiopia(42), Felege Hiwot Comprehensive specialized Hospital Bahir Dar Ethiopia(30), Iran(37), Dilchora Hospital Dire Dawa, Eastern Ethiopia(16) and Nepal (44). This because of nutrition education can change eating habits of the patients.

Frequent education about diabetes at hospitals and frequent DM education per year were associated with the good dietary pattern of the patients. This is in line with a study evaluating nutritional practices among diabetics at Yekatit 12 Medical College Hospital, Addis Ababa(43) and study done in South Africa which has identified the need for nutrition education related to diabetes care for optimal diabetes management(85). Those who get nutrition education and who get more frequent nutrition education follow the advices from clinicians and have better knowledge and understanding about the foods suitable for condition of their disease, food guides and prescriptions than those who don't get nutrition education.

Availability of fruits and vegetables was another factors significantly associated with good dietary pattern. Participants who have no fruits and vegetables availability problem were 2.4 times more likely to had good dietary pattern than those who did. This result is in line with studies done a report on creating healthy food and eating environments in the United States of America(86) and study done in Adare Hospital Hawassa(9). This may be due to the seasonality of fruits and vegetables which make the patients suffer from difficulty to take the recommended type and amount of fruits and vegetables, leading to poor dietary pattern.

Comorbidity was also another factor affecting the dietary patterns of diabetic patients. Diabetic patients who have comorbidity 1.8 times more likely to had better dietary pattern than those who had not comorbidity counterparts. This may be due to fear if they have comorbidity, they will strictly follow good dietary pattern.

7. Strength and limitation of the study

The data was collected by the department staff members so it gives an advantage to keep the quality of data.

This study has its own limitation; first the assessment of dietary pattern was based on self-reported dietary habits rather than direct observation. This may led to under reporting of socially undesirable responses and recall bias. Using self-reported dietary pattern as a measure of the level of practice may introduce social desirability bias. Since this study used non quantitative FFQ, there may be measurement errors such as over-reporting or underreporting of food consumption in general or of specific foods. Seasonal variation was also not covered and is the other limitation of the study.

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8. CONCLUSIONS

The study founded that majority of respondents had high prevalence of unhealthy dietary pattern and needs dietary modification. The factors improving the outcome variables were thoroughly analyzed. Attending Secondary school and above, having family history of DM, Bing DM association member, having comorbidity, the price of the food not to be costly, having family support, having good knowledge on recommended diet and availability of fruits and vegetables have positive association with good dietary pattern.

9. RECOMMENDATIONS

To the Hospital administrative bodies

- ✓ It is better to have routine nutrition education program and standardize this nutrition education that is given to type 2 patients and help to foster good eating habits among type 2 diabetic patients.

To Ministry of Agriculture:

- ✓ The Agricultural sector is better to design effective and efficient mechanisms of fruits and vegetables production throughout the year rather than season based.

To family Members and Patients

- ✓ Family members should be informed about their important roles in encouraging patients to undergo DM management with diet.
- ✓ Patients are better to become an association member because they will receive diabetes education are more likely to use primary care and preventive services, take medications as prescribed, control their blood glucose level and have lower health costs.

To Researchers:

- ✓ Further study which could see the association longitudinally is also recommended to address seasonal variability.

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Bahir Dar University
School of public health
Department of Nutrition and dietetics
ANNEXES

Annex-1 Subject Information Sheet

My name is …….. I am here on behalf of Shambel Abate student of Bahir dar University School of public health department of public health nutrition. He is doing a research on 'The Association between dietary pattern and glycemic control among type 2 DM patients. He received permission from Bahir dar university school of public health and the hospitals.

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

If you agree to participate in the study, you will be asked to answer some questions about yourself, your dietary pattern and knowledge of diet. The interview with you will take about 30 minutes.

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

Address: Cell phone +251 (0) 913863363 Gmail: shambelabate@gmail.com Questionnaires ID--

Annex 2-Informed Consent Form

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

A) Yes

B) No

(1) If yes, I will continue a

2) If no I will skip to next participant after writing the reasons of refusal.

Respondent

Signature_____ Date _____

Interviewer

Name _____ Signature_____ Questionnaires number___

Date of interview____ starting time____ Completed____

Result of interview

A) Completed

B) Not completed

C) Partially completed

D) Refused

Checked by Supervisor: Name_____ Signature_____

Address: Cell phone +251 (0) 913863363

Email: shambelabate@gmail.com

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

Annex 3-english version questionnaires

Part 1 -Socio demographic

On this section of the questionnaire I will ask you few questions about your socioeconomic status and you will choose one or more choices from the answers

No	Questions	Responses	Skip to
101	What is your age	----------year	
102	Sex	Male……1 Female……..2	

103	What is your religion?	Muslim……...1 Orthodox…….2 Protestant ……..3 Catholic…….....4 Other……5	
104	What is your marital status?	Married… ..... Single..... Widowed… ..... Divorced…	
105	What is your Ethnicity?	Amhara ..... Tigre ..... Oromo..... Others (Specify)	
106	Have you attended	Yes.....1 No…..... 2	go to 107
107	What is your Educational level?	Can you read and write .....1 Primary school .....2 Secondary school .....3 College graduate or above 4	
109	What is your occupation? (multiple answer is possible)	Farmer.....1 Government employee.....2 Merchant .....3 Private organization employee..... 4 Daily laborer .....5 House wife .....6 Other… 7	
110	Monthly income (if married write the v income)		

Section 2 Health profile questions

On this section of the questionnaire I will ask you few questions about the health profile and I will ask you to choose one or more answers from the choices

201	How long has it been since you Diagnosed with DM?		
202	How long has it been since you started DM follow up?		
203	Do you have other Comorbidity diseases	No…..... 1 Yes..... 2 If yes what type of co morbidity? Hypertension…..... 1 Hyperlipidemia .....2 CVD.....3	
204	Do you have family history of DM?	Yes.....1 No…..... 2	
205	How do you control your diabetes so far? (multiple answer is possible)	By insulin…..... 1 Tablets.....2 By controlling diet .....3 By exercise..... 4 Other 5	
206	Have you made a complete change of your dietary habit when youknow you are diabetic?	Yes..... No…..... 2	
207	What is your source of information about diabetic	Media .....1 Doctors.....2	

	diet?(multiple answer is possible)	Nurses ..... 3 Dietitians .....4 Social medias .....5 Diabetic patients..... 6 Non diabetic patients..... 7 Neighbors 8	
208	Does your doctor give you advice about DM patients diet?	Yes.....1_ No…..... 2	Go to 209
209	What does your doctor recommend that you should be eating more?	To eat whole grain…..... 1 To eat more vegetable .....2 To eat fruits .....3 Meat and dairy products..... 4 Cereals..... 5 To avoid sweets.....6	
210	Have you participated in a regular exercise?	Yes, usually (3 times a week for 30 min)…1 Yes, occasionally(less than 3 times a week..... No, never.....	
211	Which of the following factor affects your dietary habit although you wanted to follow recommended diet? Circle more than if there is any	Family support .....1 Cost of healthy foods .....2 Availability of fruit and vegetable ..... 3 Poor dietary knowledge .....4 Got no problem 5	
212	Are you a member of diabetic associations?	Yes.....1 No..... 2	
213	What was the last blood level?	FBS_____	

Section 3 - Diabetic nutritional knowledge questions

On this section of the questionnaire I will ask you few questions about your nutritional knowledge and I will ask you to choose one or more answers from the choice

301	What do you know regarding life style modification(multiple answer is possible)	Exercise ..... 1 Dietary modification..... 2 Weight loss..... 3 I don't know..... 4	
302	Which of the food groups raises blood glucose relatively faster?	Carbohydrate ..... 1 Fiber..... 2 Fat .....3 Protein…..... 4 I don't know……. 5	
303	Which of the following should you do to control your blood glucose? (multiple answer is possible)	Eating foods prepared only of barley…..1 To eat from different cereal type with limited amount and mixing with other food groups .....2 To take food small or no sugar… .....3 To skip breakfast and dinner..... 4	
304	Which food do you think raises your blood level relatively faster?	Whole grain .....1 Refined grains..... 2	
305	Which one is source of carbohydrate?	Barley,tef,bread,rice,kocho,sorghum… 1 Meat,egg,milk,yoghurt ..... 2 Kale, Cabbage, Salad…..... 3 I don 't know..... 4	
306	Which food helps to achieve good glycemic control? Read the choices (multiple answer is possible)	Eating fruits daily .....1 Eating vegetables daily..... 2 Avoiding cereals ……3 Eating fiber… .....4 I don't know..... 5	

307	Which one of the following raises blood glucose relatively faster?	Butter… ..... 1 Meat .....2 Enjera .....3 Carrot 4	
308	Which food group should a person with DM eat the most of time?	Milk, yogurt, cheese..... 1 Fats, oils, sweets .....2 Vegetable and fruit .....3 Meat, fish, poultry..... 4	
309	Which one is good to control blood glucose on a person with a diabetes?	Juices..... 1 Eating fruits without juicing……2	
310	On a person with diabetes what proportion of the plate should be vegetable and fruit?	half or ½… .....1 1/3…….2 ¼…….…… 3 I don't know……...……..4	
311	Do you believe that skipping meal can help you control your blood glucose level	Yes I do believe so… .....1 No I don't believe so……..2	

Section four –Food frequency questionnaire

Instruction –Dear respondent please take few moment to memorize the food and drinks you ate within the last **one month** and I will say the food items if you consume the food type you will tell me how often you ate.

S.No	**Variable**	**Response**	
		If yes for the following questions, how often per day or week or month were followed to each question whereas if the response is no go to the next question of each	
Cereals			
1	Did you take teff in the last three months?	1.Yes 2.No	Per day--week--month --
2	Did you take dagusa (millets) in the last three months?	1.Yes 2.No	Per day--week--month --
3	Did you take maize in the last three months?	1.Yes 2.No	Per day--week--month --
4	Did you take wheat in the last three months?	1.Yes 2.No	Per day--week--month --
5	Did you take barley in the last three months?	1.Yes 2.No	Per day--week--month --

6	Did you take sorghum in the last three months?	1.Yes 2.No	Per day--week--month --
7	Did you take rice in the last three months?	1.Yes 2.No	Per day--week--month --
Legumes			
8	Did you take beans in the last three months?	1.Yes 2.No	Per day--week--month --
9	Did you take peas in the last three months?	1.Yes 2.No	Per day--week--month --
10	Did you take soybeans in the last three months?	1.Yes 2.No	Per day--week--month --
11	Did you take lentils in the last three months?	1.Yes 2.No	Per day--week--month --
12	Did you take kidney beans in the last three months?	1.Yes 2.No	Per day--week--month --
13	Did you take chickpeas in the last three months?	1.Yes 2.No	Per day--week--month --
14	Did you take grasspeas in the last three months?	1.Yes 2.No	Per day--week--month --
15	Did you take nuts in the last three months?	1.Yes 2.No	Per day--week--month --
16	Did you take lupines in the last three months?	1.Yes 2.No	Per day--week--month --
17	Did you take sunflower seeds in the last three months?	1.Yes 2.No	Per day--week--month --
18	Did you take linseeds in the last three months?	1.Yes 2.No	Per day--week--month --
19	Did you take niger seeds in the last three months?	1.Yes 2.No	Per day--week--month --
20	Did you take sesame seeds in the last three months?	1.Yes 2.No	Per day--week--month --
Vegetables			
21	Did you take potatoes in the last three months?	1.Yes 2.No	Per day--week--month --
22	Did you take sweet potatoes in the last three months?	1.Yes 2.No	Per day--week--month --
23	Did you take beetroots in the last three months?	1.Yes 2.No	Per day--week--month --
24	Did you take Ethiopian collard greens (gomen) in the last three months?	1.Yes 2.No	Per day--week--month --
25	Did you take cabbages in the last three months?	1.Yes 2.No	Per day--week--month --
26	Did you take carrots in the last three months?	1.Yes 2.No	Per day--week--month --
27	Did you take tomatoes in the last three months?	1.Yes 2.No	Per day--week--month --
28	Did you take salads in the last three months?	1.Yes 2.No	Per day--week--month --
29	Did you take pumpkin in the last three months?	1.Yes 2.No	Per day--week--month --

30	Did you take Kosta in the last three months?	1.Yes 2.No	Per day--week--month --
31	Did you take greenpeppers in the last three months?	1.Yes 2.No	Per day--week--month --
	Did you take peppers in the last three months?	1.Yes 2.No	Per day--week--month --
	Did you take onions in the last three months?	1.Yes 2.No	Per day--week--month --
	Did you take garlic in the last three months?	1.Yes 2.No	Per day--week--month --
Meat			
32	Did you take meat in the last three months?	1.Yes 2.No	Per day--week--month --
33	Did you take chicken in the last three months?	1.Yes 2.No	Per day--week--month --
34	Did you take fish in the last three months?	1.Yes 2.No	Per day--week--month --
35	Did you take eggs in the last three months?	1.Yes 2.No	Per day--week--month --
Dairy products			
36	Did you take milk in the last three months?	1.Yes 2.No	Per day--week--month --
37	Did you take cheese in the last three months?	1.Yes 2.No	Per day--week--month --
38	Did you take yogurt in the last three months?	1.Yes 2.No	Per day--week--month --
39	Did you take whey in the last three months?	1.Yes 2.No	Per day--week--month --
Fruits			
40	Did you take bananas in the last three months?	1.Yes 2.No	Per day--week--month --
41	Did you take oranges in the last three months?	1.Yes 2.No	Per day--week--month --
42	Did you take papayas in the last three months?	1.Yes 2.No	Per day--week--month --
43	Did you take lemons in the last three months?	1.Yes 2.No	Per day--week--month --
44	Did you take avocados in the last three months?	1.Yes 2.No	Per day--week--month --
45	Did you take guavas in the last three months?	1.Yes 2.No	Per day--week--month --
46	Did you take mangos in the last three months?	1.Yes 2.No	Per day--week--month --
47	Did you take wild fruits in the last three months?	1.Yes 2.No	Per day--week--month---specify----------
Fat and oil			
48	Did you take oil in the last three months?	1.Yes 2.No	Per day--week--month --
49	Did you take fat in the last three months?	1.Yes 2.No	Per day--week--month --
50	Did you take butter in the last three months?	1.Yes 2.No	Per day--week--month --

Annex 4-amharic version questionnaires

ክፍል 1

ከዚህ በመቀጠል ስለ ስኳር ህመምዎ አንዳንድ ጥያቄዎች ልጠይቅዎ እወዳለዉ ምላሽዎትን ከማነብልዎት ምርጫ ዉስጥ የትኛዉ እንደሆነ ይነግሩኛል

ተ.ቁ	ጥያቄ	ምላሽ	የሚዘለል
101	እድሜዎ ስንት ነዉ		
102	ጾታ ?	ወንድ .....1 ሴት	
103	የየትኛዉ ሃይማኖት ተከታይ ነዎት?	የእስልምና……1 የኦርቶዶክ……2 የፕሮቴስታንት……..3 የካቶሊክ……..4 የሌላ…… ……5	
104	የጋብቻ ሁኔታ ?	ያገባ……1 ያላገባች……2 የሞተበት……3 የፈታ……4	
105	ብሄርዎት ምንድነዉ?	አማራ……..1 ትግሬ……2 ኦሮሞ……3 አገዉ……4 ሌላ……5	
106	ትምርት ተምረዋል ?	አዎ..... አልተማርኩም 2	ከሆነ ወደ 107
107	የትምህርት ደረጃ	መፃፍና ማንበብ የሚችል……..1 አንደኛ ደረጃ…… ……2 ሁለተኛ ደረጃ ከዚያ በላይ ……3 ከ ኮሌጅ በላይ ……	
108	የስራ ሁኔታ(ከአንድ በላይ መልስ መስጠት ይቻላል)	አርሶ አደር/ገበሬ……..1 የመንግስት ሰራተኛ..... ……2 ነጋዴ……..……3 የግሌ ድርጅት ሰራተኛ..... ……4 የቀን ሰራተ…… ……..…..5 የቤትእመቤት……6 ሌላ ካለ ይጥቀሱ..……7	

109	ወርሃዊ ገቢዎ ምን ያህል ነዉ? (ያገቡ ከሆነ አጠቃላይ የቤተሰብ ገቢ ያላገቡ ከሆነ የግል ገቢዎ ይግለጹ)		

2.ክፍል ሁለት

ከዚህ በመቀጠል ስለ ጤናዎት ሁኔታ አንዳንድ ጥያቄዎች እጠይቅዎታለዉ ምላሽዎትን ከማነብሎት ምርጫ ዉስጥ ይገልጹልኛል::

ተ.ቁ	ጥያቄ	ምላሽ	የሚዘለል
201	የስኳር ህመም ከጀመሮት ምን ያህል ጊዜ ሆኖት?		
202	የስኳር ህመም ከትትል ከጀመሩ ምን ያህል ጊዜ ሆኖት?		
203	ተጓዳኝ (ሌላ ህመም)አለብዎት? ካለ በምርጫ ከተዘረዘሩት መሃል ይምረጡ	የለም……..1 አለ……..2	አለ ከሆነ ወደ 204
204	የትኛዉ ህመም አለብዎት?	የደም ግፊት……...1 የኮሌስትሮል ከፍ ማለት……2 የልብችግር…….3	
205	በዘር (በቤተሰብዎ)የስኳር ህመም አለ?	አለ……..……1 የለም…….……..……..…2	
205	የስኳርዎን መጠን ለማተካከል በየትኛዉ መንገድ ይጠቀማሉ? (ከአንድ በላይ ምላሽ መስጠት ይችላሉ)	በኢንሱሊን……...……..1 የሚዋጥ መዳኒት……..……..……2 የአመጋገብበማስተካከል……3 የአካል ብቃት እንቅስቃሴ በማድረግ(ስፖርት)……4 ሌላ…….……5	
206	የስኳር ህመም ሲጀምሮት አመጋገብዎት ላይ ማሰተካከያ አድርገዋል?	አዎ አድርጌያለዉ…..……1 አላረኩም…….……2	

207	ስለ ስኳር ህመምተኞች አመጋገብ ከየት ነዉ መረጃ የሰሙት ? (ከአንድ በላይ ምላሽ መስጠት ይቻላል)	ከመገናኛ ብዙሃን……1 ሃኪም……..……..2 ነርስ…….……3 የስነምግብ…….4 የማህረሰብ……...5ሌላ የስኳር ታካሚ……..6 የስኳር ታካሚ ካልሆነ ሰዉ.……..7 ጎረቤት…….……....8	
208	ከ ሃኪምዎ ስለ ስኳር ህመምተኛ አመጋገብ ምክር አግኝተዉ ያዉቃሉ›	አዎ ወስጀ አውቃለዉ 1 ወስጀ አላዉቅም……..…….2	 ወደ 209
209	በሃኪሞ ምን እንዲመገቡነዉ የተመከሩት?አይነበብላቸዉ (የመለሱት ብቻ ይከበብ)	ያልተፈተጉምግቦች እንድበላ……1 ቅጠላቅጠል እንድበላ……2 ፍራፍሬ እንድበላ……3 ስጋ እና የወተትተዋእፆዎች እንድቀንስ……4 እህል ዘሮች(ጤፍ ስንዴ)እንዳልመገብ ……..5 ጣፋጭ ነገር እንዳስወግድ…..…..6 የአካል እንቅስቃሴ በማድረግ(ስፖርት)…7	
210n ደበኛ የአካል እንቅስቃሴ ተሳትፈዉ ያዉቃሉ?		አዎ በብዛት (በሳምንት 3 ቀን ለ 30 ደቂቃ ያህል).....1 አዎ አንዳንዴ(በሳምንት ከ 3 ቀን ያነሰ)……2 አላዉቅም…….……3	

211	የሚመከረዉን አመጋገብ መመገብ ቢፈልጉም እንዳይመገቡ የሚያረግዎት ምክንያት ካለ የትኛዉ ነዉ ከአንድ በላይ መምረጥ ይችላሉ ?	የቤተሰብ ድጋፍ ማጣት……1 የገቢ ማነስ…….2 የምግብ አይነቶቹ አለመኖር……..3 የግንዛቤ ማነስ…….……...4 የለም …….5	
212	የስኳር ህመምተኞች ማህበር አባል ነዎት?	አዎ……1 አደለሁም……2	
213	የመጨረሻዉ የደም ስኳር መጠን ስንት ነዉ?	FBS	

ክፍል ሶስት

ከዚህ በመቀጠል ስለ ስኳር ህመምኞች የአመጋገብ ሁኔታ በተመለከተ ስላሎት እዉቀት እጠይቆታለዉ ምላሽዎትን ከማነብሎት ምርጫ ዉስጥ የትኛዉ እንደሆነ ይነግሩኛል::

ተ.ቁ	ጥያቄዎች	መልስ	የሚዘለል ጥያቄ
301	የስኳር ህመምን ለመከላከል የሚጠቅሙ የአኗኗር ዘይቤ ለውጥ የቱን ያውቃሉ? (ከአንድበላይ አማራጭ መጥቀስ ይችላሉ)	የአካል ብቃት እንቅስቃሴ……1 የአመጋገብ ለውጥ…… ……..2 ክብደትን መቀነስ……3 ምንም የማዉቀዉ የለም……..4	
302	የደምን የስኳር መጠን በአፋጣኝ ከፍ የሚያረገዉ የምግብ ክፍል የቱ ነዉ?	ሀይል ሰጪ ምግብ (ካርቦሃይድሬት)…….. ..1 ያልተፈተጉምግቦ…….2 ቅባታማምግቦች…….3 ሰዉነት ገንቢ ምግብ(ፕሮቲን)…..…4 ምንምየማዉቀዉ የለም……..5	
303	አንድ የስኳር ህመምተኛ የደሙን መጠንን ለመቆጣጠር የቱን አማራጭ ቢጠቀም ተመራጭ ነዉ? (ከአንድ በላይ አማራጭ መጥቀስ ይችላሉ)	ከገበስ ብቻ የተዘጋጁ ምግቦችን መብላት---1 ከሁሉም የእህል አይነቶች በመጠኑ ከሌሎች የምግብ አይነቶች ጋር አቀላቅሎ መብላት 2 ስኳር የሌላቸዉን ወይም መጠነኛ ምግቦች መብላ-------..... 3 እራትና ቁርስን መዝለል……4	
304	የትኛዉ የ እህል አዘገጃጀት የደም መጠንን ለመቀነስ ይረዳል?	የተፈተገ እህል……..1 ያልተፈተገእህል……2	
305	የትኛዉ የምግብ አይነት ሀይል ሰጪ ምግብ ዉስጥ ይመደባል ?	ገበስ፣ጤፍ፣ስንዴ፣ሩዝ……1 ስጋ፣ወተት፣እርጎ……2 ሰላጣ፣ጥቅል ጎመን፣ቆስጣ……..……...3 አላዉቅም……4	

306	የትኛዉ የምግብ አይነት መጠንን ይረዳል? (ከአንድ በላይ መምረጥ ይችላሉ)	ፍራፍሬበየቀኑመመገብ……1 ቅጠል በየቀኑ መመገብ……2 የእህል ዘርን ማስወገድ ……3 ፍራፍሬን ሙሉዋቸዉን መመገብ(ሳይጨመቁ)……4	
307	የትኛዉ የምግብ አይነት በአፋጣኝ የደም መጠንን ከፍ ያረጋል?	ቅቤ……1 ስጋ……2 እንጀራ……3 ካሮት……4	
308	አንድ የስኳር ህመምተኛ የትኛዉ የምግብ አይነት በብዛት ቢመገብ ይመረጣል ?	ስጋ፣አሳ፣እንቁላል……1 ወተትና የወተት ተዋእጾ……2 ቅባት፣ዘይት፣ጣፋጭ……3 ቅጠላ ቅጠልና ፍራፍሬ……4 ዳቦ፣ሩዝ፣እንጀራ……5	
309	አንድ የስኳር ህመምተኛ የደም የስኳር መጠንን ለመቆጣጠር ፍራፍሬን በየትኛዉ መንገድ ቢጠቀም ተመራጭ ነዉ?	በጭማቂ መልክመጠጣት……1 ቆራርጦ መመገብ……2	
310	አንድ የስኳር ህመምተኛ ከሚበላዉ ምግብ ሳህን ላይ ቅጠላ ቅጠልና ፍራፍሬ ምን ያህሉን መያዝ አለበት?	ግማሹን……1 አንድሶስተኛዉን……2 አንድአራተኛዉን……3 አላዉቀዉም……4	

ተ.ቁ	ጥያቄ	መልስ	የሚዘለል ጥያቄ
401	በቀን ምን ያህል ጊዜ ይመገባሉ?	አንድ ጊዜ .....1 ሁለት ጊዜ .....2 ሶስት ጊዜ .....3 ከሶስት ጊዜ በላይ.....4	
402	የምግብ ለአቶትን ጠበቀዉ ይመገባሉ?	አልመገብም ..... ….1 እመገባለዉ 2	
403	የሚጠቀሙት የዘይት አይነት ምን አይነት ነዉ? (ከአንድ በላይ መምረጥ ይችላሉ)	የሚረጋዉን ዘይት.....1 የማይረጋዉን ፈሳሽ 2	
404	ለስላላሳና ጣፋጭ በመደበኛነት(በሳምንት ከ 2 በላይ)ይወስዳሉ	አዎ……...1 አልወስድም……2	
405	በመደበኛነት(በሳምንት ከ 2 በላይ)ቅባት ያለዉ ስጋ ይበላሉ?	አዎ……1 አልበላም……..2	
40	ፍራፍሬበመደበኛንት	አዎ……1 አልበላም……2	
408	ቅጠላ ቅጠል በመደበኛነት(በሳምንት ከ 6 በላይ ጊዜ በቀን ከ≥3 በላይ ይመገባሉ?	አዎ……1 አልበላም……2	
409	ፍራፍሬንበምን መልክ ነዉ የሚወስዱት?	በጭማቂ……1 ሳይጨመቅ ከነሙሉ.....,…2	

ክፍል 4፣የዘወትር አመጋገብ ሁኔታና የምግብ መጠን የሚያሳይ መጠይቅ

ከዚህ በመቀጠል በሚገኘዉ የምግብ ዝርዝር ከያዘዉ ሰንጠረዥ ዉስጥ በ 3ወር ውስጥ የተመገቡትን የምግብ ዐይነት ለትንሽ ደቂቃ አስበዉ የወሰዱት የምግብ አይነት ካለ በምን ያህል ጊዜ እና መጠን እንደወሰዱ ይገልጹልኛል፡፡

ተ.ቁ	ተለወጭ	ምላሽ	
		ለሚከተሉት ጥያቄዎች አዎ ከሆነ ፣ ለእያንዳንዱ ጥያቄ በቀን ወይም በሳምንት ወይም በወር ምን ያህል ጊዜ እንደተከተለ ምላሹ ግን ካልሆነ ወደሚቀጥለው የእያንዳንዱ ጥያቄ ይሂዱ	
እህሎች			
1	ባለፉት ሶስት ወራት ጤፍ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
2	ባለፉት ሶስት ወራት ዳጉሳ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
3	ባለፉት ሶስት ወራት በቆሎ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
4	ባለፉት ሶስት ወራት ስንዴ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
5	ባለፉት ሶስት ወራት ገብስ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
6	ባለፉት ሶስት ወራት ማሽላ ወስደዋል?	1. አዎ 2. የለም	-በቀን ሳምንት - ወር -
7	ባለፉት ሶስት ወራት ሩዝ ወስደዋል?	1. አዎ 2. የለም	በቀን- ሳምንት - ወር -
ጥራጥሬዎች			
8	ባለፉት ሶስት ወሮች ውስጥ ባቄላ ወስደዋል?	1.አዎ 2.የለም	በቀን- ሳምንት - ወር -
9	ባለፉት ሶስት ወሮች ውስጥ አተር ወስደዋል?	1.አዎ 2.የለም	በቀን- ሳምንት - ወር -
10	ባለፉት ሶስት ወሮች ውስጥ አኩሪ አተር ወስደዋል?	1.አዎ 2.የለም	በቀን- ሳምንት - ወር -
11	ባለፉት ሶስት ወሮች ውስጥ ምስር ወስደዋል?	1.አዎ 2.የለም	በቀን- ሳምንት - ወር ---
12	ባለፉት ሶስት ወሮች ውስጥ የኩላሊት ባቄላ ወስደዋል?	1.አዎ 2.የለም	በቀን- ሳምንት - ወር -
13	ባለፉት ሶስት ወሮች ውስጥ ሽምብራ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
14	ባለፉት ሶስት ወሮች ውስጥ የሣር ዝርያዎችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
15	ባለፉት ሶስት ወሮች ውስጥ ለዉዝ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
16	ባለፉት ሶስት ወሮች ውስጥ ሉፒንስ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
17	ባለፉት ሶስት ወሮች ውስጥ የሱፍ አበባ ዘሮችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
18	ባለፉት ሶስት ወራቶች ውስጥ እህል ወስደዋል	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
19	ባለፉት ሶስት ወሮች የኒጀር ዘሮችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
20	ባለፉት ሶስት ወራቶች የሰሊጥ ዘር ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --

አትክልቶች			
21	ባለፉት ሶስት ወራት ውስጥ ድንች ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
22	ባለፉት ሶስት ወራት ውስጥ ስኳር ድንች ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር ----
24	ባለፉት ሶስት ወራት ውስጥ የአበሻ ጎመን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር ----
25	ባለፉት ሶስት ወራት ውስጥ ጥቅል ጎመን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
26	ባለፉት ሶስት ወራት ውስጥ ካሮት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
27	ባለፉት ሶስት ወራት ውስጥ ቲማቲም ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
28	ባለፉት ሶስት ወሮች ውስጥ ሰላጣዎችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
29	ባለፉት ሶስት ወራቶች ዱባ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
30	ባለፉት ሶስት ወራቶች ቆስጣ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
31	ባለፉት ሶስት ወራቶች አረጓደ አትክልቶችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
32	ባለፉት ሶስት ወራቶች ቃሪያ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
33	ባለፉት ሶስት ወራቶች ሽንኩርት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
34	ባለፉት ሶስት ወራቶች ነጭ ሽንኩርት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
ስጋ			
35	ባለፉት ሶስት ወራቶች ነጭ ስጋ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
36	ባለፉት ሶስት ወራቶች ዶሮ ወጥ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር ----
37	ባለፉት ሶስት ወራቶች አሳ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
38	ባለፉት ሶስት ወራቶች እንቁላል ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
የእንስሳት ተዋጽኦ			
39	ባለፉት ሶስት ወራቶች ወተት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
40	ባለፉት ሶስት ወራቶች አይብ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
41	ባለፉት ሶስት ወራቶች እርጎ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
42	ባለፉት ሶስት ወራቶች አጓት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
ፍራፍሬዎች			
43	ባለፉት ሶስት ወራቶች ሙዝ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
44	ባለፉት ሶስት ወራቶች ብርቱካን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
45	ባለፉት ሶስት ወራቶች ፓፓያ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
46	ባለፉት ሶስት ወራቶች ሎሚ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --

47	ባለፉት ሶስት ወራቶች አቮካዶ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
48	ባለፉት ሶስት ወራቶች ማንጎ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
49	ባለፉት ሶስት ወሮች የዱር ፍራፍሬዎችን ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር -- ዘርዝር….
ቅባት እና ዘይት			
50	ባለፉት ሶስት ወራት ውስጥ ዘይት ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
51	ባለፉት ሶስት ወራት ውስጥ ስብ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --
52	ባለፉት ሶስት ወራት ውስጥ ቅቤ ወስደዋል?	1.አዎ 2.የለም	በቀን-- ሳምንት -- ወር --