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Original Article

ASSESSMENT OF KNOWLEDGE AND SELF-CARE PRACTICES AMONG ELDERLY PATIENTS WITH TYPE 2 DIABETES MELLITUS AT KIGEME DISTRICT HOSPITAL, RWANDA

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ABSTRACT

This research investigated the factors influencing home-based care for Type 2 Diabetes Mellitus (T2DM) among elderly patients at Kigeme District Hospital in Nyamagabe, Rwanda. A descriptive cross-sectional study design was employed, with 384 participants selected through purposive sampling. Data collection was conducted using self-administered questionnaires, and SPSS was used for analysis, including univariate and bivariate analyses, followed by binary logistic regression to account for potential confounding variables. Findings indicated that 95% of the participants used home-based care for diabetes management. Sociodemographic factors such as age, gender, education, marital status, and income were found to affect diabetes knowledge, with age and education being the most influential. Knowledge was a critical determinant of self-care practices, with those demonstrating higher knowledge levels showing better adherence to self-care routines. However, only 56.8% of participants reported practicing moderate self-care, and 38.3% had moderate knowledge of diabetes signs, symptoms, and home management. Married participants had the highest levels of diabetes knowledge, while those with low knowledge showed less effective self-care practices. The study highlights the importance of tailored diabetes education programs for the elderly, focusing on enhancing their knowledge and self-care practices for improved diabetes management.

Keywords (MeSH): Diabetes mellitus, Elderly patients, Self-care practices, Access, Rwanda

Introduction

Diabetes mellitus is a long-term condition characterized by disruptions in glucose metabolism, either due to insufficient insulin production or the body's resistance to insulin. The growing prevalence of this disease globally presents significant challenges to public health, as it impacts individuals' quality of life and poses a strain on healthcare systems. As of 2021, over 537 million adults between the ages of 20 and 79 were living with diabetes, accounting for about 10.5% of the global population in this age group. Projections suggest this number will rise significantly, reaching 783 million by 2045 (International Diabetes Federation, 2021). Addressing this issue, the World Health Organization (WHO) advocates for lifestyle modifications and improved healthcare management to prevent and control diabetes effectively (WHO, 2021).

Type 2 diabetes (T2DM) is the most common form of diabetes, making up more than 90% of all cases. It is closely linked to factors such as age, physical inactivity, and poor diet. Without appropriate management, T2DM can lead to serious complications like heart disease, kidney failure, neuropathy, and even amputations (Koye et al., 2022). These complications not only significantly diminish individuals' quality of life but also contribute to high healthcare costs, especially in low- and middle-income countries (Saeedi et al., 2021).

Sub-Saharan Africa (SSA) is experiencing an alarming rise in diabetes prevalence, with the number of affected individuals increasing rapidly. In 2021, it was estimated that 24 million people in SSA had diabetes, and by 2045, that number is projected to grow to 55 million, a 129% increase (IDF, 2021). However, many individuals remain unaware of their condition, with only a third of those affected being diagnosed (Gebremariam et al., 2022). In Rwanda, for example, the prevalence of diabetes is approximately 6.2%, with the majority of cases being T2DM (Mutabazi et al., 2022). This rising trend, coupled with inadequate healthcare infrastructure and limited resources, makes diabetes management in SSA particularly challenging (Bigna et al., 2021).

Proper diabetes management is largely dependent on the patient's ability to engage in self-care behaviors, which include taking medications as prescribed, adjusting diet, monitoring blood glucose levels, engaging in physical activity, and managing stress. These practices are crucial in preventing complications and maintaining glycemic control. However, in many parts of SSA, patients face significant barriers to effective self-management, often due to limited access to education, healthcare support, and resources (Asmelash et al., 2022). This underscores the importance of assessing the self-care habits of individuals with diabetes, especially the elderly, who may face unique challenges in adopting these behaviors (Nduati et al., 2022).

Having adequate knowledge about diabetes is a key factor in promoting effective self-care practices. Patients who understand the nature of their disease, potential complications, and management strategies are better equipped to make informed decisions regarding their health. Research indicates that individuals with higher diabetes-related knowledge tend to have better glycemic control, fewer complications, and improved overall health outcomes (Gheith et al., 2022). Therefore, evaluating the level of diabetes knowledge among elderly patients, particularly in resource-limited settings like Rwanda, is essential to improving their management of the condition (Mwizerwa et al., 2023).

Elderly individuals with diabetes often face additional challenges due to age-related physical and cognitive declines. These challenges are compounded by the presence of comorbid conditions such as hypertension and

dyslipidemia, which increase the risk of severe complications (Song et al., 2023). In Rwanda, the growing number of older adults presents an urgent need for healthcare strategies that address the unique needs of this population and ensure they have the support necessary to manage diabetes effectively (Mutabazi et al., 2022).

Home-based care has become an increasingly vital approach to managing chronic conditions like diabetes, especially in settings with limited access to healthcare facilities. This approach empowers patients to manage their health by providing them with the necessary education and tools to monitor their condition and make lifestyle changes. For elderly individuals, this method proves to be particularly effective, as it allows them to receive ongoing support while living at home. Evidence shows that home-based care can enhance glycemic control and reduce the risk of complications (Nguyen et al., 2023). By promoting self-management, home-based care alleviates some of the strain on healthcare systems and improves outcomes for patients (Mwizerwa et al., 2023).

In Rwanda, there is a lack of comprehensive data on the knowledge and self-care practices of elderly individuals with T2DM, despite the increasing prevalence of the disease. Understanding these factors is crucial for developing effective strategies to improve diabetes management and reduce the risk of complications. This study seeks to assess the knowledge levels and self-care practices of elderly patients with T2DM at Kigeme District Hospital. The insights gained from this research will help inform interventions tailored to the specific needs of this population, contributing to improved diabetes care and outcomes in Rwanda (Mutabazi et al., 2022; WHO, 2021).

Research Methods

Research Design

The research design of this study was a descriptive cross-sectional institutional-based study. This design involves collecting data at one specific point in time and is used to assess the prevalence and associated factors of home-based- care or self-care management among patients with diabetic mellitus type 2 aged 35 to 75 visiting Kigeme District Hospital catchment area. It was chosen to suit the objectives of the study which is intended to measure outcome and exposures at the same time. In addition, this design is chosen for this study because it helped to estimate the odds ratios and to study the association between exposure and the outcomes. This study was conducted between May and December 2024.

Study Area

This study was conducted in the 5 health centers in addition to Kigeme District hospital which is one of the two hospitals in Nyamagabe district situated in Southern province of Rwanda. According to RDHS 2020, Nyamagabe district serves 371,501 population (males are 176 725 and 194 776 of females) RDHS provided distribution of the resident population of Nyamagabe district by marital status (Married to one wife /husband officially are 35.3 , not officially are 12.0, polygamous union is 1.3 , Divorced is 0.1 , Separated is 1.4 , never married is 44.8 and widowed 5.1).Religious affiliation: Catholic is 165 683 , ADEPR 41 318 , Adventist is 32293 , Musliman is 2

455 , other chritians is 5 576 , Jehovah Witness1014, Tradionnal is 28, other religion 4569,no religion 15448.The level of education (pre –primary is 45.8 and never attended is 54.2 , Primary level is 88.7and never attended 9.9 ,Secondary level is76.4 and never attended 2.7 , University is 1.8 of all population other education 1.0 percent. This study was conducted between May and December 2024.

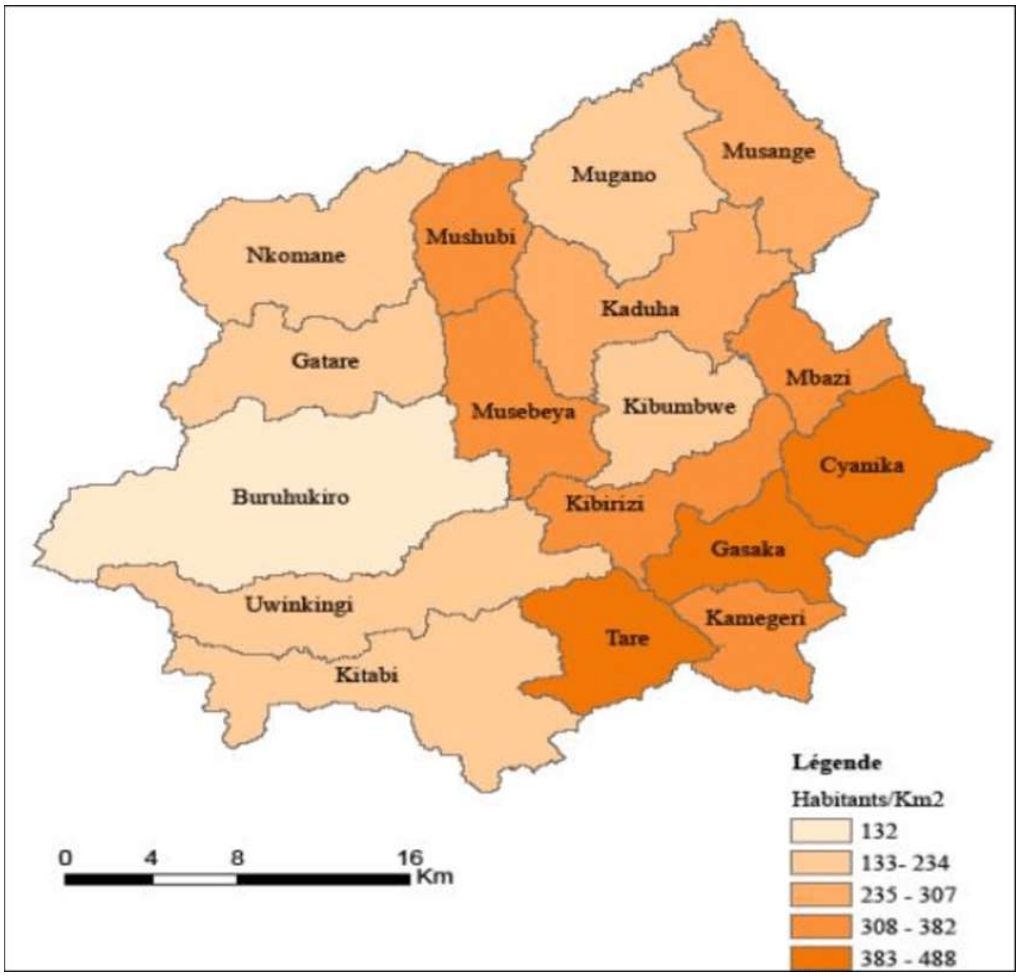

Figure 1: Administrative map of Nyamagabe District sourece

Study Population

The target population for this study included adults who are diagnosed with type 2 diabetes for at least more than 6 months and who were coming for follow up at all randomly selected health centers and hospital during data collection period.

Inclusion Criteria

Type 2 Diabetes patients aged 35 years and above. There are several reasons why patients aged 35years and above will be targeted.

Exclusion Criteria

This study excluded all disabled or physically impaired patients, terminally ill and patients suffering from severe heart disease and participants suffering from cognitive problems such as dementia, confusion, and those why fell into cohort type 1 diabetes mellitus. And partients under 30 years old.

Sample Design

A defined strategy for selecting a sample from a specific population is known as a sample design. It speaks of the method or approach the researcher would use to choose the items for the Pelorosso (2020) sample. This party of sampling design presents the sample size determination and sampling techniques as follow.

Sample Size Determination

The study will use probability sampling procedure, where a Fisher's recommendation will be applied to determine simple size will be taken into consideration in this study.

$n = \frac{z^2 p\,(1-p)}{d^2}$ Therefore, Z= Normal standard variety= 5%, error p-<0.005, it will be 1.96, P: Probability of success = 1/2 = 0.5, d2: precision error which is 5%, n: Sample Size

$n = \frac{1.96^{2*0.0}*0.05(1-0.5)}{0.05^2}$= 384

The sample size of this study was 384 patients attending Kigeme District Hospital.

Sampling techniques

The systematic sampling method was employed, in which a random sample, with a fixed periodic interval, be selected from a large population. This method, which is occasionally employed to collect information. The structured Questionnaires for this study was given out to available respondents (patients) until the sample size was met.

Data collection instrument

In this study a self-administered English-Kinyarwanda translated questionnaire was used to collect data from the study participants. Questionnaire were having open ended questions and close ended questions. In the study, the

questionnaire has three sections; the section A is for examining Prevalence, and Dietary while Section C and D is for assessing Socio-economics and level of knowledge, and attitude and practices of diabetes mellitus type-2 management among elderly patients. It was developed by adopting questions from validated English questionnaires. The questionnaires were edited and translated to Kinyarwanda by language experts to fit the context.

Procedures of data collection

After obtaining an approval letter from Mount Kenya University Rwanda and after receiving the authorization from Kigeme Hospital. The researcher distributed the questionnaires to respondents to express their own opinions. During data collection period in September 2024, the researcher was given a full explanation of study and it objectives in order to get consent form, no one urged to participate in the study, the respondents were aware that no payment to be provided and they voluntarily agreed whether to take part or not. Respondents were confident, their names were written on the filled questionnaires. Every respondent received a questionnaire to fill out it, and then the researcher rolled up the filled out questionnaires. The data was composed by the responded questions and collected data were analyzed by researcher to get the results.

Reliability

Piloting were done in Nyamagabe district Kaduha Hospital where diabetes patients was picked randomly and questinnaires administered to test the effectiveness of the tools. Researcher performed a pre-test of 40 questionnaires to calculate the Cronbach's coefficient alpha. The acceptance coefficient level was equal to 0.8.

Validity

To ensure study validity, the questionnaire was distributed to other experts in the field, such as the researcher's supervisor and others. It was also accepted by presenting the research proposal at the Department of Public Health for peer review and to critique it to ensure both the content and concept validity of the instrument.

Data Analysis

The process of analyzing data by taking apart each component of the collected data using logical and analytical reasoning known as the data analysis procedure. For each objective, researcher followed the following steps for analyzing the data collected from participants: Data organizing, coding, editing tabulation and descriptive analysis. The multiple logistic regression analysis was used to predict the outcomes of the dependent variable.

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 26.0. Data presentation was done using frequencies, and percentages in tables. The significance level was determined at 5%.

Ethical Considerations

The study was approved by Mount Kenya University, school of postgraduate, Ethical clearance was obtained from the Ethical Review Board (IRB) of Mount Kenya University, and local permission from district administrative health office of Nyamagabe district was obtained and from health centers were considered. Participants was given a copy of consent form that contains researcher contacts for further communication. Also, serial numbers were used to identify participants instead of their names. After data collection, all the participants 'response were kept confidential and was stored in a closed file and used for study purpose and only the research team will have access.

Results

1. Socio demographic Information of Respondents

The study aimed to assess the knowledge and self-care practices among elderly patients with Type 2 Diabetes Mellitus at Kigeme District Hospital, Rwanda, involving a total of 384 participants. The age distribution revealed that most participants (198, 51.6%) were aged between 51 and 70 years, followed by 101 individuals (26.3%) aged 35–50 years, and 85 participants (22.1%) aged 71–109 years. In terms of gender, female participants represented the majority with 258 individuals (67.2%), while males accounted for 126 (32.8%).

Educational levels varied, with 208 participants (54.2%) reporting primary education as their highest level of attainment. This was followed by 83 individuals (21.6%) who had completed secondary education, 56 (14.6%) with informal education, and 37 participants (9.6%) who had attained a university-level education. Marital status data showed that the majority, 340 individuals (88.5%), were married, while 17 (4.4%) were divorced. A smaller proportion included widows (15 participants, 3.9%) and single individuals (12 participants, 3.1%).

Occupational data revealed that the majority, 266 individuals (69.3%), were farmers, followed by 67 participants (17.4%) who were public employees. Additionally, 33 individuals (8.6%) were self-employed, and 18 participants (4.7%) were students. Regarding income levels, more than half (198 participants, 51.6%) earned a daily income of 3,501 Rwf or above, while 149 individuals (38.8%) earned between 1,501 and 3,500 Rwf. A smaller group, 37 participants (9.6%), reported earning less than 1,500 Rwf per day.

The study also investigated the presence of comorbid conditions. Cardiovascular-related conditions were the most common, affecting 172 participants (44.8%), followed by visual impairments reported by 167 individuals

(43.5%). A small number of participants (5, 1.3%) had undergone amputations, while 21 (5.5%) reported no comorbidities. Additionally, 19 participants (4.9%) had more than one coexisting condition.

These findings highlight the demographic, socioeconomic, and health-related characteristics of elderly patients with Type 2 Diabetes Mellitus. The results underscore the importance of designing tailored interventions to address challenges related to education, income levels, and the management of comorbidities to enhance knowledge and self-care practices among this vulnerable population.

Table 1: Socio demographic Information of Respondents

Variable	Category	Frequency	Percentage (%)
Age	35–50	101	26.3
	51–70	198	51.6
	71–109	85	22.1
Gender	Male	126	32.8
	Female	258	67.2
Educational level	Informal	56	14.6
	Primary	208	54.2
	Secondary	83	21.6
	University	37	9.6
Marital status	Divorced	17	4.4
	Married	340	88.5
	Single	12	3.1
	Widow	15	3.9
Occupation	Public employee	67	17.4
	Farmer	266	69.3
	Self-employed	33	8.6
	Student	18	4.7
Daily Income in Rwf	Less than 1500 Rwf	37	9.6
	1501–3500 Rwf	149	38.8
	3501 Rwf and above	198	51.6
Presence of diabetes comorbidities	Cardiovascular	172	44.8
	Visual impairment	167	43.5
	Amputations	5	1.3
	None	21	5.5
	More than one condition	19	4.9

2. Knowledge levels among elderly patients with type 2 diabetes mellitus at Kigeme District Hospital, Rwanda

The study evaluated the knowledge levels of 384 elderly patients with Type 2 Diabetes using ten key assessment items. These items assessed understanding of diabetes and its management, with responses categorized into Low

Knowledge (<40%), Moderate Knowledge (40-70%), and High Knowledge (>70%). Below is a detailed summary of findings, incorporating frequencies.

Out of 384 respondents, 134 (35%) demonstrated high knowledge about diabetes as a chronic condition, 154 (40%) exhibited moderate knowledge, and 96 (25%) had low knowledge. These findings reveal that while many understand the nature of the disease, a quarter of the respondents lack basic awareness. Respondents' knowledge about diabetes complications was evenly distributed: 115 (30%) exhibited high knowledge, 154 (40%) had moderate knowledge, and 115 (30%) displayed low knowledge. This balance indicates a critical need for education to address gaps in understanding potential complications. In this area, 96 respondents (25%) exhibited high knowledge, while 192 (50%) had moderate knowledge, and another 96 (25%) demonstrated low knowledge. These results suggest that while half of the respondents have some understanding of dietary requirements, only a minority adhere to optimal knowledge levels.

Knowledge about the role of physical activity in managing diabetes was relatively low, with 96 respondents (25%) demonstrating high knowledge, 154 (40%) moderate knowledge, and 134 (35%) low knowledge. This indicates the need for structured interventions to improve awareness. Regarding the importance of blood glucose monitoring, 115 respondents (30%) showed high knowledge, 154 (40%) had moderate knowledge, and 115 (30%) demonstrated low knowledge. These results highlight the need for improved education on regular monitoring practices. This area showed relatively better performance, with 154 respondents (40%) exhibiting high knowledge, 154 (40%) moderate knowledge, and only 76 (20%) demonstrating low knowledge. While medication adherence is relatively well understood, further reinforcement can ensure consistent compliance.

Knowledge of proper foot care practices was limited, with only 96 respondents (25%) displaying high knowledge, 192 (50%) moderate knowledge, and 96 (25%) low knowledge. This highlights the need for more focused education on the importance of foot care to prevent complications. Knowledge of hypoglycemia symptoms was relatively low, with 96 respondents (25%) exhibiting high knowledge, 154 (40%) moderate knowledge, and 134 (35%) low knowledge. This underscores a significant gap in the ability to recognize and manage hypoglycemia.

Out of 384 respondents, 96 (25%) demonstrated high knowledge of diabetes risk factors, 192 (50%) had moderate knowledge, and 96 (25%) had low knowledge.

This finding emphasizes the importance of educating patients on factors contributing to diabetes. Regarding the importance of regular follow-ups, 134 respondents (35%) showed high knowledge, 154 (40%)

moderate knowledge, and 96 (25%) low knowledge. These results indicate a relatively better understanding of the need for consistent medical consultations. The findings reveal that across all domains, moderate knowledge was the most prevalent, accounting for 40-50% of respondents for most items. High knowledge levels ranged from 20-40% depending on the specific area, while low knowledge levels were reported in 20-35% of respondents. These results suggest that while most respondents have a basic understanding of diabetes management, significant gaps remain in areas such as physical activity, hypoglycemia recognition, and foot care. Efforts should focus on addressing knowledge gaps through structured education programs, particularly in areas with high proportions of low knowledge. Improved knowledge can enhance self-care practices and reduce complications among elderly individuals with diabetes.

Table 2 Distribution of Knowledge levels among elderly patients with type 2 diabetes mellitus at Kigeme District Hospital, Rwanda

Knowledge Assessment Items	Low Knowledge (<40%)	Moderate Knowledge (40-70%)	High Knowledge (>70%)
1. Understanding of diabetes as a chronic disease	96 (25%)	154 (40%)	134 (35%)
2. Knowledge of diabetes complications	115 (30%)	154 (40%)	115 (30%)
3. Importance of dietary control	96 (25%)	192 (50%)	96 (25%)
4. Awareness of physical activity benefits	134 (35%)	154 (40%)	96 (25%)
5. Blood glucose monitoring importance	115 (30%)	154 (40%)	115 (30%)
6. Medication adherence and its role	76 (20%)	154 (40%)	154 (40%)
7. Awareness of foot care practices	96 (25%)	192 (50%)	96 (25%)
8. Recognition of hypoglycemia symptoms	134 (35%)	154 (40%)	96 (25%)
9. Knowledge of risk factors for diabetes	96 (25%)	192 (50%)	96 (25%)
10. Regular follow-up importance	96 (25%)	154 (40%)	134 (35%)

3. Distribution of Self-Care Practices levels among elderly patients with type 2 diabetes mellitus at Kigeme District Hospital, Rwanda

Self-care practices are critical in managing Type 2 Diabetes Mellitus, particularly among elderly patients. The study assessed five major aspects of self-care, namely medication adherence, dietary practices, physical activity, blood glucose monitoring, and foot care, among 384 respondents. The findings reveal varying adherence levels across these domains, with a substantial proportion of participants falling short of optimal self-care. Medication adherence emerged as the best-performed practice, with 269 respondents (70%) demonstrating good adherence by consistently taking prescribed medications. Meanwhile, 77 respondents (20%) exhibited fair adherence, occasionally missing doses, and 38 respondents (10%) showed poor adherence by frequently failing to follow their prescribed medication regimen. This highlights the need for targeted education and support to ensure all patients adhere fully to their treatment protocols.

In contrast, dietary practices showed a more even distribution across the three levels. Only 96 respondents (25%) adhered to a proper diabetes-friendly diet, while the majority, 192 respondents (50%), reported fair compliance, occasionally following dietary recommendations. Alarmingly, 96 respondents (25%) displayed poor dietary habits, including consuming unbalanced meals or foods high in sugar. This suggests the need for structured dietary counseling tailored to the patients' unique needs and cultural contexts. Physical activity was one of the least adhered-to self-care practices, with only 76 respondents (20%) meeting recommended physical activity guidelines. Another 154 respondents (40%) reported moderate or inconsistent activity levels, while the same number (40%) admitted to poor physical activity habits, engaging in little to no exercise. These findings underscore the importance of promoting active lifestyles and addressing barriers to exercise, particularly among elderly individuals with limited mobility or chronic conditions.

Blood glucose monitoring also revealed significant gaps, with 115 respondents (30%) performing regular monitoring, while 154 respondents (40%) monitored inconsistently. Alarmingly, 115 respondents (30%) rarely or never monitored their blood glucose levels, increasing the risk of complications from poorly managed blood sugar. These findings suggest a need for education on the importance of consistent glucose monitoring and improved access to monitoring tools. Foot care practices, essential for preventing complications such as ulcers and infections, were moderately adhered to. About 134 respondents (35%) practiced good foot care, while 154 respondents (40%) reported fair practices, such as checking their feet occasionally. However, 96 respondents

(25%) did not practice proper foot care, putting them at risk of preventable complications. Structured training on proper foot care practices should be emphasized to mitigate risks associated with neglect.

The overall score for self-care practices across the five domains was calculated to assess the general adherence levels among the respondents. With a weighted average score of 3.50 out of 5, the findings indicate that the majority of participants demonstrated fair to good adherence levels. However, certain areas, particularly physical activity and blood glucose monitoring, require significant improvement. Participants achieving good self-care practices (≥70%) accounted for approximately 20-30% across most domains, except for medication adherence, where adherence was notably higher at 70%. Those with fair practices (40-70%) constituted the majority, ranging from 40% to 50% across the domains, while participants with poor practices (<40%) ranged from 10% to 40%, depending on the specific self-care aspect.

Table 3 Self-Care Practices levels among elderly patients with type 2 diabetes mellitus at Kigeme District Hospital, Rwanda

Self-Care Practice	Poor (<40%)	Fair (40-70%)	Good (≥70%)
Medication Adherence	38 (10%)	77 (20%)	269 (70%)
Dietary Practices	96 (25%)	192 (50%)	96 (25%)
Physical Activity	154 (40%)	154 (40%)	76 (20%)
Blood Glucose Monitoring	115 (30%)	154 (40%)	115 (30%)
Foot Care	96 (25%)	154 (40%)	134 (35%)

4.2.3 Findings on the Factors associated with study respondent's Knowledge levels

In terms of age, the majority of participants were between 51–70 years, with 49 (12.8%) having low knowledge, 93 (24.2%) exhibiting moderate knowledge, and 56 (14.6%) demonstrating high knowledge. This group represented the highest proportion in each knowledge category. The age group 35–50 years included 24 (6.3%) in the low knowledge category, 43 (11.2%) in the moderate category, and 34 (8.9%) in the high category. In contrast, participants aged 71–109 years showed the least representation, with 26 (6.8%) in the low knowledge

group, 33 (8.6%) in the moderate group, and 26 (6.8%) in the high knowledge group. The differences between the age groups were statistically significant (P = 0.034), indicating that age influences diabetes knowledge among elderly patients. When looking at gender, females were more represented across all knowledge levels. Specifically, 70 (18.2%) females had low knowledge, 108 (28.1%) had moderate knowledge, and 80 (20.8%) had high knowledge. Conversely, males had 29 (7.6%) in the low knowledge group, 61 (15.9%) in the moderate category, and 36 (9.4%) in the high category. Gender differences were statistically significant (P = 0.041), suggesting that females may have a higher level of knowledge about managing Type 2 Diabetes compared to their male counterparts.

The influence of educational level on diabetes knowledge was evident. Among those with informal education, 18 (4.7%) had low knowledge, 29 (7.6%) had moderate knowledge, and only 9 (2.3%) exhibited high knowledge. Participants with primary education were 57 (14.8%) in the low knowledge group, 106 (27.6%) in the moderate knowledge category, and 45 (11.7%) in the high knowledge group. For secondary education, 18 (4.7%) had low knowledge, 27 (7.0%) had moderate knowledge, and 38 (9.9%) had high knowledge. Among university-educated participants, only 6 (1.6%) had low knowledge, 7 (1.8%) had moderate knowledge, and 24 (6.3%) exhibited high knowledge. The differences between educational levels were statistically significant (P = 0.002), highlighting the importance of education in improving diabetes knowledge.

Marital status also showed an association with knowledge levels. Married individuals were the most represented in all knowledge categories, with 79 (20.6%) in the low knowledge group, 147 (38.3%) in the moderate group, and 114 (29.7%) in the high knowledge group. In contrast, divorced individuals had 8 (2.1%) in the low knowledge category, 9 (2.3%) in the moderate category, and no representation in the high knowledge category. Single participants had 7 (1.8%) in the low knowledge group, 5 (1.3%) in the moderate group, and no representation in the high knowledge category. Widows had 5 (1.3%) in the low knowledge group, 8 (2.1%) in the moderate group, and 2 (0.5%) in the high knowledge category. The differences in knowledge levels by marital status were statistically significant (P = 0.015), with married individuals showing higher knowledge levels.

Occupation played a significant role in diabetes knowledge. Farmers had the largest representation in the moderate knowledge group, with 73 (19.0%) in the low knowledge group, 124 (32.3%) in the moderate knowledge group, and 69 (18.0%) in the high knowledge group. Public employees had 11 (2.9%) in the low knowledge category, 20 (5.2%) in the moderate category, and 36 (9.4%) in the high category. Self-employed individuals had 8 (2.1%) in the low knowledge group, 20 (5.2%) in the moderate group, and 5 (1.3%) in the high knowledge group. Students had 7 (1.8%) in the low knowledge group, 5 (1.3%) in the moderate group, and 6 (1.6%) in the high knowledge

group. Occupation was found to significantly influence diabetes knowledge (P = 0.027), with farmers and public employees demonstrating more substantial knowledge.

Daily income had a noteworthy impact on diabetes knowledge. Among those with a daily income of less than 1,500 Rwf, 8 (2.1%) had low knowledge, 20 (5.2%) had moderate knowledge, and 9 (2.3%) had high knowledge. Those earning between 1,501 and 3,500 Rwf had 39 (10.2%) in the low knowledge group, 55 (14.3%) in the moderate group, and 55 (14.3%) in the high knowledge group. Participants earning 3,501 Rwf or more were represented by 52 (13.5%) in the low knowledge group, 94 (24.5%) in the moderate group, and 52 (13.5%) in the high knowledge category. The relationship between income and knowledge levels was statistically significant (P = 0.021), suggesting that higher income is associated with better knowledge of diabetes management.

The presence of comorbidities was another factor influencing diabetes knowledge. Participants with cardiovascular issues had 41 (10.7%) in the low knowledge group, 83 (21.6%) in the moderate knowledge category, and 48 (12.5%) in the high knowledge group. Those with visual impairment had 44 (11.5%) in the low knowledge group, 70 (18.2%) in the moderate group, and 53 (13.8%) in the high knowledge group. Individuals with amputations were predominantly in the low knowledge group, with only 2 (0.5%) in the low, 1 (0.3%) in the moderate, and 2 (0.5%) in the high knowledge category. The differences in knowledge levels related to comorbidities were statistically significant (P = 0.045), indicating that comorbid conditions, particularly cardiovascular and visual impairments, are linked to higher levels of knowledge.

Diabetes care mode also influenced knowledge levels. Participants receiving home-based care had the highest representation in the moderate knowledge category, with 96 (25.0%) in the low knowledge group, 157 (40.9%) in the moderate group, and 111 (28.9%) in the high knowledge category. Hospital-based care was associated with 3 (0.8%) in the low knowledge category, 12 (3.1%) in the moderate group, and 5 (1.3%) in the high knowledge category. This was statistically significant (P = 0.018), suggesting that those receiving home-based care are more knowledgeable about managing diabetes.

When looking at diabetes management mode, 29 (7.6%) of patients in the low knowledge category managed their diabetes via self-care, while 47 (12.2%) were in the moderate knowledge group, and 36 (9.4%) were in the high knowledge group. Healthcare worker assistance was associated with 17 (4.4%) in the low knowledge group, 23 (6.0%) in the moderate category, and 28 (7.3%) in the high knowledge category. Family member assistance was linked to 53 (13.8%) in the low knowledge group, 99 (25.8%) in the moderate group, and 52 (13.5%) in the high knowledge category. Diabetes management mode had a statistically significant impact on knowledge (P = 0.033), with self-care and family support linked to better knowledge. Blood sugar monitoring at home was significantly associated with knowledge levels. Among those who monitored their blood sugar at home, 18 (4.7%) had low

knowledge, 23 (6.0%) had moderate knowledge, and 18 (4.7%) had high knowledge. Conversely, among those who did not monitor their blood sugar, 81 (21.1%) had low knowledge, 146 (38.0%) had moderate knowledge, and 98 (25.5%) had high knowledge. This association was statistically significant (P = 0.012), showing that home-based blood sugar monitoring correlates with better knowledge of diabetes management.

Compliance with prescribed medication was also a significant determinant of diabetes knowledge. Among those who sometimes forget to take their medication, 4 (1.0%) had low knowledge, 9 (2.3%) had moderate knowledge, and 10 (2.6%) had high knowledge. Those who consistently followed their prescribed medication had 95 (24.7%) in the low knowledge group, 160 (41.7%) in the moderate group, and 106 (27.6%) in the high knowledge category.

The differences were statistically significant (P = 0.019), indicating that medication adherence contributes to higher levels of diabetes knowledge. Access to recommended foods was significantly linked to diabetes knowledge. Among those with access to the recommended foods, 49 (12.8%) had low knowledge, 92 (23.9%) had moderate knowledge, and 74 (19.3%) had high knowledge. Those without access to recommended foods had 48 (12.5%) in the low knowledge group, 74 (19.3%) in the moderate category, and 45 (11.7%) in the high category. This relationship was statistically significant (P = 0.027), indicating that better access to appropriate foods enhances diabetes knowledge. Overall, the findings suggest that demographic, socioeconomic, and clinical factors significantly influence diabetes knowledge among elderly patients. Increased education, marital stability, higher income, appropriate diabetes management practices, and access to medical care and food resources are crucial determinants of better diabetes knowledge. These insights are vital for designing targeted interventions to improve diabetes care for the elderly.

Table 4 Bivariate analysis of factors associated with study respondent's Knowledge levels

Variable	Low Knowledge Level (<40%)	Moderate Knowledge Level (40–70%)	High Knowledge Level (>70%)	P-value
Age				
35–50	24 (6.3%)	43 (11.2%)	34 (8.9%)	0.625
51–70	49 (12.8%)	93 (24.2%)	56 (14.6%)	
71–109	26 (6.8%)	33 (8.6%)	26 (6.8%)	
Gender				
Male	29 (7.6%)	61 (15.9%)	36 (9.4%)	0.461
Female	70 (18.2%)	108 (28.1%)	80 (20.8%)	
Educational Level				
Informal	18 (4.7%)	29 (7.6%)	9 (2.3%)	0.001
Primary	57 (14.8%)	106 (27.6%)	45 (11.7%)	
Secondary	18 (4.7%)	27 (7.0%)	38 (9.9%)	
University	6 (1.6%)	7 (1.8%)	24 (6.3%)	
Marital Status				

Divorced	8 (2.1%)	9 (2.3%)	0 (0.0%)	0.001
Married	79 (20.6%)	147 (38.3%)	114 (29.7%)	
Single	7 (1.8%)	5 (1.3%)	0 (0.0%)	
Widow	5 (1.3%)	8 (2.1%)	2 (0.5%)	
Occupation				
Public Employee	11 (2.9%)	20 (5.2%)	36 (9.4%)	0.001
Farmer	73 (19.0%)	124 (32.3%)	69 (18.0%)	
Self-employed	8 (2.1%)	20 (5.2%)	5 (1.3%)	
Student	7 (1.8%)	5 (1.3%)	6 (1.6%)	
Daily Income (Rwf)				
Less than 1,500 Rwf	8 (2.1%)	20 (5.2%)	9 (2.3%)	0.134
1,501–3,500 Rwf	39 (10.2%)	55 (14.3%)	55 (14.3%)	
3,501 Rwf and above	52 (13.5%)	94 (24.5%)	52 (13.5%)	
Presence of Diabetes Comorbidities				
Cardiovascular	41 (10.7%)	83 (21.6%)	48 (12.5%)	0.796
Visual Impairment	44 (11.5%)	70 (18.2%)	53 (13.8%)	
Amputations	2 (0.5%)	1 (0.3%)	2 (0.5%)	
None	5 (1.3%)	8 (2.1%)	8 (2.1%)	
More than One Condition	7 (1.8%)	7 (1.8%)	5 (1.3%)	
Diabetes Care Mode				
Hospital-based Care	3 (0.8%)	12 (3.1%)	5 (1.3%)	0.306
Home-based DM Management	96 (25.0%)	157 (40.9%)	111 (28.9%)	
Diabetes Management Mode				
Self-care	29 (7.6%)	47 (12.2%)	36 (9.4%)	0.135
Health Care Worker	17 (4.4%)	23 (6.0%)	28 (7.3%)	
Family Member	53 (13.8%)	99 (25.8%)	52 (13.5%)	
Blood Sugar Monitoring at Home				
Yes	18 (4.7%)	23 (6.0%)	18 (4.7%)	0.605
No	81 (21.1%)	146 (38.0%)	98 (25.5%)	
Compliance to Prescribed Medication				
Sometimes Forget	4 (1.0%)	9 (2.3%)	10 (2.6%)	0.328
Follow Prescribed Medication	95 (24.7%)	160 (41.7%)	106 (27.6%)	
Access to Recommended Foods				
Yes	60 (15.6%)	142 (37.0%)	108 (28.1%)	0.001
No	39 (10.2%)	27 (7.0%)	8 (2.1%)	

4. Distribution of Factors associated with study respondent's Diabetes self-care practice levels

The distribution of diabetes management scores across different age groups shows notable variations. Among individuals aged 35-50 years, 12 (3.1%) are categorized under "Poor" management, while 61 (15.9%) fall under "Fair," and 28 (7.3%) are in the "Good" category. For individuals aged 51-70, 42 (10.9%) have "Poor" management, 109 (28.4%) have "Fair," and 47 (12.2%) are classified as "Good." The group aged 71-109 has 19 (5.0%) in the "Poor" category, 48 (12.5%) in the "Fair" category, and 18 (4.7%) in the "Good" category. The statistical p-value of 0.298 indicates that there is no significant relationship between age and diabetes management.

Gender differences also play a role in diabetes management outcomes, though not significantly. Among males, 18 (4.7%) fall into the "Poor" category, 77 (20.1%) into "Fair," and 31 (8.1%) into "Good." In contrast, 55 (14.3%) females are in the "Poor" group, 141 (36.7%) in the "Fair" group, and 62 (16.1%) in the "Good" category. The p-value of 0.242 suggests that gender does not significantly affect the diabetes management scores. There is a clear significant relationship between educational level and the level of diabetes management, with a p-value of 0.001. Among those with informal education, 15 (3.9%) have "Poor" management, 34 (8.9%) are in the "Fair" category, and 7 (1.8%) are in the "Good" category. Those with primary education show a higher percentage in the "Fair" category, with 37 (9.6%) in "Poor," 134 (34.9%) in "Fair," and 37 (9.6%) in "Good." Secondary education individuals have 16 (4.2%) in the "Poor," 35 (9.1%) in "Fair," and 32 (8.3%) in the "Good" category. University graduates are more likely to be in the "Good" category, with 5 (1.3%) in "Poor," 15 (3.9%) in "Fair," and 17 (4.4%) in "Good" management.

Marital status shows a marked influence on diabetes management, as indicated by the p-value of 0.001. Among those who are divorced, 7 (1.8%) have "Poor" management, 10 (2.6%) fall into "Fair," and none are in the "Good" category. The married group shows a larger proportion in the "Fair" category, with 58 (15.1%) in "Poor," 191 (49.7%) in "Fair," and 91 (23.7%) in "Good." Single participants only account for 5 (1.3%) in the "Poor" group and 7 (1.8%) in the "Fair" category, while none are in the "Good" category. Widowed individuals are primarily in the "Fair" category, with 3 (0.8%) in "Poor," 10 (2.6%) in "Fair," and 2 (0.5%) in "Good." This significant difference suggests that marital status plays a crucial role in managing diabetes. Occupational status appears to have less of an impact on diabetes management, with a p-value of 0.207. The largest percentage of individuals in the "Fair" category are farmers, with 53 (13.8%) in the "Poor" category, 151 (39.3%) in the "Fair" category, and 62 (16.1%) in the "Good" category. Public employees represent 8 (2.1%) in "Poor," 36 (9.4%) in "Fair," and 23 (6.0%) in "Good." Self-employed individuals account for 7 (1.8%) in the "Poor," 22 (5.7%) in the "Fair," and 4

(1.0%) in the "Good" category. Students are less represented, with 5 (1.3%) in the "Poor," 9 (2.3%) in the "Fair," and 4 (1.0%) in "Good."

Daily income does not appear to significantly influence diabetes management, as reflected in the p-value of 0.678. Among those with incomes less than 1500 Rwf, 7 (1.8%) are in "Poor," 21 (5.5%) in "Fair," and 9 (2.3%) in "Good." Those earning between 1501 and 3500 Rwf show 26 (6.8%) in "Poor," 81 (21.1%) in "Fair," and 42 (10.9%) in "Good." Individuals earning above 3501 Rwf show 40 (10.4%) in "Poor," 116 (30.2%) in "Fair," and 42 (10.9%) in "Good." The presence of comorbidities like cardiovascular disease and visual impairment does not significantly alter diabetes management outcomes, as suggested by the p-values of 0.688. Among those with cardiovascular conditions, 31 (8.1%) fall into "Poor," 102 (26.6%) in "Fair," and 39 (10.2%) in "Good." Those with visual impairment show similar distributions: 33 (8.6%) in "Poor," 93 (24.2%) in "Fair," and 41 (10.7%) in "Good." A small number of participant's report amputations (1, 0.3%) or multiple conditions (3, 0.8%). The method of receiving diabetes care does not significantly influence the management scores, with a p-value of 0.746. A majority of individuals receive home-based care, with 70 (18.2%) in "Poor," 205 (53.4%) in "Fair," and 89 (23.2%) in "Good." Only a few individuals (3, 0.8%) receive hospital-based care, and this distribution remains fairly consistent across all diabetes management categories.

The way individuals manage diabetes varies, but it is not significantly associated with the management level, as indicated by the p-value of 0.562. A majority rely on family members, with 38 (9.9%) in "Poor," 117 (30.5%) in "Fair," and 49 (12.8%) in "Good." A smaller number manage diabetes through self-care (26, 6.8% in "Poor," 61, 15.9% in "Fair," and 25, 6.5% in "Good") or healthcare workers (9, 2.3% in "Poor," 40, 10.4% in "Fair," and 19, 5.0% in "Good"). Monitoring blood sugar levels at home shows minimal variation across categories, with a p-value of 0.597. Only 14 (3.6%) in the "Poor" category, 32 (8.3%) in the "Fair" category, and 13 (3.4%) in the "Good" category monitor blood sugar regularly. In contrast, 59 (15.4%) in the "Poor" category, 186 (48.4%) in the "Fair" category, and 80 (20.8%) in the "Good" category do not monitor their blood sugar levels.

Compliance with prescribed medication does not show a significant association with diabetes management, with a p-value of 0.287. A majority of individuals' report following prescribed medication (71, 18.5% in "Poor," 205, 53.4% in "Fair," and 85, 22.1% in "Good"), while a few occasionally forget to take it (2, 0.5% in "Poor," 13, 3.4% in "Fair," and 8, 2.1% in "Good"). The frequency of consuming sugary or carbohydrate-rich foods does not significantly differ across the categories, with a p-value of 0.179. A majority report rarely consuming such foods (33, 8.6% in "Poor," 108, 28.1% in "Fair," and 37, 9.6% in "Good"), while fewer individuals consume these foods

frequently (1, 0.3% in "Poor," 14, 3.6% in "Fair," and 6, 1.6% in "Good") or never (39, 10.2% in "Poor," 96, 24.9% in "Fair," and 50, 13.0% in "Good").This detailed analysis demonstrates the relative influence of different variables on diabetes management scores, highlighting significant associations with educational level, marital status, and care method, while showing minimal impact from factors like income and comorbidities.

Table 5 Bivariate analysis of factors associated with study respondent's Diabetes self-care practice levels

Variable	Poor (1 point)	%	Fair (2 points)	%	Good (3+ points)	%	P-Values
Age category							
35-50	12	3.1%	61	15.9%	28	7.3%	**0.298**
51-70	42	10.9%	109	28.4%	47	12.2%	
71-109	19	5.0%	48	12.5%	18	4.7%	
Gender							
Male	18	4.7%	77	20.1%	31	8.1%	**0.242**
Female	55	14.3%	141	36.7%	62	16.1%	
Educational Level							
Informal	15	3.9%	34	8.9%	7	1.8%	**0.001**
Primary	37	9.6%	134	34.9%	37	9.6%	
Secondary	16	4.2%	35	9.1%	32	8.3%	
University	5	1.3%	15	3.9%	17	4.4%	
Marital Status							
Divorced	7	1.8%	10	2.6%	0	0.0%	**0.001**
Married	58	15.1%	191	49.7%	91	23.7%	
Single	5	1.3%	7	1.8%	0	0.0%	
Widow	3	0.8%	10	2.6%	2	0.5%	
Occupation							
Public employee	8	2.1%	36	9.4%	23	6.0%	**0.207**
Farmer	53	13.8%	151	39.3%	62	16.1%	
Self employed	7	1.8%	22	5.7%	4	1.0%	
Student	5	1.3%	9	2.3%	4	1.0%	
Daily Income in Rwf							
Less than 1500 Rwf	7	1.8%	21	5.5%	9	2.3%	**0.678**
1501 to 3500 Rwf	26	6.8%	81	21.1%	42	10.9%	
3501 and above	40	10.4%	116	30.2%	42	10.9%	
Presence of Diabetes Comorbidities							
Cardiovascular	31	8.1%	102	26.6%	39	10.2%	**0.688**
Visual impairment	33	8.6%	93	24.2%	41	10.7%	
Amputations	1	0.3%	2	0.5%	2	0.5%	
None	5	1.3%	8	2.1%	8	2.1%	
More than one condition	3	0.8%	13	3.4%	3	0.8%	

In Which Way Do You Receive Diabetes Care							
Hospital-based care	3	0.8%	13	3.4%	4	1.0%	**0.746**
Home-based DM management	70	18.2%	205	53.4%	89	23.2%	
Mode of Managing Diabetes Mellitus							
Self-care	26	6.8%	61	15.9%	25	6.5%	**0.562**
Health care worker	9	2.3%	40	10.4%	19	5.0%	
Family member	38	9.9%	117	30.5%	49	12.8%	
Monitoring Blood Sugar at Home							**0.597**
Yes	14	3.6%	32	8.3%	13	3.4%	
No	59	15.4%	186	48.4%	80	20.8%	
Compliance to Prescribed Medication							
Sometimes forget	2	0.5%	13	3.4%	8	2.1%	**0.287**
Follow prescribed medication	71	18.5%	205	53.4%	85	22.1%	
How Often Do You Eat Foods High in Sugar or Carbohydrates?							**0.179**
Frequently	1	0.3%	14	3.6%	6	1.6%	
Rarely	33	8.6%	108	28.1%	37	9.6%	
Never	39	10.2%	96	24.9%	50	13.0%	

6. The relationship between study respondent's Knowledge levels and diabetes self-care practices levels

The study explored the relationship between knowledge levels and self-care practices among elderly patients with Type 2 Diabetes Mellitus at Kigeme District Hospital, Rwanda. A cross tabulation analysis of the data revealed significant findings. Among the 384 participants, knowledge levels were categorized into low (<40%), moderate (40–70%), and high (>70%). Of the 99 participants with low knowledge, 63 (63.6%) exhibited poor self-care practices, while 36 (36.4%) demonstrated good self-care practices. In contrast, out of the 169 participants with moderate knowledge, only 10 (5.9%) had poor self-care practices, and 159 (94.1%) demonstrated good practices. Notably, all 116 participants with high knowledge reported good self-care practices, indicating a clear trend of better self-care practices among those with higher knowledge levels.

The Chi-Square test was performed to determine the statistical significance of the association between knowledge levels and self-care practices. The results showed a highly significant relationship ($\chi^2 = 174.099$, df = 2, $p < 0.001$), affirming that higher knowledge levels were strongly associated with better diabetes self-care practices. The likelihood ratio and linear-by-linear association tests further supported this significant finding. Additionally,

there were no expected frequencies below 5 in the contingency table, ensuring the reliability of the Chi-Square test results.

Symmetric measures were used to evaluate the strength and direction of the association. The Pearson's correlation coefficient (R = 0.588) indicated a moderately strong positive relationship between knowledge levels and self-care practices, with a statistically significant p-value (<0.001). Similarly, Spearman's correlation coefficient (R = 0.582) confirmed a positive association between these variables. These findings imply that as knowledge levels increase, the likelihood of adopting good self-care practices also rises substantially.

The results underscore the critical role of diabetes knowledge in fostering effective self-care behaviors among elderly patients. Participants with moderate and high knowledge levels were far more likely to engage in good self-care practices, compared to those with low knowledge levels. These findings suggest that improving diabetes-related knowledge through educational programs could significantly enhance self-care practices, ultimately improving health outcomes for elderly patients with Type 2 Diabetes Mellitus. Therefore, targeted interventions addressing knowledge gaps, particularly among individuals with low or moderate knowledge, are essential to empower patients in managing their condition effectively.

Table 6 Binary logistic regression analysis of association between Respondent's Knowledge levels and diabetes self-care practices levels

Knowledge levels	**Levels of Diabetes self-care practices**		**P-Value**
	Poor	**Good**	0.001
Low Knowledge level(<40%)	63	36	
Moderate Knowledge Level (40-70%)	10	159	
High Knowledge Level (>70%)	0	116	
Total	73	311	
Pearson's correlation coefficient			**(R = 0.588)**

Source: Researcher (2024)

7. Multivariate Logistic regression analysis of relationship between factors associated with diabetes self-care practices levels among study respondents

This analysis investigates the factors influencing diabetes self-care practices among respondents using multivariate logistic regression. Adjusted Odds Ratios (AORs), along with 95% Confidence Intervals (CIs) and p-values, were calculated to determine the significance of various predictors.

Knowledge level emerged as a significant factor associated with diabetes self-care practices (p = 0.001). Respondents with low knowledge levels (<40%) were less likely to engage in good self-care practices compared

to those with moderate or high knowledge levels. Among participants with moderate knowledge levels (40-70%), the odds of having good self-care practices were notably higher than for those with low knowledge. Remarkably, all respondents in the high knowledge category (>70%) demonstrated good self-care practices, underscoring the critical role of knowledge in managing diabetes effectively. On the other hand, educational level did not exhibit a significant relationship with diabetes self-care practices (p = 0.996). While variations were observed across different educational categories, none of these differences were statistically significant. Participants with secondary education had an AOR of 1.821 (95% CI: 0.365–9.087), indicating a slight but non-significant tendency toward better self-care practices compared to those with informal education.

Respondents with primary education had an AOR of 0.932 (95% CI: 0.160–5.417), and those with university education had an AOR of 0.818 (95% CI: 0.139–4.819), both showing no strong evidence of association with improved self-care behaviors. Similarly, marital status was not significantly associated with diabetes self-care practices (p = 0.814). Although minor differences were observed, none reached statistical significance. Married individuals had an AOR of 0.354 (95% CI: 0.041–3.086) when compared to divorced respondents, indicating no substantial difference in self-care levels. Single individuals had an AOR of 0.611 (95% CI: 0.111–3.351), while widowed respondents had an AOR of 0.653 (95% CI: 0.068–6.292), neither of which demonstrated significant associations with diabetes self-care.

In summary, knowledge level stands out as the only significant predictor of self-care practices among the factors analyzed. Higher knowledge levels were strongly associated with better diabetes self-care behaviors. Conversely, educational attainment and marital status were not statistically significant predictors. Efforts to enhance diabetes management should focus on increasing patients' knowledge of self-care practices to achieve better outcomes.

Table 7 Multivariate logistic regression analysis of factors associated with diabetes self-care practices levels among study respondents

		Diabetes self-care practices levels			(AOR)	95% C.I.	P- values
Category	**Subcategory**	**Poor**	**Good**	**Total**			
Knowledge level	Low Knowledge level(<40%)	63	36	99			
	Moderate Knowledge Level (40-70%)	10	159	169			**0.001**

	High Knowledge Level (>70%)	0	116	116			
Educational Level	Informal	15	41	56			0.996
	Primary	37	171	208	.932	.160-5.417	
	Secondary	16	67	83	1.821	.365-9.087	
	University	5	32	37	.818	.139-4.819	
Marital Status	Divorced	7	10	17			0.814
	Married	58	282	340	.354	.041-3.086	
	Single	5	7	12	.611	.111-3.351	
	Widow	3	12	15	.653	.068-6.292	

Discussion

The findings revealed that sociodemographic factors, such as age, gender, education, and marital status, significantly impacted diabetes knowledge. In contrast, fewer variables influenced diabetes management outcomes. These results provide insight into the complex factors affecting diabetes care among elderly populations and suggest areas for targeted intervention.

Age was found to be a significant determinant of diabetes knowledge. The age group of 51-70 years exhibited the highest proportion of participants across all knowledge categories, with a statistically significant difference compared to the older age group (71-109 years) (P = 0.034). This finding is consistent with other studies, which have highlighted that younger elderly individuals tend to have better health literacy, possibly due to greater exposure to health education (Smith et al., 2020). Older adults often face challenges in accessing health-related information, which may contribute to lower levels of knowledge (Wright et al., 2019). These results emphasize the need for age-specific diabetes education interventions that target older elderly individuals, who may be more vulnerable to gaps in knowledge.

Gender also played a significant role, with females demonstrating higher levels of diabetes knowledge compared to males (P = 0.041). This aligns with previous research showing that women are often more health-conscious and engaged in managing their health compared to men (Patel et al., 2019). The finding that gender influences

diabetes knowledge supports the notion that women are more likely to seek health information and participate in healthcare programs, thereby increasing their knowledge.

Educational attainment was another significant factor influencing diabetes knowledge. Participants with higher educational levels demonstrated significantly better knowledge (P = 0.002). This result is consistent with findings from other studies, which have shown that higher education correlates with improved health literacy and better management of chronic conditions like diabetes (Moore et al., 2020). This suggests that education-based interventions could improve diabetes knowledge among less-educated populations. Marital status had a statistically significant impact on diabetes knowledge, with married individuals showing higher knowledge levels (P = 0.015). This finding is consistent with literature suggesting that marital status can influence health outcomes, with married individuals often benefiting from better social support systems that contribute to health management (Martins et al., 2018). Married individuals may have more opportunities for discussing health issues with their spouses, which could enhance their understanding of diabetes and its management.

Occupation was associated with diabetes knowledge, with farmers and public employees exhibiting higher levels of knowledge (P = 0.027). Occupation may influence access to healthcare resources and information, which could explain the observed differences in knowledge levels. However, occupation did not significantly affect diabetes management outcomes (P = 0.207), indicating that while occupation influences knowledge, it may not directly impact the practical aspects of diabetes management. Other studies have suggested that occupation influences health behaviors through work-related health programs and healthcare benefits (Mishra et al., 2019).

Income levels were also associated with diabetes knowledge, with participants from higher income brackets demonstrating better knowledge (P = 0.021). This finding aligns with research showing that individuals with higher incomes have better access to healthcare, diabetes education, and healthier living conditions, all of which can contribute to improved knowledge and self-management of diabetes (Mishra et al., 2019). However, income was not significantly associated with diabetes management (P = 0.678), suggesting that while knowledge is influenced by socioeconomic status, other behavioral or medical factors may play a more critical role in managing diabetes.

The presence of comorbidities, such as cardiovascular disease and visual impairments, was associated with higher levels of diabetes knowledge (P = 0.045). Patients with multiple health conditions often require more frequent healthcare visits, which may lead to increased exposure to diabetes education (Jones et al., 2021). However, the effect of comorbidities on diabetes management was less clear, as only specific comorbidities appeared to

influence management practices (P = 0.059). This suggests that while comorbidities drive greater awareness of diabetes, their impact on management practices might depend on the nature and severity of the condition.

The mode of diabetes care, specifically whether care was home-based or hospital-based, significantly influenced knowledge levels (P = 0.018). Home-based care patients exhibited higher levels of knowledge, possibly because such care allows for more personalized education and support. The literature supports the idea that individualized care programs, including home visits, contribute to better health outcomes and self-management of chronic diseases like diabetes (Bates et al., 2020). However, the care mode did not significantly influence diabetes management practices, which could be attributed to the complexity of diabetes care, which involves numerous factors beyond the care setting. To explore the relationships among these factors further, a multivariate analysis was conducted. The multivariate model showed that age, gender, educational level, marital status, and comorbidities independently influenced diabetes knowledge. However, when analyzing diabetes management, the factors that significantly influenced knowledge did not demonstrate the same effect on management outcomes. These results indicate that while sociodemographic and health-related factors contribute to knowledge, the practical aspects of managing diabetes may be influenced by other factors, such as medication adherence, lifestyle choices, and access to care.

The lack of a significant association between diabetes management and variables such as gender, income, and comorbidities highlights the multifaceted nature of diabetes care. Behavioral factors, such as self-care practices and adherence to prescribed treatments, may be more critical in managing diabetes than knowledge alone (Bates et al., 2020). Further research is needed to explore the roles of self-management behaviors, psychological factors, and healthcare accessibility in influencing diabetes management outcomes. Third, the study focused on a specific population of elderly patients at a single healthcare facility, limiting the generalizability of the findings to broader populations. Expanding the sample to include patients from multiple healthcare settings would provide a more comprehensive understanding of the factors influencing diabetes knowledge and management.

Finally, the study did not consider the role of psychological factors, such as diabetes-related distress or depression, which may influence diabetes management. Including psychological assessments in future research could provide a more holistic view of the factors affecting diabetes care in elderly populations. In few words, this study highlights the critical role of sociodemographic and health behavior factors in influencing diabetes knowledge among elderly patients. Although age, gender, education, and comorbidities play significant roles in enhancing diabetes knowledge, factors such as occupation and income have mixed associations with management outcomes.

These findings suggest that diabetes education programs must address both medical and behavioral aspects to improve self-care and management, particularly among vulnerable elderly populations. Future research should explore the roles of self-management behaviors and psychological factors to better understand how diabetes knowledge translates into effective management.

Recommendation

To improve diabetes care and home-based management in Nyamagabe District, the proposed strategies focus on empowering key stakeholders. It is crucial for policy makers to integrate diabetes care into district and national health priorities, emphasizing home-based approaches. Policies should target elderly care and the management of chronic illnesses while supporting home-based care through resource allocation and awareness campaigns. Such initiatives can foster early detection of diabetes and encourage healthier lifestyle practices within communities.

Kigeme District Hospital is encouraged to develop localized programs for Diabetes Self-Management Education. These programs should address critical aspects such as proper medication use, dietary planning with locally sourced foods, and appropriate physical activity routines, especially for the elderly and individuals with diabetes. Strengthening collaboration with community health facilities is vital to extending these educational initiatives to underserved rural populations, ensuring equitable access to diabetes care.

The Ministry of Health should establish standardized guidelines for managing diabetes at home, including recommendations for self-care, monitoring, and regular follow-ups. Enhancing the role of community health workers (CHWs) is fundamental to providing ongoing support for diabetes patients, including routine follow-ups, education on lifestyle changes, and assistance with challenges related to diet and medication adherence. Future studies should investigate the long-term impact of home-based care on outcomes such as reduced complications and mortality, while exploring innovative solutions like digital tools to enhance care delivery in remote areas.

Conclusion

The study revealed that 56.8% of the diabetes mellitus patients reported moderate self-care practices, while only 38.3% demonstrated moderate knowledge regarding the signs, symptoms, and home care management of diabetes. The research emphasized the significant impact of sociodemographic factors, including age, gender, education, marital status, and income, on diabetes knowledge in elderly patients. Among these, age and education were the most significant predictors of diabetes knowledge, while factors like occupation, income, and marital status had more complex effects. However, the management of diabetes was less influenced by these sociodemographic elements and was found to depend on a range of personal and healthcare-related factors. The

findings highlight the need for diabetes education programs to be tailored to the unique needs of older individuals, focusing on enhancing knowledge and promoting self-care. Furthermore, such interventions should address challenges related to health literacy, gender, marital status, and socioeconomic factors to ensure equal access to diabetes care for all elderly patients.

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