ISSN: 3107-4707
DOI: doi.org/10.51219/JMMS/Mesele-H/26

URF PUBLISHERS
connect with research world

Journal of Medicine and Medical Studies
https://urfpublishers.com/journal/medicine-medical-studies

Vol: 2 & Iss: 3

Research Article

Knowledge, Attitude and Practices Regarding Chronic Complications of Diabetes among Patients with Diabetes in Northeastern Ethiopia, 2024

Habtamu Mesele[1]*, Abayneh Tunta[2], Atitegeb Abera[4], Eshetu Abebe[1], Tesfaye Mulaw[1], Zeru Seyoum[2], Woldeteklehymanot Kassahun[3], Ifaa Dereje[5], Zenebe Daniel[2] and Mulu Shiferaw[2]

[1]Woldia Comprehensive Specialized Hospital, Internal Medicine department, Woldia, Ethiopia

[2]Woldia University, School of Medicine, Biomedical Sciences department,Woldia, Ethiopia

[3]Woldia University, Department of Medical Laboratory Science, Woldia,Ethiopia

[4]Woldia University, Department of public health, Woldia, Ethiopia

[5]Salale university, School of Medicine, Biomedical Sciences department, Salale, Ethiopia

Citation: Mesele H, Tunta A, Abera A, et al., Knowledge, Attitude and Practices Regarding Chronic Complications of Diabetes among Patients with Diabetes in Northeastern Ethiopia. *J M Med Stu 2025;* 2(3): 169-177. DOI: doi.org/10.51219/JMMS/Mesele-H/26

Received: 05 September, 2025; **Accepted:** 18 September, 2025; **Published:** 22 September, 2025

***Corresponding author:** Mesele Habtamu, Woldia Comprehensive Specialized Hospital, Internal Medicine department, Woldia, Ethiopia, Email: habtamum8@gmail.com

A B S T R A C T

Background: In 2021, diabetes claimed the lives of 6.7 million people and cost the healthcare system at least $966 billion. Diabetic individuals with a poor understanding of the condition had greater risks of hospitalization for diabetes.

Objective: To assess knowledge, attitude and practices regarding chronic complications of diabetes among patients with diabetes in northeastern Ethiopia in 2024.

Methods: A cross-sectional study design was conducted among 350 diabetic patients in northeastern Ethiopia from April 25 to May 25, 2024. A pretested, structured questionnaire was developed from published sources on the same subject area. SPSS version 22 for Windows was used and binary and multivariate logistic regressions were applied to assess the knowledge, attitude and practice of respondents about diabetic complications. $P \leq 0.05$ was used to declare statistically significant variables.

Result: A total of 350 diabetes patients were enrolled, with a response rate of 95%. In this study, 184(58%) of the participants had good knowledge, 188 (59.1%) had a good attitude and 168 (53.4%) had good practice. Patients staying with the disease for more than 10 years were 2.05 times (AOR = 2.05, 95% CI = 1.03, 4.05) more likely to have a good attitude. Government workers were 3.17 times (AOR = 3.17, 95% CI = 1.17, 8.62) more likely to have a good attitude toward chronic complications of DM. Male patients were 1.71 times (AOR = 1.71, 95% CI = 1.10, 2.65) more likely to have good practice than their female counterparts. Patients with a monthly income of 500–1500 and 150–1500 ETB were 2.02 times and 1.97 times more likely to have good practice for chronic complications of DM as compared to patients with a monthly income of < 500 ETB.

Conclusion: Participants with better educational status and a family history of DM were more likely to have good knowledge about diabetic complications. Study subjects with disease duration of more than 10 years and government employees had a positive attitude. Male patients and those with a good monthly income had good practices towards the chronic complications of DM.

Keywords: Attitude, Diabetes mellitus, Knowledge, Practice

1. Introduction

Diabetes mellitus (DM) is a severe chronic illness that develops when a patient's serum glucose levels are high due to either insufficient or no insulin production by their body or an inability to utilize the insulin that is produced[1]. Diabetes mellitus is a complex disease resulting in issues such as population health decline and increased health-care expenses[2]. Diabetes is one of the four non-communicable diseases (NCDs) that the World Health Organization has prioritized for prevention and control[3].

According to the International Diabetes Federation (IDF) 2021 report, there is a continued global increase in diabetes prevalence, confirming diabetes as a significant global challenge to the health and well-being of individuals. Globally, 537 million adults are living with diabetes, which is predicted to rise to 643 million by 2030. Moreover, with an expected 1.5 million fatalities due to diabetes directly in 2019, diabetes ranked as the ninth most common cause of death[1].

It is estimated that 24 million adults in Africa are living with diabetes and over 1 in 2 people living with diabetes in Africa are not diagnosed. Furthermore, more than two-thirds of diabetes mellitus patients in Sub-Saharan Africa are untreated[4]. According to an IDF report, diabetes mellitus was present in 3.3% of Ethiopians[5]. Other evidence suggests that the prevalence of diabetes in Ethiopia ranges from 0.5 percent to 6.5 percent[6-9].

Diabetes is linked to significant financial burdens for individuals, families and the community. Patients with diabetes who experience both macro and microvascular complications can spend up to 2.5 times as much on care overall as those without problems[10,11]. Treatment of comorbidities associated with diabetes is essential for the patients' health related quality of life. Over the past few years, the expense of treating diabetes and associated complications has increased[12].

In addition to preserving an ideal blood glucose level, the aim of diabetes management is to avoid consequences from the condition, including retinopathy, neuropathy, nephropathy and cardio cerebrovascular disease[13]. Non-adherence, a negative attitude toward the illness and its complications and unhealthy diet are typical causes of poor diabetic control and hence diabetic complications. These complications can predispose the patient to different infections and death or disability as final outcome[14]. In a US sample of 12,379 participants, hospitalization for infection-related reasons was much more likely in those with diabetes mellitus (1.67 times higher) than in those without the condition[15].

Sub optimal glycemic management in clinical practice is linked to diabetes complications such as diabetic ketoacidosis, micro- and macro-vascular diabetic problems and their associated poor consequences[16]. Poor glycemic control and consequences such as diabetic nephropathy, diabetic retinopathy and diabetic neuropathy are linked to insufficient diabetes education and self-care behaviors[17]. Each 1% drop in mean glycated hemoglobin (HbA1c) has been linked to a 21% reduction in the risk of diabetes-related mortality, a 14% reduction in the risk of myocardial infarction and a 37% reduction in the risk of micro-vascular complications[18,19].

With an expected 1.5 million fatalities directly related to diabetes in 2019, diabetes ranked tenth among all causes of mortality[1]. Furthermore, those with diabetes are two to three times more likely to die from any cause, including liver disease, cancer, heart disease, stroke and chronic renal illness[20,21]. According to a Chinese study, 76.4% of diabetes patients reported experiencing at least one type of diabetes related complications[22,23]. In sub-Saharan Africa, up to 48% of diabetics had neuropathy symptoms, while 14-18% of diabetics had ocular problems, 10% to 15% of diabetics have acquired diabetic foot ulcers at some point in their lives and in sub-Saharan Africa, diabetic foot issues account for over 50% of all DM-related hospitalizations[23]. According to a prior study conducted in Ethiopia, 29.4% of diabetics suffer at least one chronic problem[24].

Individuals diagnosed with diabetes mellitus must keep an eye on their health, specifically on complications, treatment and prescription schedules. Along with exercise, diet and medication adjustment, therapeutic adherence is crucial for achieving glycemic control and preventing complications[25-28]. Misconceptions stemming from a lack of awareness, when combined with insufficient knowledge, are significant obstacles to appropriate diabetes management[29].

Diabetes self-care routines are significantly influenced by perceptions of sickness and diabetes knowledge. Furthermore, decision-making about nutrition, exercise, medication use and health status monitoring which includes diabetic screening and foot care is influenced by knowledge about the disease[30]. Diabetic individuals with a poor understanding of the condition had greater risks of hospitalization for diabetes, which is unstable[31].

Glycemic control knowledge can assist people in comprehending the risks of diabetes and motivating them to seek appropriate therapy and care in order to keep the disease under control[16]. In order to effectively manage the condition, an individual must be aware of and knowledgeable about the disease's nature and consequences, as well as its risk factors, management and chronic complications. The aim of this study was to assess knowledge, attitude and practices regarding chronic complications of diabetes among patients with diabetes in a comprehensive specialized hospital in Woldia, Ethiopia in 2024.

2. Methods

2.1. Study design, period and area

A cross-sectional study design was conducted in Woldia comprehensive specialized hospital from April 25 to May 25, 2024, Woldia, northeast Ethiopia. Woldia Comprehensive Specialized Hospital, located in Woldia Town in Ethiopia, is a prominent healthcare institution dedicated to providing high-quality medical services. As a comprehensive specialized hospital, it serves as a critical healthcare provider for the region, offering a wide range of medical services and specialized treatments to the local population.

2.2. Population

2.2.1. Source population: All diabetes patients who visited to Woldia comprehensive specialized hospital diabetic clinic.

2.2.2. Study population: all diabetes patients who fulfill the eligibility criteria and visited woldia comprehensive specialized hospital during the data collection time.

2.3. Inclusion criteria

Diabetic patients who are on follow up or take regular

medical checkups and services, at Woldia comprehensive specialized hospital diabetic clinic.

Diabetic patients whose age is greater than 18 years.

.4. Exclusion criteria

Diabetics secondary to pregnancy (gestational DM). Those unable to respond because of dementia or psychiatric illness. Diabetes patients admitted to ward

2.5. Sample size and sampling technique

The convenience sampling technique was employed to select participants who visited the diabetic clinic of Woldia Comprehensive Specialized Hospital for routine appointment visits. So, using this sampling technique, **368** subjects were recruited. The sample size was calculated using a single population proportion formula and determined by taking 58.8% as the rate of prevalence (p) of knowledge toward diabetic complications among diabetics in Gondar, Ethiopia (32), a 95% confidence level (Zα/2 = 1.96) and a 5% margin of error.

$$n = \frac{\left(Z\,\frac{\alpha}{2}\right)^2 p(1-p)}{d^2}$$

$Z_{\alpha/2}$ is the standard normal variable value at (-١α) ٪ confidence level (α is ٠,٠٥ with ٪٩٥ CI, $Z_{\alpha/}$ ١,٩٦ = ٢), an estimate of the proportion (p) was considered as 58.8 % and margin of error (d) 5%.

2.6. Variables

2.6.1. Dependent variables: knowledge, attitude and practice towards chronic complications of DM.

2.6.2. Independent variables: age, sex, residency, marital status, occupation, educational status, income, duration since diagnosis as diabetic, family history and type of DM.

2.7. Operational definitions

- **Diabetes complications:** Acute and chronic conditions caused by diabetes[7].
- **Positive attitude:** if participants scored ≥ mean score of answered questions for attitude of diabetic complications
- **Poor attitude:** if participants scored < mean score of questions about diabetic complications
- **Good knowledge:** if participants scored ≥ mean score of the correctly answered questions for knowledge of diabetic complications
- **Poor knowledge:** participants scored <mean score of the correctly answered questions for knowledge of diabetic complications
- **Good practice:** if participants scored ≥ mean score for answers to practice questions about diabetic complications
- **Poor practice:** if participants scored < mean score for answers to practice questions about diabetic complications[33].

2.8. Data collection tool and data collection process

An organized, pretested interviewer-administered questionnaire was utilized to collect data regarding knowledge, attitude, practice and associated factors. A number of published articles were reviewed in order to build the tool for gathering data[34-36]. The data collection survey was structured into four primary sections: Socio-demographic data, diabetes knowledge and history, attitude and practice-specific data. To ensure consistency in wording, the questionnaire was produced in English, translated into the local language (Amharic) and then translated back into English. To calculate the knowledge, attitude and practice (KAP) score, a scoring system was prepared. Each correct answer was coded as 1, while each incorrect answer was coded as 0. The data collectors were trained in the data collection tool before data collection. Each participant was interviewed face-to-face by a data collection team. The collected data was checked every day for consistency and completeness before processing. During data gathering, three trained health professionals were recruited and supervised by two MSc graduate health professionals.

2.8.1. Assessment of knowledge: The participants had two options for responses to questions testing their knowledge of diabetes complications: "Yes" or "No." A "0" point was given for no and a "1" point for yes. After calculating the mean knowledge score, knowledge was divided into two categories: good and poor. Participants were classified as having good knowledge if their answers scored higher than the mean (10.6) and as having poor knowledge if their answers scored lower than the mean (10.6).

2.8.2. Assessment of attitude: To assess the patients' attitudes, we had adapted questions from several articles. There were three options for each question: agree, neutral and disagree. For each attitude question, a score of "0" indicated an unfavorable attitude (disagree and indifferent), while a score of "1" indicated a favorable attitude (right answer). By adding up the correct responses and computing the mean value, the diabetic patient's attitude toward complications related to their diabetes was determined. Individuals who scored lower than the average (22.9) were classified as having negative attitudes. Those who scored higher than the average (22.9) was considered to have a positive attitude.

2.8.3. Assessment of practice

Patients were asked questions about diabetic complications and were asked to respond with a "Yes" or "No." "Yes" receives a score of 1, while "No" receives a score of 0. "Yes" indicates that the patient is adhering to the advised course of action. Subsequently, Then, the patient's practice level was calculated by adding their responses and calculating the mean which is 7.9. Those with a mean score or higher were considered good practice while the remaining scores were classified as poor practice.

2.9. Data processing and analysis

The social science statistics package (SPSS) version 22 for Windows was used to enter the gathered data. The mean (± SD) was used to express all continuous data, while numbers and percentages were used to express categorical variables. Descriptive statistics and frequency distributions were used to describe participant characteristics. Based on bi-variable analysis, variables with a p-value < 0.25 were entered into a multivariable logistic regression model; P ≤ 0.05 was used to declare statistically significant variables in the final model. Descriptive statistics, such as frequencies and percentages, were used. A binary logistic regression was used to identify predictors of awareness of diabetes and its complications.

2.10. Data quality control

The principal investigator performed continuous oversight and follow-up to ensure the quality of the data. In addition, the data was checked on a daily basis for completeness and consistency and then corrections were made accordingly.

2.11. Ethical approval

Ethical approval was obtained from Woldia comprehensive specialized hospital ethical review committee with ethical clearance number ERC 016/2024. A permission letter was obtained from the medical director's office. Written consent was obtained from each respondent in the study to fulfill ethical considerations and confidentiality was maintained throughout the study process.

3. Result

A total of 350 diabetes patients were enrolled, with a response rate of 95%.

3.1. Socio-demographic characteristics of respondents

Out of 350 diabetic respondents, 178 (50.9%) were male and 172 (49.1%) were female. The majority of participants were Orthodox Christian followers (66%). Concerning to educational status, 156(44.5%) study participants were Secondary school and above. Approximately 30% of the population earned more than 2500 ETB a month. About 60.6% of participants were urban dwellers and 48.9% had had diabetes for one to five years **(Table 1)**. Around half of participants 171(48.9%) were under oral hypoglycemic treatment.

Table 1: Socio-medical characteristics of study participants in WCSH, 2024.

Variables	Categories	Frequency	Percent (%)
Sex	Male	178	50.9
	Female	172	49.1
Educational status	No formal education	108	30.9
	Primary	86	24.6
	Secondary and above	156	44.5
Marital status	Single	62	17.7
	Married	210	60
	Widowed	13	3.7
	Divorced	65	18.6
Religion	Orthodox	231	66
	Muslim	101	28.9
	Protestant	18	5.1
Residence	Urban	212	60.6
	Rural	138	39.4
Duration of diseases	1-5	171	48.9
	6-10	119	34
	>10	60	17.1
Type of medication	Oral	171	48.9
	Injectable	166	47.4
	Both	13	3.7
Family history of DM	No	177	50.6
	Yes	173	49.4
Monthly income	<500	66	18.9
	500-1500	91	26
	1501-2500	88	25.1
	>2500	105	30

3.2. Knowledge, attitude and practice

In this study, 184 (58%) of the participants had good knowledge, 188 (59.1%) had a good attitude and 168 (53.4%) had good practice **(Figure 1)**.

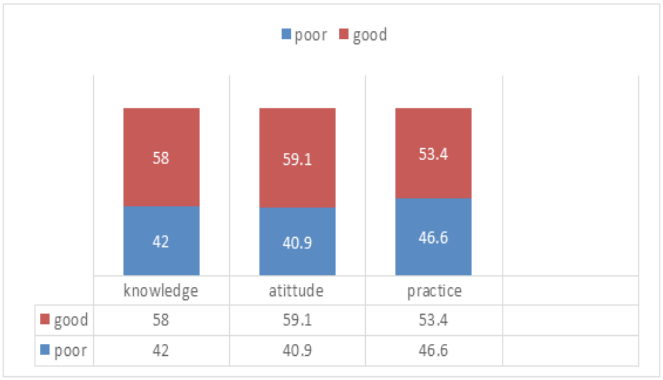

Figure 1: KAP regarding chronic complication of diabetes among patients with diabete in WCSH, 2024.

3.3. Factors associated with good knowledge

In multivariable analysis, education status, religion and family history of DM were significantly associated with good knowledge of chronic complications of diabetes. Patients who had primary education were 56% (AOR = 0.44, 95% CI = 0.23, 0.85) less likely to have good knowledge as compared to those who attended secondary education and above. Regarding religion, protestant patients were 82% (AOR = 0.18, 95% CI = 0.06, 0.55) less likely to have good knowledge **(Table 2)**. Those with a family history of DM were 1.86 times (AOR = 1.86, 95% CI = 1.16, 3.00), more likely to have good knowledge as compared to their counterparts.

Table 2: Factors associated with knowledge towards chronic diabetic complications of study participants in WCSH, 2024.

Variables	Category	AOR	95% CI
Sex	Female	1	1
	Male	1.21	0.71, 2.05
Occupation	Unemployed	1	1
	Farmer	0.80	0.33, 1.95
	Housewife	1.61	0.63, 4.14
	Gov't worker	1.24	0.46, 3.30
	Other	1.75	0.69, 4.38
Education status	No formal education	1	1
	Primary	0.44	0.23, 0.85*
	Secondary and above	0.86	0.39, 1.90
Religion	Orthodox	1	1
	Muslim	1.14	0.67, 1.91
	Protestant	0.18	0.06, 0.55*
Residence	Urban	1	1
	Rural	0.72	0.39, 1.36
Family history	No	1	1
	Yes	1.86	1.16, 3.00*
Income	< 500	1	1
	500 – 1500	0.88	0.40, 1.94
	1501-2500	0.47	0.21, 1.04
	> 2500	1.06	0.41, 2.72

3.4. Factors associated with attitude

Factors such as residence, duration of diseases, occupational status and level of knowledge were significantly associated with the attitude of respondents.

Regarding the duration of diseases, those patients staying with the disease for more than 10 years were 2.05 times (AOR = 2.05, 95% CI = 1.03-4.05) more likely to have a good attitude towards chronic complications of diabetes as compared to the counterparts, while the effect of other variables kept constant. The other significant predictor was occupation and patients who are government workers were 3.17 times (AOR = 3.17, 95% CI = 1.17, 8.62) more likely to have a good attitude toward chronic complications of DM **(Table 3)**.

Table 3: Factors associated with attitude towards chronic diabetic complications of study participants in WCSH, 2024.

Variables	Category	AOR	95% CI
Residence	Urban	1	1
	Rural	0.49	0.27,0.91*
Duration of diseases in years	1-5	1	1
	6-10	0.89	0.52, 1.51
	>10	2.05	1.03, 4.05*
Monthly income	< 500	1	1
	500 – 1500	1.40	0.63, 3.11
	1501-2500	0.69	0.32, 1.52
	> 2500	0.60	0.25, 1.47
Occupation	Unemployed	1	1
	Farmer	1.16	0.53, 2.56
	Housewife	1.14	0.50, 2.61
	Gov't worker	3.17	1.17, 8.62*
	Others	1.36	0.57, 3.21
Level of knowledge	Poor	1	1
	Good	2.47	1.55, 3.95

3.5. Determinants of good practice towards chronic complications of DM

In multivariable analysis, sex and income of patients were significantly associated with practice toward chronic complications of DM. As compared to female patients, male patients were 1.7 times more likely to have good practice (AOR = 1.71, 95% CI = 1.10, 2.65) **(Table 4)**. Those patients with a monthly income of 500-1500 and 150-1500 were 2.02 times (AOR = 2.02, 95% CI = 1.05-3.88) and 1.97 times (AOR = 1.97, 95% CI = 1.02-3.81) more likely to have good practice for chronic complications of DM as compared to patients with a monthly income of < 500 birr.

Table 4: Factors associated with practice towards chronic diabetic complications of study participants in WCSH, 2024.

Variables	Category	AOR	95 % CI
Sex	Female	1	1
	Male	1.71	1.10, 2.65*
Religion	Orthodox	1	1
	Muslim	0.73	0.45, 1.18
	Protestant	1.67	0.59, 4.72
Income	< 500	1	1
	500 - 1500	2.02	1.05, 3.88*
	1501-2500	1.97	1.02, 3.81*
	> 2500	1.45	0.76, 2.76

4. Discussion

Worldwide, diabetes is one of the leading causes of death[36]. It is a chronic illness with a variety of complications that require in-depth understanding and care. Adequate knowledge of DM and its complications is necessary for diabetes self-management[37].

In this study, 184 (58%) of the participants had good knowledge. This is in line with results from Ethiopia (59%)[38], Malaysia (58.1%)[39], Tarlai 57%[40], India (50.1%)[41], Debre Tabor (Ethiopia) (51%). And this finding is higher than reports from a study in Ghana, which reported 45.9 % of participants had good knowledge of diabetes complications[42]. However, the findings of our study are incomparable with those of a Saudi Arabian study, which reported that 80% of participants knew the complications associated with diabetes and a study from Nigeria, where 90.5% of type 2 DM patients had adequate knowledge of diabetes complications[43]. Variations in socioeconomic conditions, cultural beliefs and behaviors may account for the discrepancy, as they have an effect on the pattern of awareness regarding diabetic consequences[44].

The results of this study showed a favorable association between participants' knowledge of diabetic complications and their educational status. This is supported by other study findings that reported a positive relationship between the level of education and the degree of knowledge about diabetic complications[42,45-48]. The knowledge of diabetics about maintaining appropriate blood glucose levels was greatly influenced by education[49]. Knowledge is one of the predictors of behavior in many ways[50]. This might be due to increased opportunity of learning about DM complications from various sources as they become more knowledgeable. Furthermore, educated people have access to a variety of medical literatures[44].

Respondents with family history of DM were 1.86 times more likely to have good knowledge about diabetic complications as compared to their counterparts. This is consistent with findings from the study done in India[44,47] and Ethiopia[44]. Receiving information from the family with chronic disease might influence the patient's attitude and daily practice, which can be a good source of information[51]. This is as a result of their learning from family experiences.

In this study, about 59.1% of study participants had a good attitude. This is in contrast to the results of a study done in Ethiopia, in which over 65.2% of the study participants had a good attitude level[35]. Differences in culture and socioeconomic status could be the explanation. Our study findings revealed that, regarding the duration of diseases, those patients staying with the diseases for more than 10 years were 2.05 times more likely to have a good attitude towards chronic complications of diabetes as compared to the counterparts when the effect of other variables kept constant. This is supported by findings from a recent study conducted in Iran, which reported a substantial positive link between attitude level and the length of the disease[51].

The other significant predictor in this study was occupation. Patients who are government workers were 3.17 times more likely to have a good attitude toward chronic complications of DM. This is supported by a study from southeast Ethiopia which reported that employment in the public or private sector was three times more likely to result in a favorable attitude toward DM[33]. This might be due to patients with greater education and

employment status may find it easier to obtain and read various resources and they may also be able to speak with medical staffs without difficulty. This aids in their knowledge gathering and helps them adopt a more positive outlook regarding DM complications[35,52].

Regarding practice, as compared to female patients, male patients were 1.71 times more likely to have good practice. This is in line with a study from Bangladesh which reported higher level of practice among males than females[36]. Those patients with a monthly income of 500-2500 birr were 2.02 times more likely to have good practice for chronic complications of DM as compared to patients with a monthly income of < 500 birr. Low income is associated with poor access to educational opportunities regarding methods of preventions of diabetes. This could also be because people with lower incomes would have to wait longer to get health care[53].

5. Limitation

Since the information about the attitudes and practices related to DM problems was self-reported, recall bias might have existed. The study was conducted on all diabetic patients regardless of their diabetic complication history status during the data collection period which could possibly affect knowledge, attitude and practice levels. And being cross-sectional study, this study did not show the conditions of cause-and-effect relationships.

6. Conclusion

A higher percentage of diabetes patients had generally positive attitude, knowledge and practice towards preventing diabetic complications in this study. Participants with better educational status and having family history of DM were more likely to have good knowledge about diabetic complications. Study subjects with disease duration more than 10 years with diabetes and government employees were more likely to have positive attitude towards chronic complications of diabetes. Male patients and those with a monthly income of 500 -2500 ETB had good practice to prevent chronic complication of DM as compared to patients with monthly income of < 500 ETB. Based on the above information, increasing health education about diabetic complication will help to maintain the good KAP of the population and fills gaps in prevention.

7. Abbreviations and Acronyms

AOR- adjusted odds ratio

CI- confidence interval

CVD- cardiovascular diseases

DM- diabetes mellitus

ETB- Ethiopian birr

NCDS- Non communicable diseases

IDF- International diabets federation

SPSS- statstical packages for social sciences

WSCH- woldia specialized comprehensive hospital

8. Declarations

8.1. Ethical approval

Ethical approval was obtained from Woldia comprehensive specialized hospital ethical review committee with ethical clearance number ERC 016/2024. Written consent was obtained from each respondent in the study to fulfill ethical considerations and confidentiality was maintained throughout the study process.

8.2. Consent for publication

Not applicable.

8.3. Data availability

The data used in this study are included and available in the whole manuscript. The dataset can be available at the hand of the corresponding author and can be accessed upon reasonable request.

8.4. Competing interest

All authors declared that there is no competing interest.

8.5. Authors' contributions

All authors have contributed equally for the manuscript.

8.6. Funding

Not applicable.

8.7. Acknowledgment

We thank all participants and facilitators from for their support in accomplishment of this study.

9. References

1. Roth G. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2018. The Lancet, 2018;392(10159): 1789-1858.
2. Bickler SW, Wang A, Amin S, et al. Urbanization in Sub-Saharan Africa: Declining Rates of Chronic and Recurrent Infection and Their Possible Role in the Origins of Non-communicable Diseases. World J Surg, 2018;42(6): 1617-1628.
3. Martin H. Laboratory measurement of urine albumin and urine total protein in screening for proteinuria in chronic kidney disease. Clin Biochem Rev, 2011;32(2): 97-102.
4. James SL, Abate D, Abate KH, et al. Global, regional and national incidence, prevalence and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet, 2018;392(10159): 1789-1858.
5. Bekele BB. The prevalence of macro and microvascular complications of DM among patients in Ethiopia 1990-2017: Systematic review. Diabetes & Metabolic Syndrome: Clin Res Reviews, 2019;13(1): 672-677.
6. Endriyas M, Mekonnen E, Dana T, et al. Burden of NCDs in SNNP region, Ethiopia: a retrospective study. BMC Health Services Research, 2018;18(July): 520.
7. Gizaw M, Harries AD, Ade S, et al. Diabetes mellitus in Addis Ababa, Ethiopia: admissions, complications and outcomes in a large referral hospital. Public Health Action, 2015;5(1): 74-78.
8. Tesfaye T, Shikur B, Shimels T, et al. Prevalence and factors associated with diabetes mellitus and impaired fasting glucose level among members of federal police commission residing in Addis Ababa, Ethiopia. BMC Endocrine Disorders, 2016;16(Nov): 68.
9. Abebe SM, andargie G, Shimeka A, et al. The prevalence of non-communicable diseases in northwest Ethiopia: survey of Dabat Health and Demographic Surveillance System. BMJ Open, 2017;7(10): 015496.
10. Schofield D, Cunich MM, Shrestha RN, et al. The economic

impact of diabetes through lost labour force participation on individuals and government: evidence from a microsimulation model. BMC public health, 2014;14(March): 1-8.

11. Susan van D, Beulens JW, Yvonne T. van der S, et al. The global burden of diabetes and its complications: an emerging pandemic. European J Cardiovascular Prevention Rehab, 2010;17(1): 3-8.
12. Bannier K, Lichtenauer M, Franz M, et al. Impact of diabetes mellitus and its complications: survival and quality-of-life in critically ill patients. Journal of diabetes and its complications, 2015;29(8): 1130-1135.
13. Association AD. 6. Glycemic targets: standards of medical care in diabetes-2018. Diabetes care, 2018;41(1): 55-64.
14. Abejew AA, Belay AZ, Kerie MW. Diabetic complications among adult diabetic patients of a tertiary hospital in northeast Ethiopia. Advances in Public Health, 2015;9(9): 290920.
15. Tomic D, Shaw JE, Magliano DJ. The burden and risks of emerging complications of diabetes mellitus. Nature Reviews Endocrinology, 2022;18(June): 529-539.
16. Asmelash D, Abdu N, Tefera S, et al. Knowledge, Attitude and Practice towards Glycemic Control and Its Associated Factors among Diabetes Mellitus Patients. Journal of Diabetes Research. 2019;2019(April): 2593684.
17. Fasil A, Biadgo B, Abebe M. Glycemic control and diabetes complications among diabetes mellitus patients attending at University of Gondar Hospital, Northwest Ethiopia. Diabetes Metab Syndr Obes, 2018;12(Dec): 75-83.
18. Kibirige D AG, Kampiire L, Kiggundu DS, et al. Frequency and predictors of suboptimal glycemic control in an African diabetic population. Int J Gen Med, 2017;10(Feb): 33-38.
19. Passiment E, Meissel JL, Fontanesi J, et al. Decoding laboratory test names: A major challenge to appropriate patient care. J Gen Intern Med, 2013;28(3): 453-458.
20. Yang JJ, Yu D, Wen W, et al. Association of diabetes with all-cause and cause-specific mortality in Asia: a pooled analysis of more than 1 million participants. JAMA network open, 2019;2(4): 192696.
21. Bragg F, Holmes MV, Iona A, et al. Association between diabetes and cause-specific mortality in rural and urban areas of China. Jama, 2017;317(3): 280-289.
22. Mao WenHui MW, ChiMan Y, Chen Wen CW. Complications of diabetes in China: health system and economic implications, 2019;19(March): 269.
23. Sarpong C, Nsiah K, Mensah F, et al. Prevalence of the Complications of Diabetes in Developing countries. Archives of Clin Biomed Res, 2017;1(5): 235-241.
24. Ahmed M, Yirdachew E, Tefera G. Diabetic complications among follow-up patients: a cross-sectional study at Jimma University specialized hospital diabetic clinic. J Clin Mol Endocrinol, 2018;3(1): 45.
25. Kuo VS, Koumantakis G, Gallery ED. Proteinuria and its assessment in normal and hypertensive pregnancy. Am J Obstet Gynecol, 1992;167(3): 723-728.
26. ElSayed NA, Aleppo G, Aroda VR, et al. Glycemic targets: standards of care in diabetes-2023. Diabetes care, 2023;46(1): 97-110.
27. Mirahmadizadeh A, Khorshidsavar H, Seif M, et al. Adherence to medication, diet and physical activity and the associated factors amongst patients with type 2 diabetes. Diabetes Therapy, 2020;11(2): 479-494.
28. Saleh AM. People with diabetes adherence to drug, dietary and lifestyle changes in Erbil city, Iraq. BMC Endocrine Disorders, 2022;22(1): 305.
29. Alemayehu AM, Dagne H, Dagnew B. Knowledge and associated factors towards diabetes mellitus among adult non-diabetic community members of Gondar city, Ethiopia 2019. PloS one, 2020;15(3): 0230880.
30. Kumar R, Itumalla R, Perera B, et al. Patient knowledge about diabetes: Illness symptoms, complications and preventive personal lifestyle factors. Health Psycho Res, 2022;10(3): 37520.
31. Abdullah L, Margolis S, Townsend T. Primary health care patients' knowledge about diabetes in the United Arab Emirates, 2001;7(4-5): 662-670.
32. Berihun G, Walle Z, Berhanu L, et al. Acceptance of COVID-19 vaccine and determinant factors among patients with chronic disease visiting Dessie Comprehensive Specialized Hospital, Northeastern Ethiopia. Patient preference and adherence, 2021;15(Aug): 1795-1805.
33. Kassahun CW, Mekonen AG. Knowledge, attitude, practices and their associated factors towards diabetes mellitus among non diabetes community members of Bale Zone administrative towns, South East Ethiopia. A cross-sectional study. PloS one, 2017;12(2): 0170040.
34. Kifle ZD, Adugna M, Awgichew A, et al. Knowledge towards diabetes and its chronic complications and associated factors among diabetes patients in University of Gondar comprehensive and specialized hospital, Gondar, Northwest Ethiopia. Clinical Epidemiology and Global Health, 2022;15(May-June): 101033.
35. Belsti Y, Akalu Y, Animut Y. Attitude, practice and its associated factors towards Diabetes complications among type 2 diabetic patients at Addis Zemen District hospital, Northwest Ethiopia. BMC Public Health, 2020;20(May): 785.
36. Rahaman KS, Majdzadeh R, Naieni KH, et al. Knowledge, attitude and practices (KAP) regarding chronic complications of diabetes among patients with type 2 diabetes in Dhaka. International journal of endocrinology and metabolism, 2017;15(3): 12555.
37. Gautam A, Bhatta DN, Aryal UR. Diabetes related health knowledge, attitude and practice among diabetic patients in Nepal. BMC endocrine disorders, 2015;15(June): 25.
38. Gizaw A, Belachew Y, Kebede D. Knowledge about Dia-betic complications among patients on diabetic follow up Clinic at Jimma Uni-versity Medical Centre; 2019. J Diabetes Metab Discord, 2019;6(Oct): 029.
39. Minhat H, Hamedon T. Understanding towards diabetes mellitus among rural adult community in Malaysia. World J Med Sci, 2014;11: 2014;11(2): 217-221.
40. Ulvi OS, Chaudhary RY, Ali T, et al. Investigating the awareness level about diabetes mellitus and associated factors in Tarlai (rural Islamabad). JPMA The Journal of the Pakistan Medical Association, 2009;59(11): 798-801.
41. Rani PK, Raman R, Subramani S, et al. Knowledge of diabetes and diabetic retinopathy among rural populations in India and the influence of knowledge of diabetic retinopathy on attitude and practice. Rural and remote health, 2008;8(3): 838.
42. Afaya RA, Bam V, Azongo TB, et al. Knowledge of chronic complications of diabetes among persons living with type 2 diabetes mellitus in northern Ghana. Plos one, 2020;15(10): 0241424.
43. Adeyemi O, Timothy T, Oluwanimodimu D, et al. Knowledge of Diabetic Complications and Practice of Routine Medical Check-up among Type 2 Diabetics in Nigeria. Journal of Advances in Medicine and Medical Research, 2018;25(4): 1-8.
44. Belsti Y, Akalu Y, Fekadu H, et al. Awareness of complications of diabetes mellitus and its associated factors among type 2 diabetic patients at Addis Zemen District Hospital, northwest Ethiopia. BMC Research Notes, 2019;12(Sept): 602.

45. Obirikorang Y, Obirikorang C, Anto EO, et al. Knowledge of complications of diabetes mellitus among patients visiting the diabetes clinic at Sampa Government Hospital, Ghana: a descriptive study. BMC public health, 2016;16(July): 637.

46. Ullah F, Afridi AK, Rahim F, et al. Knowledge of diabetic complications in patients with diabetes mellitus. Journal of Ayub Medical College Abbottabad, 2015;27(2): 360-363.

47. Murugesan N, Snehalatha C, Shobhana R, et al. Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. Diabetes research and clinical practice, 2007;77(3): 433-437.

48. Nisar N, Khan IA, Qadri MH, et al. Knowledge and risk assessment of diabetes mellitus at primary care level: a preventive approach required combating the disease in a developing country. Pak J Med Sci, 2008;24(Oct-Dec): 667-672.

49. Hoque MA, Islam MS, Khan MAM, et al. Knowledge of diabetic complications in a diabetic population. Journal of Medicine, 2009;10(2): 90-93.

50. Clin Lab Med, 1988;9(3): 527-540.

51. Niroomand M, Ghasemi SN, Karimi-Sari H, et al. Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: a cross-sectional study. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2016;10(1): 114-119.

52. Alaofè H, Hounkpatin WA, Djrolo F, Ehiri J, et al. Knowledge, attitude, practice and associated factors among patients with type 2 diabetes in Cotonou, Southern Benin. BMC Public Health, 2021;21(Feb): 339.

53. Kidanie BB, Alem G, Zeleke H, et al. Determinants of diabetic complication among adult diabetic patients in Debre Markos referral hospital, northwest Ethiopia, 2018: unmatched case control study. Diabetes, Metabolic Syndrome and Obesity, 2020;13(Feb): 237-245.

Appendix

Tool for assessing KAP towards chronic complications of diabetes among diabetic patients at northeast Ethiopia, 2023.

Questions for assessing socio demographic conditions

Questions for assessing Knowledge towards chronic complications of diabetes

Variables	Yes	No
DM is a condition of insufficient insulin production		
DM is a condition of a body which not responding to insulin		
DM is a condition of high level of sugar in the blood		
DM is not curable		
DM is disease that affects any part of the body		
What are risk factors of DM		
Older age		
Being overweight		
Family history		
Pregnancy		
Poor dietary habits		
Inadequate exercise		
Sign and symptoms		
Frequent urination		
Excessive thirst		
Excessive hunger		
Weight loss		
High blood sugar		
Slow healing of cuts		
Blurred vision		
Feeling of weakness		
Control and management of DM		
Insulin injection available for control and management of DM		
Tablets and capsules are available for control and management of DM		
Regular exercise		
Practice healthy diet		
Feet and toe medical checkup and care		
Complication of DM		
Diabetes can cause blindness		
Diabetes Can cause kidney failure		
Diabetes can cause heart failure		
Diabetes can cause stroke		
Diabetes can result in amputation of limb		

Questions for assessing attitude towards chronic complications of diabetes

Variables	Agree	Neutral	Disagree
I don't mind if others know I am diabetic			
Do you think you should be examined for diabetes			
Do you think family members should be screened for DM			
Do you think family support from family and friends is important in dealing with diabetes			
Do you think we should avoid consuming too much sugar			
DM doesn't seriously affect marital status			
I don' think DM seriously affects daily activities			
Do you think physical activity can prevent risk of DM			
Do you think maintaining healthy weight helps prevent DM			
DM complication can prevented If blood glucose level is well maintained			

Questions for assessing practice towards chronic complications of diabetes

Variables	Yes	No
Consume fatty foods		
Physical activity of 30-60 min daily		
Maintaining your body weight		
Drinking alcohol and smoke tobacco		
Check your blood sugar		

Gender	Male	
	Female	
Age	<24	
	25-34	
	35-44	
	>44	
Marital status	Single	
	Married	
	Divorced	
	Widowed	
Education	Illiterate	
	Elementary	
	Secondary	
	College and above	
Occupation	House wife	
	Merchant	
	Farmer	
	Gov't /private employee	
	Daily laborer	
Average family income	< 500 ETB	
	500-1000 ETB	
	1000-2000 ETB	
	>2000	
Have you heard about DM?	Yes No	
Source of information about DM	Media	
	Friends/relatives	
	Health care workers	
	Others	
Family history DM	Yes	
	Don't know	
	No	