Int. J. School. Health. 2023; 10(4)

Published online 2023 October.

Original Article

Demographic Determinants of Knowledge, Perception, and Attitude towards Diabetes Mellitus among Public In-School Adolescents in Southern Nigeria

Agofure Otovwe[1]*, PhD

[1]Department of Public Health, Achievers University Owo, Ondo State, Nigeria

Corresponding author:* Agofure Otovwe, Department of Public Health, Achievers University Owo, Ondo State, Nigeria. **Tel: +23 470 30839248; **Email:** agofureotovwe@yahoo.com

Received: May 15, 2023; **Revised:** June 14, 2023; **Accepted:** July 12, 2023

Abstract

Background: Diabetes Mellitus (DM) is a severe and long-term condition affecting glucose metabolism, with its prevalence reaching alarming levels. According to the International Diabetes Federation, diabetes is becoming increasingly common among African children and adolescents. This study examined the demographic factors influencing adolescents' knowledge, perceptions, and attitudes about diabetes in Delta State, Nigeria.

Methods: The study utilized a descriptive cross-sectional design. Seven hundred students from Ogbe Secondary School Effurun and Nana College Warri were selected using simple random sampling from November 2019 to February 2022. Data was collected through a four-part semi-structured questionnaire, which included socio-demographic characteristics, knowledge of DM, perception of DM, and attitude towards DM. Inferential statistics were determined using logistic regression at a significance level of $P<0.05$.

Results: The average age of the participants was 14.99±1.86 years. Significant determinants of DM knowledge were ages of 16-22 years ($P<0.001$, OR=1.902), female sex ($P=0.001$, OR=1.874), senior classes ($P<0.001$, OR=3.825), and training on the prevention of DM ($P=0.001$, OR=1.735). Additionally, significant determinants of attitude towards DM were ages of 16-22 years ($P=0.001$, OR=1.885), female sex ($P<0.001$, OR=2.652), senior classes ($P<0.001$, OR=4.128), and training on the prevention of DM ($P=0.002$, OR=1.748).

Conclusion: The study identified demographic variables that predict knowledge, perception, and attitude toward DM among in-school adolescents. These variables should facilitate public health programs' success and positive outcomes.

Keywords: Attitude, Diabetes mellitus, In-school adolescents, Knowledge, Students

How to Cite: Otovwe A. Demographic Determinants of Knowledge, Perception, and Attitude towards Diabetes Mellitus among Public In-School Adolescents in Southern Nigeria. Int. J. School. Health. 2023;10(4):197-205. doi: 10.30476/INTJSH.2023.99096.1316.

1. Introduction

Diabetes Mellitus (DM) is a severe chronic disorder of carbohydrate metabolism, resulting in a deficiency in insulin production or the ineffective utilization of produced insulin for energy by the body (1). Diabetes has emerged as a significant health issue in developed and developing countries, with its prevalence reaching alarming levels. Due to its prolonged duration and considerable impact on the population, this disease seriously threatens public health (2). Globally, in 2000, only 151 million people aged 20-79 were living with DM. However, this number has grown exponentially to 537 million in 2021 and is projected to increase further to 783 million by 2040 (1).

Elevated blood glucose levels are a defining feature of diabetes, leading to serious harm over time to the heart, blood vessels, eyes, kidneys, and nerves (3). The three most prevalent types of DM are Type 1, Type 2, and gestational diabetes. Type 1 DM, caused by an autoimmune process in which the body's immune system attacks the insulin-producing beta-cells of the pancreas, is the most common form of DM among children, adolescents, and young adults (1). Type 2 diabetes, the most prevalent condition, occurs when the body becomes resistant to insulin or fails to produce enough (3). Gestational diabetes mellitus (GDM), characterized by high blood glucose levels, affects women who have never been diagnosed. However, there has been a significant increase in the incidence and prevalence of prediabetes and type 1 DM in the African sub-region (1).

Living with DM poses ongoing challenges for children aged 0-19 and their families. Daily insulin injections are necessary to maintain blood glucose levels within an appropriate range, and

managing the disease may lead to acute or chronic complications. This burdens families, communities, health systems, and the nation (4). The school environment is not exempt from the impact of this pandemic, as evidence indicated an increasing prevalence and burden of DM within primary and secondary schools in Africa (5-9). Apart from significant factors such as age, family history, and poor lifestyle contributing to the gradual increase of DM (10-12), other reasons linked to the rise in DM within the school environment include poor understanding, perception, and attitude toward DM among students (13, 14). Therefore, it is essential to raise DM awareness among adolescents in the school setting to promote health in developing countries like Nigeria, which has yet to experience a peak in the incidence and prevalence of DM among adolescents.

Additionally, health promotion and education programs must consider independent demographic variables such as age, sex, level of students, and family history of DM, as these factors significantly influence the success of any educational intervention program. They constantly and significantly impact assessing students' knowledge, perception, attitude, and practices in most public health research. This study addressed this gap by highlighting the demographic determinants of knowledge, perception, and attitude towards DM among in-school adolescents in Delta State, Nigeria. The findings will be crucial in designing DM awareness programs across schools in the state and the nation. The significance of this study lies in its potential to provide valuable information on the influence of these demographic variables in implementing school health research in Nigeria and other developing nations.

2. Methods

2.1. Study Settings and Participants

The study followed a descriptive cross-sectional design and was conducted at Ogbe Secondary School Effurun, Uvwie Local Government Area, and Nana College Warri, Warri South Local Government Area, both located in Delta State. The study occurred between November 2019 and February 2022, encompassing both schools. The participants included male and female students from junior and senior secondary levels at Ogbe Secondary School in Uvwie Local Government Area, Delta State, and male and female students from senior secondary schools at Nana College Warri.

2.2. Inclusion Criteria

To be eligible for the study, participants had to be students from Ogbe Secondary School and Nana College Warri who actively participated in the research.

2.3. Exclusion Criteria

The study excluded students who were not enrolled at Ogbe Secondary School or Nana College, registered students who were absent during the data collection process, and those who chose not to participate in the survey.

2.4. Sample Size Determination

The sample size was determined using Yaro Yamane's formula for estimating percentages in a finite population (15).

$$n = \frac{Z^2pq}{d^2}$$

n=minimum sample size z=1.96 at a 95% confidence interval obtained from the statistical table of normal distribution P=70.3%, representing the perception of DM as curable among students (16)

q=1.0-p=1-0.703=0.297

d=Margin of error (0.05)

$$n = \frac{1.96^2 \times 0.703 \times 0.297}{0.05^2}$$

n=321

In order to enhance the study's power, 700 questionnaires were distributed in both schools, and considering a 10% non-response rate.

2.5. Sampling Procedure

The selection process involved randomly choosing one secondary school from eight public secondary schools in the local government areas of Uvwie and Warri South. Consequently, Ogbe Secondary School and Nana College were selected for Uvwie and Warri South local governments.

Next, classes from the chosen schools were stratified into shared units, including junior secondary school 1 (JSS 1), junior secondary school 2 (JSS 2), junior secondary school 3 (JSS 3), senior secondary school 1 (SSS 1), senior secondary school 2 (SSS 2), and senior secondary school 3 (SSS 3). A total of 700 pupils were randomly selected from each class in both institutions using a straightforward random selection procedure.

2.6. Data Collection Instrument

Data was collected through a questionnaire consisting of four sections (A-D). The questionnaire was adapted from previous studies (13, 14). Sections A focused on the students' socio-demographic characteristics, Section B assessed their knowledge of DM, Section C explored their perceptions of DM, and Section D examined their attitudes toward DM in both schools.

2.7. Data Collecting Method

During break time, each class administered the data collection tool themselves with the help of teachers from both schools. After the students completed the questionnaire, the researcher and other research assistants collected it.

2.8. Validity and Reliability

Experts in Public Health were consulted regarding the instrument's design, and their feedback was implemented to strengthen the research tool. The instrument's validity was then reinforced using the comments received to determine its validity. The questionnaire's sections and sub-sections were based on the study objectives. The questions were checked for content and construct validity to ensure unambiguity. Additionally, the expert's feedback was used to improve the content and construct validity by modifying the knowledge section of the questionnaire from closed-ended questions to open-ended questions. This modification was done to eliminate the possibility of guesswork by the respondents when filling out the questionnaire. Face validity was ensured by submitting the suggested instrument's draft to independent peer and expert reviews, who offered feedback and ideas. The results from the evaluation provided clarity, comprehensibility, and appropriateness of the instrument. The instrument's reliability was assessed using the Cronbach Alpha reliability approach, resulting in a dependability score of 0.871.

Bias: Considering the respondents' ages, there was a good chance of recollection bias and, most likely, a lack of understanding of the questions. However, the researcher and research assistants gave the students ample time and offered support as needed throughout the data collection procedure to help them complete the questionnaire.

2.9. Data Analysis

The data was sorted and manually coded before being imported onto a computer for examination using the Statistical Package for Social Sciences version 20.0 (IBM SPSS Chicago, Illinois, United States of America). Multiple logistic regression was performed at the $P<0.05$ significance threshold to determine the demographic determinants of knowledge, perception, and attitude toward diabetes. The variables selected for multiple logistic regression showed significance in bivariate analysis using Chi-Square.

2.10. Scales of Measurement

A dichotomous knowledge scale was designed to quantify the students' DM knowledge level. The knowledge component of the questionnaire consisted of 17 test items. A correct response scored 1, while an incorrect answer received 0. Thus, each study participant's knowledge score was divided into two categories: 0-8 (Code 1) and >8-17 (Code 2). Respondents who scored 0-8=Code 1 had poor knowledge of DM prevention, while those who scored >8-17=Code 2 had a good understanding of DM prevention. The mean knowledge score is reported as mean±SD.

2.11. Perception Scale

Perceived susceptibility was measured on an 8-point perception scale graded 0-4=Code 1 for poorly perceived exposure to DM and >4-8=Code 2 for well-perceived susceptibility to DM. The perceived severity of DM complications was measured on a 5-point perception scale graded 0-2=Code 1 for the poor perceived severity of DM complications and >2-5=Code 2 for the good perceived severity of DM complications. Additionally, perceived benefits of DM prevention were measured on a 5-point perception scale graded

0-2=Code 1 for poor perceived benefits of T2DM prevention and >2-5=Code 2 for good perceived benefits of T2DM prevention. Furthermore, perceived barriers to DM prevention were measured on a 6-point perception scale graded 0-3=Code 1 for poor perceived barriers of DM prevention and >3-6=Code 2 for robust perceived barriers of DM prevention. The mean perception score is reported as mean±SD.

2.12. Attitude Scale

A two-sided attitude scale (Agree, Disagree) was created. The attitude component of the questionnaire consisted of a total of 8 test items. A correct response scored 2, while an incorrect answer received a 0. Thus, each study participant's attitude score was divided into two categories: 0-8 for Code 1 and >8-16 for Code 2. Respondents who scored 0-8=Code 1 had a poor attitude toward DM prevention, while those who scored >8-16=Code 2 had a good attitude toward DM prevention. The mean attitude score is reported as mean±SD.

2.13. Ethical Consideration

The College of Medical and Health Sciences at Novena University's Department of Public and Community Health granted clearance to gather data. The principals of Ogbe Secondary School in Effurun and Nana College in Warri, Delta State, received an authorized letter requesting their permission to conduct the study there. Additionally, since most students were under 18, the principal gave their consent on their behalf. The school's principals examined the study instrument before they provided their approval, ensuring that the pupils would not be harmed. The information acquired will be handled in complete secrecy, and the principal and the students were also informed of this.

3. Results

Seven hundred questionnaires were distributed in both schools and retrieved after being filled out by the selected students. After checking for completeness, all 700 questionnaires were deemed valid and included in the study. Furthermore, only 621 respondents stated that they had heard of DM, so further analysis was limited to these 621 individuals.

More than half of the respondents (56.7%) were between the ages of 10 and 15; women made up just under two-thirds of the respondents (60.4%);

Table 1: Logistic regressional analysis of demographic characteristics and knowledge of Diabetes Mellitus, attitude towards Diabetes Mellitus

Variables	P value	OR	95 CI	
N=621			Lower	Upper
Age				
10-15 (r)	[a]P<0.001,	[a]1.902, [b]1.885	[a]1.340, [b]1.310	[a]2.700, [b]2.711
16-22	[b]0.001			
Sex				
Male (r)	[a]0.001, [b]P<0.001	[a]1.874, [b]2.652	[a]1.304, [b]1.784	[a]2.693, [b]3.940
Female				
Class				
JSS 1 (r)	[a]0.010, [b]0.789	[a]3.269, [b]1.094	[a]1.651, [b]0.572	[a]6.472, [b]2.093
JSS 2	[a]0.181, [b]0.321	[a]1.782, [b]0.643	[a]0.765, [b]0.269	[a]4.154, [b]1.538
JSS 3	[a]0.959, [b]0.386	[a]0.981, [b]0.743	[a]0.464, [b]0.380	[a]2.072, [b]1.454
SSS 1	[a]0.044, [b]0.002	[a]1.900, [b]0.359	[a]1.017, [b]0.190	[a]3.549, [b]0.680
SSS 2		[a]3.825	[a]1.983	[a]7.379
SSS 3	[a]P<0.001, [b]P<0.001	[b]4.128	[b]2.251	[b]7.569
Family history of Diabetes Mellitus				
No (r)				
Yes: Grandparent, Aunt, Uncle or First Cousin (but not own parent, brother, sister or child)	[a]0.460, [b]0.257	[a]1.218, [b]1.357	[a]0.722, [b]0.800	[a]2.052, [b]2.303
Yes: Parent, Brother, Sister	[a]0.245, [b]0.606	[a]1.753, [b]1.301	[a]0.680, [b]0.479	[a]4.522, [b]3.529
Those who have just finished a training on Diabetes Mellitus prevention				
Yes	[a]0.001, [b]0.002	[a]1.735, [b]1.748	[a]1.236, [b]1.231	[a]2.436, [b]2.482
No (r)				

Mean Knowledge Score: 6.61±3.91, Mean Attitude Score: 5.52±4.12, a: Knowledge of Diabetes Mellitus, b: Attitude towards Diabetes Mellitus, JSS: Junior Secondary school, SSS: Senior Secondary School

and almost all of the respondents (95.9%) identified as Christians. Additionally, only 229 respondents (32.7% of the total) were in Senior Secondary School (SSS) 2, but 621 (88.7%) admitted hearing about DM, with 265 (42.7%) stating the radio as their source of information. 88 respondents (14.2%) reported having a family member diagnosed with DM. Furthermore, approximately 284 students (45.7%) confirmed they had recently attended training on DM prevention at school.

Table 1 presents the logistic regression analysis results of the knowledge predictors. It shows that respondents aged 16-22 were significantly more likely to be knowledgeable about DM (P<0.001, OR=1.902, 95% CI=1.340-2.700). Similarly, female respondents were significantly more likely to be knowledgeable about DM (P=0.001, OR=1.874, 95% CI=1.304-2.693). Respondents in SSS 3 were also significantly more likely to be knowledgeable about DM (P<0.001, OR=3.825, 95% CI=1.983-7.379). Furthermore, respondents who had recently received training on DM were significantly more likely to be knowledgeable about it (P<0.001, OR=3.825, 95% CI=1.983-7.379).

Additionally, respondents aged 10-15 were significantly more likely to exhibit a positive attitude towards DM prevention (P=0.001, OR=1.885, 95% CI=1.310-2.711). In contrast, female respondents were significantly more likely to have a positive attitude towards DM prevention (P<0.001, OR=2.652, 95% CI=1.784-3.940), and respondents in SSS 3 were significantly more likely to have a positive attitude towards DM prevention (P<0.001, OR=4.128, 95% CI=2.251-7.569). Furthermore, respondents who had recently received training on DM prevention were significantly more likely to have a positive attitude towards it (P=0.002, OR=1.748, 95% CI=1.231-2.482).

According to Table 2, female respondents were

Table 2: Logistic Regressional analysis of demographic characteristics and perception of Diabetes Mellitus

Variables	P value	OR	95 CI	
N=621			Lower	Upper
Age				
10-15 (r)	[a]0.080, [b]P<0.001, [c]0.006, [d]0.003	[a]1.440, [b]2.008, [c]1.014, [d]1.821	[a]0.958, [b]1.423, [c]0.729, [d]1.222	[a]2.164, [b]2.834, [c]1.410, [d]2.713
16-22				
Sex				
Male (r)	[a]0.029, [b]P<0.001, [c]0.020, [d]P<0.001	[a]1.611, [b]2.818, [c]1.486, [d]4.178	[a]1.050, [b]1.943, [c]1.063, [d]1.222	[a]2.473, [b]4.087, [c]2.078, [d]2.713
Female				
Class				
JSS 1 (r)	[a]0.179, [b]0.542, [c]4.178, [d]0.080			
JSS 2	[a]P<0.001, [b]0.551, [c]0.002, [d]0.201	[a]0.220, [b]1.067, [c]1.206, [d]0.526	[a]0.024, [b]0.571, [c]0.661, [d]0.257	[a]2.007, [b]1.992, [c]2.201, [d]1.079
JSS 3	[a]0.001, [b]0.014, [c]0.009, [d]0.386	[a]0.998, [b]1.259, [c]1.014, [d]0.556	[a]0.678, [b]0.590, [c]0.570, [d]0.226	[a]1.218, [b]2.686, [c]1.803, [d]1.367
SSS 1	[a]0.021, [b]0.113, [c]0.201, [d]0.035	[a]6.667, [b]0.526, [c]1.045, [d]0.357	[a]2.207, [b]0.269, [c]0.502, [d]0.166	[a]7.640, [b]1.028, [c]2.174, [d]0.770
SSS 2	[a]P<0.001, [b]P<0.001, [c]0.033, [d]0.143	[a]3.580, [b]0.634, [c]0.695, [d]0.522	[a]1.217, [b]0.362, [c]0.398, [d]0.285	[a]10.534, [b]1.113, [c]1.213, [d]0.955
SSS 3		[a]4.324, [b]3.429, [c]0.956, [d]1.571	[a]2.780, [b]1.897, [c]0.589, [d]0.858	[a]3.376, [b]6.198, [c]1.552, [d]2.878
Family history of Diabetes Mellitus				
No (r)	[a]0.009, [b]0.023, [c]0.003, [d]0.659	[a]1.031, [b]1.081, [c]2.540, [d]1.140	[a]0.553, [b]0.3991, [c]1.379, [d]1.636	[a]1.924, [b]2.927, [c]4.679, [d]2.044
Yes: Grandparent, Aunt, Uncle or First Cousin (but not own parent, brother, sister or child)	[a]0.081, [b]0.024, [c]0.070, [d]0.595	[a]1.179, [b]0.917, [c]3.175, [d]0.711	[a]0.380, [b]0.304, [c]0.908, [d]0.202	[a]3.655, [b]2.760, [c]11.101, [d]2.498
Yes: Parent, Brother, Sister				
Those who have just finished a training on Diabetes Mellitus prevention	[a]P<0.001, [b]0.573, [c]P<0.001, [d]0.005	[a]2.521, [b]1.100, [c]2.495, [d]1.013	[a]1.673, [b]0.789, [c]1.769, [d]0.692	[a]3.800, [b]1.534, [c]3.518, [d]1.482
Yes				
No (r)				

Mean Perception Scale: 9.58±4.32, a: Perceived Susceptibility, b: Perceived Severity, c: Perceived Benefits, d: Perceived Barrier, JSS: Junior Secondary school, SSS: Senior Secondary School, CI: Confidence Interval, OR: Odds Ratio

significantly more likely to perceive themselves as susceptible to DM (P=0.029, OR=1.611, 95%CI=1.050-2.473). Respondents in SSS 3 were also significantly more likely to perceive themselves as susceptible to DM (P<0.001, OR=25.600, 95% CI=8.780-74.645), and respondents who reported a positive perception of vulnerability to DM were considerably more likely to have a family history of DM (P=0.009, OR=1.031, 95% CI=0.553-1.924).

Furthermore, respondents aged 16-22 years were significantly more likely to perceive the severity of DM (P<0.001, OR=2.008, 95% CI=1.423-2.834), as were female respondents (P<0.001, OR=2.818, 95% CI=1.943-4.087) and respondents in SSS 3 (P<0.001, OR=3.429, 95% CI=1.897-6.198).

Moreover, respondents aged 16-22 years were significantly more likely to perceive the benefits of DM prevention (P=0.006, OR=1.014, 95%CI=0.729-1.410), as were female respondents (P=0.020, OR=1.486, 95% CI=1.063-2.078), and respondents in SSS 3 (P=0.014, OR=1.045, 95% CI=0.502-2.174). Additionally, respondents who had recently received training on DM prevention were significantly more likely to perceive the benefits of it (P<0.001, OR=2.495, 95% CI=1.769-3.518).

Furthermore, respondents aged 10-15 years were significantly more likely to perceive barriers to DM treatment and prevention (P=0.003, OR=1.821, 95%CI=1.222-2.713), as were female respondents (P<0.001, OR=4.178, 95% CI=2.559-6.820). Respondents who had received training on DM were significantly more likely to perceive barriers (P=0.005, OR=1.013, 95% CI=0.692-1.482).

4. Discussion

The study aimed to determine the demographic determinants of knowledge, perception, and attitude toward DM prevention among in-school adolescents in two Delta State, Nigeria secondary schools.

The study revealed that age, sex, senior class status, and DM prevention training significantly influenced DM knowledge. In higher classes, respondents aged 16-22 showed higher knowledge levels than those in junior classes. Similar findings were corroborated (13, 17, 18). This shows DM health promotion interventions should target students in lower classes in secondary schools for knowledge enhancement.

Previous research reported higher DM knowledge among female students than male ones (19, 20), while others found no gender difference in DM knowledge (21). The current study found that females were more likely to be knowledgeable about DM than males. Although there is no known physiological or cognitive explanation for this difference, it could be inferred that DM knowledge depends on the specific study population.

Family history of DM was identified as a contributory factor to the increasing prevalence of DM (10, 22-24). The study also showed that respondents with a family history of DM were likelier to be knowledgeable about DM, though the association was insignificant.

Health education on DM was an effective strategy for improving knowledge among in-school adolescents. Respondents who recently received training on the prevention of DM demonstrated higher levels of knowledge.

Furthermore, respondents aged 16-22 years were more likely to exhibit a good perceived susceptibility to DM. This observation can be attributed to their higher knowledge of DM and senior class status compared to respondents aged 10-15. Similar findings were observed in a study among college students in the United States, where age predicted increased perception of future diabetes risk (25). Additionally, like DM knowledge, female respondents were more likely to have a better-perceived susceptibility to DM than their male counterparts. This finding aligned with a previous study where male respondents significantly underestimated their perceived future risk of DM. Family history also emerged as a significant predictor of perceived susceptibility to DM, consistent with the findings of previous studies (25, 26).

Likewise, respondents aged 16-22 years, female students, SSS 3 class, and those with a family history of DM were significant predictors of the perceived severity of DM. Understanding the severity of diabetes is crucial in preventing future complications.

Similarly, respondents aged 16-22 years, female students, SSS 3 class, family history of DM, and

those who recently received training on DM were predictors of having good perceived benefits and barriers to DM treatment and prevention. The higher knowledge and perception regarding DM can be attributed to them. Furthermore, variables such as age (16-22 years), female sex, SSS 3 class, family history of DM, and recent training on DM were significant predictors of a positive attitude towards DM. This positive attitude can be linked to their better knowledge and perception of DM. These findings were consistent with a previous study in Saudi Arabia, where female sex and family history of DM were significant predictors of a positive attitude towards DM (27).

4.1. Limitations

The study faced some limitations related to the respondents' ages. We encountered difficulties obtaining individual consent from each of the parents, and thus, the principals of the schools provided consent on behalf of the students. Additionally, the analysis solely relied on the students' responses, which could be limited due to the young age of the participants.

5. Conclusion

The study's findings revealed that various demographic characteristics, including being in the age group of 16-22 years, female gender, being in senior classes, having a family history of DM, and receiving training on DM prevention, played significant roles in determining DM knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers to DM treatment and prevention, and attitude towards DM prevention. Therefore, these factors should be carefully considered when designing health promotion and education programs to improve knowledge, perception, and attitude toward DM among in-school adolescents.

Acknowledgment

The author acknowledges the principals of Ogbe Secondary School and Nana College for allowing their students to participate in the study.

Ethical Approval

The College of Medical and Health Sciences at Novena University's Department of Public and Community Health granted clearance to gather data. Additionally, since most students were under 18, the principal gave their consent on their behalf.

Authors' Contribution

AO is responsible for the conception or design of the work; or the acquisition, analysis, interpretation of data for the work; reviewing the work critically for important intellectual content, drafting the work and reviewing it critically for important intellectual content. The author has read and approved the final manuscript and agree to be accountable for all aspects of the work, such that the questions related to the accuracy or integrity of any part of the work.

Conflict of interest: None declared.

References

1. International Diabetes Federation (IDF). Diabetes Atlas. 10th ed; 2021. Available from: http://www.diabetesatlas.org.
2. Agofure O, Odjimogho S, Okandeji-Barry OR, Efegbere HA, Nathan HT. Pattern of diabetes mellitus-related complications and mortality rate: Implications for diabetes care in a low-resource setting. Sahel Medical Journal. 2020;23(4):206-210. doi: 10.4103/smj.smj_64_19.
3. World Health Organization. Diabetes fact sheet; 2022. Available from: https://www.who.int/health-topics/diabetes#tab=tab_1.
4. Ufuoma C, Ngozi JC, Kester AD, Godwin YD. Prevalence and risk factors of microalbuminuria among type 2 diabetes mellitus: A hospital based study from, Warri, Nigeria. Sahel Medical Journal. 2016;19(1):16-20. doi: 10.4103/1118-8561.181889.
5. Jaja T, Yarhere IE. Risk factors for type-2 diabetes mellitus in adolescents secondary school students in Port Harcourt, Nigeria. Nigerian Journal of Paediatrics. 2015;42(2):137–141. doi: 10.4314/njp.v42i2.13.
6. Kamdema F, Lemogoumb D, Jingic AM, Guetchuin SC, Kenmegne C, Doualla MS, et al. Prevalence and determinants of abnormal glucose metabolism in urban and rural secondary schools in Cameroon: A cross-sectional study in a sub-Saharan Africa setting. Prim Care Diabetes. 2019;13(4):370-375. doi: 10.1016/j.pcd.2019.02.006. PubMed PMID: 31031133.
7. Nakiriba R, Mayega RW, Piloya T, Nabukeera-Barungi N, Idro R. Prevalence and factors associated

with dysglycemia among girls in selected boarding secondary schools in Wakiso District, Uganda. Adolesc Health Med Ther. 2018;9:167–176. doi: 10.2147/AHMT.S178746. PubMed PMID: 30464672; PubMed Central PMCID: PMC6211585.
8. Okpere AN, Anochie IC, Eke FU. Prevalence of Microalbuminuria among secondary school children. Afr Health Sci. 2012;12(2):140–7. doi: 10.4314/ahs.v12i2.10. PubMed PMID: 23056019; PubMed Central PMCID: PMC3462545.
9. Oluwayemi IO, Brink SJ, Oyenusi EE, Oduwole OA, Oluwayemi MA. Fasting Blood Glucose Profile among Secondary School Adolescents in Ado-Ekiti, Nigeria. Journal of Nutrition and Metabolism. 2015. doi: 10.1155/2015/417859.
10. Uloko AE, Musa BM, Ramalan MA, Gezawa ID, Puepet FH, Uloko AT, et al. Prevalence and risk factors for diabetes mellitus in Nigeria: a systematic review and meta-analysis. Diabetes Ther. 2018;9(3):1307–1316. doi: 10.1007/s13300-018-0441-1. PubMed PMID: 29761289; PubMed Central PMCID: PMC5984944.
11. Arugu GM, Maduka O. Risk factors for diabetes mellitus among adult residents of a rural District in Southern Nigeria: implications for prevention and control. Niger J Clin Pract. 2017;20(12):1544–1549. doi: 10.4103/njcp.njcp_154_17. PubMed PMID: 29378984.
12. Gatimu SM, Milimo BW, Sebastian MS. Prevalence, and determinants of diabetes among older adults in Ghana. BMC Public Health. 2016;16(1):1174. doi: 10.1186/s12889-016-3845-8. PubMed PMID: 27871259; PubMed Central PMCID: PMC5117548.
13. Agofure O, Oghenerume H. Knowledge of Diabetes Mellitus among Students of a Public Secondary School in Southern Nigeria: A Cross-Sectional Study. Student's Journal of Health Research Africa. 2022;3(3):11. doi: 10.51168/sjhrafrica.v3i3.108.
14. Agofure O, Oritseje EE, Oghenerume H. Applying the Health Belief Model on the perception and attitude towards Diabetes Mellitus among public secondary school students in Southern Nigeria: A Cross-sectional Study. Student's Journal of Health Research Africa. 2022;3(9):14. doi: 10.51168/sjhrafrica.v3i9.231.
15. Okolie U, Ehiemere I, Ezenduka P, Ogbu S. Contributory factors to Diabetes dietary regimen non-adherence in adults with diabetes. International Journal of Psychological and Behavioral Sciences. 2010;4:743-741.
16. Mgbahurike AA, Amadi DO, Onwusah DO. Knowledge attitude and perception of diabetes mellitus among students of university of Port Harcourt, Rivers State, south–south zone Nigeria. World Journal of Pharmaceutical Research. 2018;6(10):92-107. doi: 10.20959/wjpr201710-9388.
17. Agofure O, Okandeji-Barry RO, Charity OU, KingsleyA, Oghenerume H, Dikenwons A, et al. Knowledge of diabetes mellitus: An aggregate qualitative study of students, teachers, market women, religious organization and community youths. Ibom Medical Journal. 2021;14(2):161–169.
18. Ubangha LO, Odugbemi TO, Abiola AO. Diabetes mellitus: Identifying the knowledge gaps and risk factors among adolescents attending a public school in Lagos State. Journal of Clinical Sciences. 2016;13(4):193-198. doi: 10.4103/2468-6859.192302.
19. Lemes Dos Santos PF, Dos Santos PR, Ferrari GSL, Fonseca GAA, Ferrari CKB. Knowledge of diabetes mellitus: does gender make a difference? Osong Public Health Res Perspect. 2014;5(4):199-203. doi: 10.1016/j.phrp.2014.06.004. PubMed PMID: 25379370; PubMed Central PMCID: PMC4215000.
20. Shahzad A, Ahmad MM, Anwer I, Ijaz N, Shahzad M, Usman M. Gender-specific Knowledge of Diabetes and Its Management Among Patients Visiting Outpatient Clinics in Faisalabad, Pakistan. Cureus. 2018;10(8):e3119. doi: 10.7759/cureus.3119. PubMed PMID: 30338194; PubMed Central PMCID: PMC6175260.
21. Kumar IU, Murthy JP, Upadhya U, Venkatesh M. Gender differences in awareness of diabetes mellitus among the rural population. Asian Journal of Medical Sciences. 2017;8(2):44-49. doi: 10.3126/ajms.v8i2.16182.
22. Asiimwe D, Mauti GO, Kiconco R. Prevalence and risk factors associated with Type 2 diabetes in elderly patients aged 45-80 years at Kanungu District. Journal of Diabetes Research. 2020. doi: 10.1155/2020/5152146.
23. Amarasinghe S, Balakumar S, Arasaratnam V. Prevalence and risk factors of diabetes mellitus among adults in Jaffna District. Ceylon Med J. 2015;60(3):107–10. doi: 10.4038/cmj.v60i3.8191. PubMed PMID: 26520866.
24. Otovwe A, Akpojubaro EH. Diabetes mellitus in primary and secondary schools in Africa: an exploratory review. Alexandria Journal of Medicine. 2020;56(1):166-172. doi: 10.1080/20905068.2020.1833278.
25. Khan RK, Misra R, Shawley-Brzoska S, Wen S. Predictors of diabetes risk perception among college students. J Am Coll Health. 2022;70(6):1803-1809. doi: 10.1080 /07448481.2020.1825222. PubMed

PMID: 33048650; PubMed Central PMCID: PMC8041907.
26. Mongiello LL, Freudenberg N, Jones H, Spark A. Many College Students Underestimate Diabetes Risk. J Allied Health. 2016;45(2):81-6. PubMed PMID: 27262464.
27. Gazzaz JH. Knowledge, Attitudes, and Practices Regarding Diabetes Mellitus Among University Students in Jeddah, Saudi Arabia. Diabetes Metab Syndr Obes. 2020;13:5071–5078. doi: 10.2147/DMSO.S287459. PubMed PMID: 33380816; PubMed Central PMCID: PMC7767699.