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Research article

Knowledge, attitude, and perceived risks related to diabetes mellitus among university students in Southwestern Nigeria

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ABSTRACT

Introduction: Diabetes mellitus (DM) has recently shown a demographic shift in epidemiology among adolescents and young adults. Adolescents and young adults are an important demographic of study since studies have shown an increasing prevalence in low-income countries including Nigeria. This study assessed the knowledge, attitude, and perceived risks of DM among university students in selected universities in southwestern Nigeria.

Methods: This study was a cross-sectional study carried out among university undergraduates in southwestern Nigeria. An online questionnaire was used to collect data via students' WhatsApp groups. The students' knowledge was ranked as good (≥70%), fair (50–69%), and poor (<50%) while attitude was categorized into positive (≥50%), and negative (<50%). The difference in knowledge based on demographics, disease profile, and source of information was analysed using the independent sample *t*-test and one way analysis of variance for variables with 2 and > 2 groups respectively. Analyses were conducted using SPSS software version 25.

Results: A total of 349 students consented to participate in the study of whom 55.3% were female. 25.2% had good knowledge while 92.3% of the participants were aware of DM. Positive attitudes and perceived risks were reported among all of the students. Source of information, family history, level of study, and age were significantly associated with knowledge of diabetes.

Conclusion: A small proportion of the students exhibited good knowledge, while all demonstrated a positive attitude and perceived risks associated with DM. There is a clear need for educational interventions, such as health programs and awareness campaigns, to enhance their knowledge of DM.

1. Introduction

Diabetes mellitus (DM) is a metabolic condition of chronically increased blood glucose defined by abnormalities in the metabolism of carbohydrates, proteins, and fats that leads to serious damage to the heart, blood vessels, eyes, kidneys, and nerves over time [1]. DM is a complicated illness that affects a wide range of age groups and has a variety of underlying causes. It has been identified as one of the four major chronic non-communicable diseases (NCDs), alongside chronic respiratory diseases, cancer, and cardiovascular

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diseases [2]. Type 1, type 2, and gestational diabetes are the three basic types of DM, the most common being type 2 diabetes [3]. More than 460 million people worldwide have recently been estimated to have DM [4].

Previously, DM and other NCDs were primarily associated with middle-aged and older individuals. However, recent research has unveiled a notable shift in the epidemiology of prediabetes, type 1 diabetes, and type 2 diabetes. This shift is characterized by an increased incidence among adolescents and young adults [5–7]. Consequently, there has been a significant upswing in the overall prevalence of these conditions, particularly in low-income countries [8–10]. As a result, it is projected that the global population of individuals living with diabetes may reach as high as 570 million by the year 2040 [11].Africa has one of the highest prevalence rates of high-risk groups for DM, with approximately 10% of its population exhibiting impaired glucose tolerance values [12]. In Nigeria, similar findings have been documented, highlighting a high risk of diabetes among adolescents in various regions: Port Harcourt (17%) [13], Ibadan (4%) [14], and Osogbo (9%) [15]. The increasing prevalence of DM among children, adolescents, and young adults is attributed to rising rates of obesity [16,17], physical inactivity [10,18], and unhealthy dietary habits [19]. Additionally, an elevated risk of diabetes-related health issues is associated with increasing levels of drug use among teenage populations [20,21]. This recent surge in diabetes prevalence imposes significant burdens, including economic consequences and a heightened risk of complications due to delayed diagnoses and inadequate prevention measures for diabetes.

To alleviate this burden and enhance health outcomes, it is crucial to promote lifestyle changes and encourage individuals to engage in self-management behaviors. The integrated theory of behavioral change suggests that education and information play pivotal roles in fostering healthy behaviors [22]. Individuals who are well-informed about DM can more readily identify potential risk factors and are more inclined to seek timely medical attention when needed [23]. This, in turn, can lead to a reduction in diabetes prevalence, decreased complications, fewer hospitalizations, and ultimately an improved quality of life [23,24]. Consequently, it is imperative to assess students' knowledge and utilize this information to develop tailored interventions aimed at bridging knowledge gaps.

Likewise, the management and burden of a disease are strongly influenced by individuals' attitudes toward the disease and its complications, a principle that extends to diabetes management. Previous research has uncovered significant disparities in attitudes toward DM and its complications within the population [25,26]. Studies have also established a clear link between knowledge of a disease and attitudes toward it, as evidenced in Uganda [27] and Nigeria [28]. There is compelling evidence that knowledge deficits are associated with negative attitudes and vice versa [26,29–31]. Furthermore, individuals with an inadequate understanding of diabetes risk detection and prevention techniques tend to exhibit negative attitudes toward diabetes [32]. In many respects, knowledge serves as one of the most reliable predictors of behavior [33,34]. People's behavior is greatly influenced by the level of disease knowledge within the population, as they are more likely to perceive themselves as being at risk and take proactive steps to prevent contracting the disease in question [35].

While numerous studies have examined diabetes knowledge in Nigeria, most have focused on adult populations, with relatively few conducted among young populations, including adolescents and young adults [28,36,37]. Adolescents and young adults are a critical demographic to study, given the global trend of increasing diabetes prevalence among this age group [4–6], particularly in low-income countries [8,9], including Nigeria [18,19]. Additionally, southwestern Nigeria has been identified as one of the regions with a high prevalence of diabetes, alongside south and northwestern Nigeria [38]. Limited studies of this nature have been conducted in southwestern Nigeria. Therefore, this study aims to evaluate the knowledge, attitudes, and perceived risks associated with type 2 diabetes among university undergraduates in the southwestern region of Nigeria.

1.1. Objective

This study aimed to evaluate the knowledge, attitude, and perceived risks associated with type 2 DM among university undergraduates in southwestern Nigeria.

2. Methods

2.1. Study design and duration

This study was a cross-sectional study conducted online via participant WhatsApp groups from August to September 2022.

2.2. Study setting and population

The study was conducted among university students in universities in southwestern Nigeria.

2.3. Inclusion and exclusion criteria

All undergraduate students aged 18 years and above schooling in these universities who gave consent to participate were enrolled while students who did not give consent were excluded from this study.

2.4. Sample size determination

The sample size was calculated using the Raosoft® online calculator with a 95% confidence interval, 50% response distribution and

5% margin of error to obtain an estimated sample size of 383. The total population from the selected universities was 120027 (Afe Babalola University: 8500; Obafemi Awolowo University: 26000; University of Ibadan: 41743; University of Lagos: 43784) (Table 1).

2.5. Sampling technique

The multistage sampling method was used to sample the participants in this study.

Stage 1. Convenience sampling was used to select preferred universities in the southwestern region (Afe Babalola University, Obafemi Awolowo University, University of Ibadan, and University of Lagos).

Stage 2. Proportional allocation was used to determine the desired number of participants from each university (Table 1).

Stage 3. Purposive sampling was used to select each of the participants in each university. The participants were selected based on the judgement of the researchers. The questionnaires were sent to participants in the selected departments and reminders were also sent. The recruitment of the participants was done in three ways.

Direct Researcher Involvement: Relevant student WhatsApp groups were joined directly and shared the recruitment information themselves. While in the groups, the study was introduced, and purpose explained to the group members.

University Collaboration: The researchers also collaborated with university officials who shared the recruitment information within student WhatsApp groups. This was after due permission was obtained from the university to conduct the study.

Student Representatives: The researchers worked with student representatives who had access to various student groups. These representatives forwarded the recruitment information to their respective groups, acting as intermediaries between the researchers and the students.

The criteria of selection were done mostly for students who had likely scientific and medical background.

2.6. Instrument for data collection

The questionnaire used in this study was a 32-item semi-structured online questionnaire designed after a thorough literature search and based on previous studies [26–28,30]. Since the target population was educated, the instrument was written entirely in English. The questionnaire comprised 5 sections. The first section documented the student demographics such as age, gender, educational level, ethnicity, and religion. The second section reported the DM profile of the participants where 4 questions were asked. The third section evaluated the knowledge of the participants on DM. This section contained 12 questions that were multiple choice consisting of yes and no questions. Each question was scored where '1' point was allotted to the correct answer and '0' score for each incorrect response. The knowledge of the participants was grouped into good ($\geq$70% of the total score), fair (59–69% of the total score), and poor ($<$50% of the total score). Section C evaluated the students' attitudes toward DM. This section comprised seven 5-point Likert scale questions. Strongly Agree was ranked 5 while Strongly Disagree was ranked 1. Each rank was converted to scores and categorized. Students' attitude toward DM was categorized into positive ($\geq$50% of the total score) and negative ($<$50% of the total score). The last section measured the students' perceived risks associated with DMwhich was assessed using three 5-point Likert scale questions.

2.7. Validity and reliability of the instrument

Content and face validity was conducted by the authors, as well as lecturers of the Department of Clinical Pharmacy and Public Health, Afe Babalola University, Ado-Ekiti, Nigeria. To evaluate internal consistency, a pretest was performed using 10 undergraduate students from Lead City University, Ibadan. These participants' data were not considered in the final data analysis. The instrument's reliability was assessed using the Cronbach's Alpha coefficient, yielding a value of 0.82.

2.8. Data collection procedure

The online questionnaires were forwarded to the respective student class groups in each university. Informed consent was sought before access was granted to the questionnaire content. Students who did not give consent were not granted access to the questionnaire

Table 1
Proportional allocation of a sample size to the study population.

University	Population	Proportion	Calculated sample size
Afe Babalola University	8500	$= \frac{8500}{120027} = 0.071$	$= 0.071 \times 383$ $= 27.193 approx\ 27$
Obafemi Awolowo University	26000	$= \frac{26000}{120027} = 0.217$	$= 0.217 \times 383$ $= 83.111\ approx\ 83$
University of Ibadan	41743	$= \frac{41743}{120027} = 0.348$	$= 0.348 \times 383$ $= 133.284\ approx\ 133$
University of Lagos	43784	$= \frac{43784}{120027} = 0.365$	$= 0.365 \times 383$ $= 139.795 approx\ 140$
Total	120027		383

items. This study obtained ethical approval from the Afe Babalola University Research Ethics Committee (ABUADREC) with number 22/ABUAD/PUB/559. All selected participants used for this study were informed that their participation was voluntary and informed consent was sought from all participants before their participation. This research was performed following relevant guidelines/regulations and was performed in accordance with the Declaration of Helsinki.

2.9. Data analysis

Descriptive statistics were used to describe the socio-demographic characteristics of the participants. The information obtained was summarized and presented as charts and tables. The mean difference in knowledge scores based on demographics, disease profile, and source of information was analysed using an independent sample *t*-test and one-way analysis of variance for variables with 2 and greater than 2 groups respectively. Statistical Package for Social Sciences (SPSS) version 25 was used to conduct the analysis and significance was set at $p < 0.005$.

3. Results

3.1. Demographics and disease profile of the participants

In this study, 349 out of 383 students from four universities agreed to participate. Among them, 156 were male, and a majority (77.1%) fell within the age range of 18–22 years. This gave a response rate of 91%. Less than 20% read science-based courses while 69.1% read healthcare-based courses. The disease profile of the participants was assessed, and it was reported that only 2% had previously been diagnosed with DM in the past and 29.5% had a family member diagnosed with DM. This has been summarized in Table 2.

Table 2
Demographics and disease profile of study respondents.

A. Demographics		Frequency	Percent
Gender	Male	156	44.7
	Female	193	55.3
Age	18–22	269	77.1
	23–27	71	20.3
	28–32	9	2.6
Ethnicity	Yoruba	251	71.9
	Igbo	58	16.6
	Hausa	5	1.4
	Others	35	10.0
Religion	Christianity	263	75.4
	Islam	77	22.1
	Others	9	2.6
Institution	ABUAD	67	19.2
	OAU	83	23.8
	UI	79	22.6
	UNILAG	120	34.4
Courses of study	Healthcare (e.g. Pharmacy, Medicine, etc.)	241	69.1
	Arts-based (e.g. Law, English, etc.)	22	6.3
	Commercial-based (e.g. Accounting, Economics etc.)	17	4.9
	Science-based (Biology, Physics etc.)	69	19.8
Level of study	100–300	247	70.8
	400–600	102	29.2

B. Diabetes profile			
Item		**Frequency**	**Percentage**
Have you been diagnosed with diabetes before? (N=349)	Yes	2	0.5
	No	347	99.5
Do you have a family member diagnosed with DM? (N=349)	Yes	103	29.5
	No	218	62.5
	I don't know	28	8.0
Relationship with family member (N=103)	Father	26	25.2
	Mother	21	20.4
	Sibling	1	0.9
	Others (E.g. Uncle, Grandmother etc.)	55	53.5

Key: ABUAD=Afe Babalola University, Ado-Ekiti**; OAU**= Obafemi Awolowo University, Ile-Ife**; UI**=University of Ibadan, Ibadan**; UNILAG:** University of Lagos, Lagos**; DM:** Diabetes mellitus.

4. Students' knowledge of diabetes mellitus

During the assessment of students' knowledge of DM, 92.3% reported that they had heard of DM before. One hundred and fifty (43%) stated that they obtained their information from health professionals while less than 3% (9) stated that they obtained their health-related information on diabetes from friends. A little above 87% correctly defined diabetes as abnormally high blood glucose while 47.6% and 36.1% stated that DM is a lifelong disease and that it can be diagnosed by testing the blood glucose using a glucose check device respectively. Physical inactivity (56.4%), alcohol (51.0%), and high blood pressure (36.4%) were some of the risk factors for diabetes identified by the study participants while frequent exercise (78.2%) and smoking cessation (30.9%) were identified as prevention measures against DM. Overall, 25.2% of the participants showed good knowledge of DM while approximately 28% had poor knowledge. This has been summarized in Table 3.

4.1. Attitude and perceived risks of participants towards diabetes mellitus

All the study participants showed a positive attitude towards DM. Approximately 65% (224) stated that a person with DM should

Table 3
Students' knowledge of diabetes mellitus.

Item (N = 349)		Frequency	Percentage
Have you heard of diabetes before?	Yes	322	92.3
	No	27	7.7
Source of information on DM (N=322)			
Health professional		150	43
Parents		55	15.8
School		44	12.6
Social media		39	11.2
Friends		9	2.6
Others		25	7.2
Knowledge statements (N=349)			
Statement		**Correct responses**	**Percentage**
DM is defined as abnormally high blood glucose		305	87.4
Diabetes is genetic		243	69.6
DM can only affect the elderly		325	93.1
DM can be transmitted from one person to the other		329	94.3
DM is a lifelong disease		166	47.6
Diabetes can best be diagnosed by testing the blood glucose using a glucose check device		126	36.1
Risk factors for DM [a]			
Physical inactivity		197	56.4
Consumption of processed sugars		304	87.1
Smoking		72	20.6
Family history		271	77.7
Obesity		262	75.1
High blood pressure		127	36.4
Alcohol		178	51.0
Signs/symptoms of DM[a]			
Frequent urination		282	80.8
Excessive thirst		211	60.5
Excessive hunger		115	33
Tiredness/fatigue		231	66.2
Blurred vision		169	48.4
Prevention of DM[a]			
Frequent exercise		273	78.2
Reduced consumption of processed sugars		301	86.2
Taking healthy diet		322	92.3
Reduced alcohol intake		220	63
Score		**Frequency (%)**	**Remark**
<50%		97 (27.8)	Poor knowledge
50–69%		164 (47.0)	Fair knowledge
≥70%		88 (25.2)	Good knowledge

Mean knowledge score ± SD (range): 13.63 ± 3.807 (1–22).
Total obtainable score: 24.
Key: SD: Standard deviation; DM: Diabetes mellitus.
[a] Multiple responses and total sum is greater than 100%.

regularly check their blood pressure while 68.8% strongly agreed that complications of diabetes may be prevented if the blood glucose is well controlled. One-hundred and fifteen students (33%) disagreed that if anyone has diabetes, nothing can be done about it. The majority (51.6%) strongly agreed that DM can have a huge impact on life if not prevented early enough. The results are summarized in Table 4.

4.2. Differences in knowledge scores based on demographics, disease profile, and source of information on diabetes mellitus

Differences in knowledge based on student demographics, disease profile, and source of information on DM were evaluated in this study. There was no statistically significant difference in knowledge scores based on gender ($p = 0.935$) but there was a statistically significant difference based on age ($p = 0.049$), level of study ($p < 0.001$), and source of information ($p = 0.003$) (Table 5)

5. Discussion

DM has shown a recent demographic shift in epidemiology among adolescents and young adults [5–7]. Adolescents and young adults are an important demographic of study since studies have shown an increasing prevalence in low-income countries [8,9] including Nigeria [19,20]. Southwestern Nigeria was chosen as the area of study due to the high prevalence reported in this region in Nigeria in recent times [38].

This study assessed the knowledge, attitude, and perceived risks of DM among university students in selected universities in southwestern Nigeria.

Knowledge of a disease plays an important role in its prevention and management [28]. The prevalence of DM is on the rise globally [39]. According to the World Health Organization, the number of people diagnosed with diabetes as of 2000, is expected to double by 2030 [40]. Our study reports a 92.3% (n = 322) awareness of the disease. This result is supported by the study of Kharono et al. [27], which reported 99.2% (n = 375) of participants had an awareness of DM. However, it is slightly higher than the results obtained in a similar study where 75% (n = 126) awareness was reported among adolescents in a public school in Lagos state, Nigeria [28]. This is probably because university undergraduates are at a higher academic level and hence, are better exposed to information.

Interestingly, although a majority of our study participants were aware of the disease, only a small percentage of the participants demonstrated good knowledge about the disease. This is similar to studies in Saudi Arabia [41], and the United Arab Emirates (UAE) [42]. Nonetheless, our study findings are contrasted by a study in Uganda [27], where about 99% (n = 374) awareness rate was observed in the study population. This variation might be because the study in Uganda was carried out among only medical students. These findings indicate that although awareness may be associated with knowledge, it does not directly translate to having good knowledge and understanding of the disease. To increase students' understanding of DM, it is recommended that the university administration set up regular educational talks and programs about DM and other associated non-communicable diseases, such as hypertension. DM is a rising problem, but hypertension is a bigger problem in Nigeria, and share many risk factors with DM. Thus, education on non-communicable diseases with shared risk factors might bring about cost-effective outcomes [43].

Most of the participants correctly defined DM as an abnormally high blood glucose level. This is higher than that reported by

Table 4
Attitude and perceived risks of participants towards diabetes mellitus.

S/N	Statement	Responses (%)					Median
		SA	A	NA	D	SD	
1	Physical activity can prevent the risk of DM	141 (40.4)	164 (47.0)	30 (8.6)	12 (3.4)	2 (0.6)	**A**
2	Maintaining a healthy weight is important in the management of DM	206 (59.0)	124 (35.5)	16 (4.6)	2 (0.6)	1 (0.3)	**SA**
3	Everyone should be screened for DM	186 (53.3)	131 (37.5)	18 (5.2)	11 (3.2)	3 (0.9)	**SA**
4	DM complications may be prevented if blood glucose level is well controlled	240 (68.8)	102 (29.2)	7 (2.0)	–	–	**SA**
5	If anyone is going to have DM, there is nothing to be done about it	9 (2.6)	22 (6.3)	108 (30.9)	115 (33.0)	95 (27.2)	**D**
6	Making good effort to control the risks of DM makes one less likely to come down with the disease	159 (45.6)	143 (41.0)	34 (9.7)	9 (2.6)	4 (1.1)	**A**
7	A person with DM should regularly check his/her blood pressure	224 (64.2)	101 (28.9)	18 (5.2)	4 (1.1)	2 (0.6)	**SA**
Perceived risks of participants towards DM							
1	I believe I am of a lower risk to come down with DM	101 (28.9)	124 (35.5)	61 (17.5)	54 (15.5)	9 (2.6)	**A**
2	I cannot be worried about DM now because I am still young	11 (3.2)	28 (8.0)	67 (19.2)	173 (49.6)	70 (20.1)	**D**
3	DM can have a huge impact on my life if not prevented early enough	180 (51.6)	123 (35.2)	32 (9.2)	6 (1.7)	8 (2.3)	**SA**

Key: SA: Strongly Agree; A: Agree; NA: No Answer; D: Disagree; SD: Strongly Disagree; DM: Diabetes mellitus.

Table 5
Differences in knowledge scores based on demographics, disease profile and source of information on diabetes mellitus.

Variables		Frequency (%)	Mean score ± SD	p-value
Gender	Male	156 (44.7)	13.61 ± 3.692	0.935[a]
	Female	193 (55.3)	13.64 ± 3.907	
Age	18–22 years	269 (77.1)	13.41 ± 3.794	**0.049**[a,c]
	Above 22 years	80 (22.9)	**14.36 ± 3.783**	
Level of study	100–300	247 (70.8)	12.99 ± 3.691	**P<0.001**[a,c]
	400–600	102 (29.2)	**15.17 ± 3.656**	
Courses of study	Science-based	69 (19.8)	12.01 ± 3.652	**P<0.001**[b,c]
	Arts-based	22 (6.3)	11.14 ± 4.632	
	Healthcare	241 (69.1)	**14.55 ± 3.407**	
	Commercial-based	17 (4.9)	10.29 ± 3.442	
Family member diagnosed with DM	Yes	103 (29.5)	**14.51 ± 3.421**	**0.022**[a,c]
	No	218 (62.5)	13.49 ± 3.836	
Heard about diabetes before	Yes	322 (92.3)	**14.02 ± 3.585**	**P<0.001**[a,c]
	No	27 (7.7)	8.92 ± 3.393	
Source of information	Health professional	150 (43)	**14.69 ± 3.445**	**0.003**[b,c]
	Parents	55 (15.8)	14.15 ± 3.412	
	School	44 (12.6)	13.36 ± 3.148	
	Social media	39 (11.2)	12.21 ± 4.001	
	Friends	9 (2.6)	13.00 ± 3.808	
	Other	25 (7.2)	14.04 ± 3.835	

Key: DM: Diabetes mellitus; SD: Standard deviation.
[a] Independent Sample T-test.
[b] One Way Analysis of Variance.
[c] Statistically significant value, $p \leq 0.05$.

Omobuwa [28], and Kassahun [26]. Of our respondents, only 36.1% (n = 126) correctly responded that DM can best be diagnosed by testing blood glucose using a glucose check device. This, however, is known to be the best method to check the level of blood glucose [44]. More than three-quarters of our participants correctly identified that DM does not affect the older population only and this can be compared to similar results obtained in Uyo [36], and Port Harcourt [37] where 73% (n = 146) and 87% (n = 766) correctly identified this. The majority of participants identified DM as a preventable disease. This can be compared to a study conducted among university students in the UAE where 74% (n = 135) of the students reported similar findings [42].

Most of the participants recognized family history, obesity, physical inactivity, and alcohol as some of the risk factors for diabetes while only a few of the participants recognized smoking and high blood pressure as risk factors. This is in line with reports by a similar study in which 71% (n = 14), 55% (n = 11), and 53% (n = 10) of its study participants recognized family history, obesity, and reduced physical activity as risk factors respectively [45]. However, Omobuwa and Alebiosu [28], reported that only 9.1% (n = 15) of the study participants recognized physical inactivity as a risk factor for DM. High blood pressure and cigarette smoking are strong risk factors for DM and surprisingly, this knowledge was recorded to be low in our study participants as only a few saw this as a risk factor for developing DM. Good knowledge of a disease's risk factors and preventive measures is necessary for its treatment and control [41]. This result points to the need to urgently reorient the public on the impact of some conditions that can predispose them to DM.

A large number of participants were knowledgeable regarding the signs and symptoms of DM. Only a few participants recognized excessive hunger and blurred vision as signs and symptoms of DM. This can be compared to a study performed by Khan et al. (2012) [42] where only 36% (n = 66) and 39% (n = 71) correctly identified excessive hunger and blurred vision as the signs and symptoms of DM [42].

A large proportion of participants reported that healthy diets, reduced consumption of processed sugars, and frequent exercise can prevent the development of the disease. This can be compared to a study in Uganda where 70.4% (n = 266), 51.3% (n = 194), and 46.2% (n = 175) agreed that healthy diets, reducing sweet foods, and regular exercise can help prevent DM respectively [27].

Our study shows an association between age and knowledge scores with those above twenty-two years having a higher mean knowledge score. A survey by Alqahtani et al. (2020), [46] revealed better knowledge scores among the adult population regarding diabetes. This indicates the need to provide targeted health information on DM to the younger population.

Female respondents had a slightly higher knowledge score than males. This is supported in studies by Al-Mahrooqi et al. (2013) [47], Majumder et al. (2013) [48], and Demaio et al. (2013) [49] where females had higher DM knowledge scores than males. This can be attributed to the fact that females are more critical about their health and hence, are mostly looking out for anything that can harm them [50]. Our findings are in contrast to those obtained in Karachi [51] where better knowledge about DM was reported among males.

Students in healthcare courses had better knowledge scores than students in other courses. Studies have found that students pursuing healthcare professions tend to have a higher level of knowledge about diabetes mellitus compared to students in non-healthcare fields [52,53]. This is expected, as healthcare students receive specific training related to diabetes care and management. Students pursuing non-healthcare disciplines may have a basic understanding of diabetes but are unlikely to possess in-depth knowledge. However, their level of knowledge can vary based on personal interest, exposure to healthcare topics, and specific coursework. Findings from this study can inform the development of diabetes education programs for both healthcare and

non-healthcare students. Promoting a basic level of diabetes knowledge among all students can contribute to better diabetes prevention and management on a broader scale.

Students in higher classes had significantly higher knowledge scores than those in lower classes. This is supported by a study that stated that the more educational attainment reached by a person, the more interested the person is regarding issues-including health issues [54]. The possible explanation for this is the increase in the level of knowledge and better exposure to information as the level of education increases.

It has been suggested that a family history of diabetes affects students' understanding and perspective of the disease. For instance, 29.5% (n = 103) of the study participants reported that they had a family member diagnosed with diabetes, and this was significantly associated with the knowledge score. Those who had a family member diagnosed with the disease had better knowledge than those who had no family member diagnosed with the disease. It appears that the reason for the observed trend is likely due to the direct involvement of individuals in patient care and the education provided to family members about the disease [27]. Also, a study reported that individuals who had one or more family members diagnosed with DM were likely to engage in a healthy lifestyle [45].

The majority of the study participants reported that they obtained information regarding the disease from health professionals. However, in a study by Ubangha and colleagues, the main source of information was the mass media [39]. A similar result was obtained in Oman [47]. This contrasts with similar studies which reported that a few participants obtained their information from healthcare workers [26,28,54]. This could be attributed to the fact that an overwhelming number of our study participants are studying healthcare-related courses. Health professionals play a crucial role in providing updated information that can help in the prevention and management of all types of diabetes [55]. Therefore, information obtained from health professionals should be encouraged.

A good number of our respondents obtained their information about DM on social media. The world has become a global village; hence, social media can be utilised as a strong tool by schools, health organisations, and health professionals for the dissemination of health-related information. However, it is susceptible to the dissemination of false and misleading health information [56]. The government and stakeholders should, therefore, incorporate appropriate laws and reforms to curtail the dissemination of false and unlicensed health information. Stakeholders should improve school curricula to ensure that students have access to proper information sources, especially as it concerns the prevention and transmission of diseases. Increased utilization of social media by medical schools for health education should be considered, to facilitate proper information dissemination and rumour debunking in prevalent diseases such as DM and other non-communicable diseases.

The attitude exhibited by a population regarding disease is vital to reducing the prevalence and management of such disease. Hence, a positive attitude toward diabetes is associated with the implementation of diabetes risk reduction strategies [26]. The study participants demonstrated a good attitude toward DM. The respondents' positive attitude towards DM could be attributed to the high level of awareness and fair to good knowledge the majority had regarding the disease. This is supported by a study carried out in Ethiopia that assessed the knowledge, attitude, practices and associated risk factors among non-diabetics [26]. The study reported that subjects with higher knowledge scores had more positive attitudes toward DM than those with lower knowledge scores. It also established a positive correlation between the level of education, family history of diabetes, knowledge, and attitude toward DM [26].

An individual's perceived risk of diseases helps in the early diagnosis and prevention of such diseases. Hence it was vital to assess the perceived risks of DM among study participants. The increased level of perceived risks discovered among respondents could be attributed to the fact that the majority of participants had a good attitude toward the disease.

6. Strengths and limitations

Since the majority of our respondents were healthcare students, the results provide detailed information on the knowledge, and attitude displayed by future health professionals and help to gauge their approach towards the management of diabetes and other non-communicable diseases. This indicates that focus should be placed more on healthcare students in terms of tailoring of what knowledge, attitudes, and awareness of risk for DM is needed, not least for those supposed to become health informants and caretakers in the future. While our study provides valuable insights into the knowledge, attitude, and perceived risks related to type 2 diabetes mellitus among university undergraduates in southwestern Nigeria, it is important to note certain limitations. Firstly, the research primarily focuses on type 2 diabetes, and the findings may not be directly applicable to individuals with type 1 diabetes. Additionally, the study's cross-sectional design limits our ability to establish causation or infer long-term trends. The sample is drawn from specific universities in southwestern Nigeria and since participants were selected mostly by non-probability techniques, the generalizability of the results to a broader population may be constrained. Despite these limitations, the study offers valuable information that contributes to our understanding of the perceptions surrounding type 2 diabetes among this particular demographic.

Further studies should be conducted using probability sampling methods to ensure better balancing of the background of the students. The study was also an online survey so it might be difficult to prove the integrity of the answers provided by the respondents as they might have sought some information sources for their answers. Furthermore, the response rate was not adequate for the estimated sample size due to difficulty in finding participants during the study. However, the study has provided findings that could serve as baseline or background for future studies.

7. Conclusions

A small proportion of the students exhibited good knowledge, while all demonstrated a positive attitude and perceived risks associated with DM. There is a clear need for educational interventions, such as health programs and awareness campaigns, to enhance

their knowledge of DM.

Ethics approval and consent to participate

This study obtained ethical approval from the Afe Babalola University Research Ethics Committee (ABUADREC) with number 22/ABUAD/PUB/559. All selected participants used for this study were informed that their participation was voluntary and informed consent was sought from all participants before their participation. This research was performed in accordance with relevant guidelines/regulations, and the Declaration of Helsinki.

Consent of publication

All authors gave their final consent to the final version and included in this publication.

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Data availability statement

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

CRediT authorship contribution statement

Edidiong Orok: Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Yetunde Kabiawu:** Writing – review & editing, Writing – original draft, Conceptualization. **Zainab Aderohunmu:** Writing – review & editing, Writing – original draft. **Danielle Obiwulu:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e25793.

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