

Prevalence and Associated Risk Factors for Prediabetes and Diabetes in Udo, Edo State, South-South Nigeria

***EKHATOR NP, **ERAH FO**

**Department of Medicine, University of Benin/ University of Benin Teaching Hospital, Benin, Edo State*

***Department of Community Health, Ambrose Alli University, Edo State*

ABSTRACT

Background: Diabetes is a chronic condition that can lead to serious illness and death if not detected early and managed effectively. Prediabetes is the crucial period to promote, prevent, or delay the development of Diabetes mellitus (DM). It describes a metabolic state that signals the potential progression to type 2 DM. Individuals with prediabetes have a higher risk of developing Type 2 diabetes. This study aimed to evaluate the prevalence and risk factors associated with prediabetes and diabetes among residents of Udo, a rural community in Edo State, South-South Nigeria.

Methods: A community-based descriptive cross-sectional study was conducted. Adults aged 18 years and older living in the rural community who attended a free medical outreach program as part of the World Diabetes Day Celebration were screened for prediabetes and diabetes mellitus. Data were collected using a structured, interviewer-administered questionnaire. Fasting plasma glucose (FPG) was measured with calibrated glucometers and classified as follows: normal (<or equal to 6mmol/L), prediabetes (6.1-6.9 mmol/L), and diabetes (≥ 7 mmol/L). Data were analyzed using descriptive statistics, the chi-square test, and binary logistic regression.

Results: The mean (standard deviation) age of the participants was 48.8 ± 18.3 years. The prevalence of prediabetes and diabetes was 23.6% and 18.2%, respectively. Of the 78 diabetic patients, 75.6% (59) were undiagnosed, and 24.4% (19) were diagnosed diabetics. Hypertension was significantly associated with prediabetes. A positive family history of DM and increasing age were the main predictors of diabetes.

Conclusion: This study demonstrated a high prevalence of prediabetes and diabetes in the study population in a rural setting, reducing the rural-urban disparity in DM prevalence. There is a need for targeted routine screening for diabetes and hypertension, especially for at-risk individuals, along with intervention programs aimed at reducing the risk of diabetes and prediabetes and the associated risk factors, thereby alleviating the burden of DM in Nigeria.

Correspondence

Dr. Noruwa P. Ekhator
Department of Medicine
University of Benin/University of Benin
Teaching Hospital
Benin City, Edo State
Nigeria
Email: noruwa.ekhator@uniben.edu

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INTRODUCTION

Diabetes mellitus is a major global health issue. It is a multisystemic, chronic, non-communicable metabolic disorder that can lead to significant morbidity and mortality if not properly managed.

The condition results from the destruction of pancreatic beta cells and/or a deficiency in insulin.

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Additionally, insulin resistance may play a crucial role as a contributing factor. If diabetes mellitus goes unrecognized or untreated for a long period, or if it is not managed to target levels, it increases the risk of cardiovascular disease, nephropathy, retinopathy, and diabetic foot amputations.

Prediabetes is an early stage of diabetes mellitus that can go unnoticed for years. Prediabetes is defined as an intermediate metabolic state between normoglycaemia and diabetes. It is a state characterized by a broad spectrum of conditions, including impaired fasting glucose (IFG), defined as fasting blood sugar (FBS) between 5.6 and 6.9 mmol/L; impaired glucose tolerance (IGT), marked by a 2-hour blood sugar level between 7.8 and 11.0 mmol/L during an oral glucose tolerance test (OGTT); and elevated glycosylated haemoglobin (HbA_{1c}) levels ranging from 5.7% to 6.4% (American Diabetes Association Professional Practice Committee, 2022). It is an independent risk factor for cardiovascular disease, and many macrovascular and microvascular complications of diabetes can develop during the prediabetic stage (Huang et al., 2016).

Recently, diabetes mellitus and its precursor, prediabetes, have become increasingly common, especially in low- and middle-income countries compared to high-income countries. Additionally, the rate of increase of diabetes and prediabetes in rural areas is significant.

As the prevalence and progression of diabetes continue to rise, diabetes-related morbidity and mortality have become major public health concerns. Diabetes affects an estimated 589 million adults worldwide aged 20 to 79 (1 in 9 adults). By 2050, this number is projected to rise by 45%, totalling 853 million people with diabetes globally. In Africa, according to the 11th edition of the IDF Diabetes Atlas, about 25 million adults aged 20-79 have diabetes. A systematic review and meta-analysis of diabetes prevalence in population-based studies in Nigeria from 1990 to 2017 reported a pooled prevalence of 5.77%, with the South-South zone showing the highest prevalence at 9.8% across the six geopolitical zones (Uloko et al., 2018;).

In 2024, 487.7 million adults, or 9.2% of the global adult population, had IFG. The age-standardized prevalence of IFG in 2024 was highest in North America and the Caribbean regions and lowest in Europe. By 2050, 647.5 million adults, or 9.8% of the global adult population, are projected to have IFG (IDF Diabetes Atlas, 2025). In 2024, 634.8 million adults worldwide, or 12.0% of the population, had IGT. The age-standardized prevalence of IGT in 2024 was highest in Southeast

Asia and lowest in Europe. By 2050, an estimated 846.5 million adults, or 12.9% of the global adult population, are projected to have IGT. Globally, the prevalence of IGT increased from 9.1% to 12.0%, and for IFG from 5.8% to 9.2% between 2021 and 2024 (Rooney et al., 2025).

Bashir et al. (2021), in their study 'Prediabetes Burden in Nigeria: A Systematic Review and Meta-Analysis,' reported a pooled prevalence of 13.2% for prediabetes in Nigeria using the ADA and WHO criteria. According to the latest data from the United Nations, this equates to an estimated 15.8 million and 12.5 million adult prediabetic individuals in Nigeria, respectively, using the ADA and WHO criteria (Bashir et al., 2021).

Many community-based studies have reported varying prevalence rates of prediabetes and diabetes in various parts of the country. Previous studies showed a lower prevalence of diabetes and prediabetes across rural communities in Nigeria. However, recent studies show a high rate of diabetes and prediabetes in rural areas (Chuhwak et al., 2019; Ubani et al., 2022), gradually bridging the expected gap between prevalence in urban and rural regions. Isara et al. reported the prevalence of diabetes as 4.6% in rural southern Nigeria (Isara & Okundia, 2015).

To our knowledge, there have been no reports on the prevalence of diabetes mellitus and prediabetes in the Udo community, a rural area in Ovia South-East, Edo State. This study was conducted to determine the prevalence of diabetes and prediabetes, as well as their associated factors, in this region.

MATERIALS AND METHODS

The study was a community-based cross-sectional study. The study was conducted in Udo, a rural community in the Ovia South West Local Government Area (LGA) of Edo State, Nigeria, approximately 121 km from the state capital. Edo State is located in Southern Nigeria. Udo is one of several towns and villages within the Ovia South-West Local Government Area, including Aghobahi, Igueze, Usen, and Ugbogui. It borders Ovia North East Local Government Area and Ondo State. The area features rainforest terrain and has limited basic social amenities, such as unpaved access roads, some electricity, and inadequate housing. The population is estimated at 92,106, with 47,422 males and 44,684 females (National Population Commission, Final results of the 2006 population census in Nigeria - Udo community). The indigenes are mainly subsistent farmers and traders.

Adults aged 18 years and older who were community residents were recruited. Adults who

declined consent, pregnant women, and breastfeeding mothers were excluded from the study.

This study was conducted during a health outreach program that provided clear benefits for both participants and the community, aligning with the activities planned for the 2023 World Diabetes

Celebration Day in Udo. Individuals diagnosed with diabetes or hypertension during the event were referred for additional assessment and follow-up at a nearby hospital. Those identified as obese received counselling and were also directed to further evaluation at a nearby tertiary hospital.

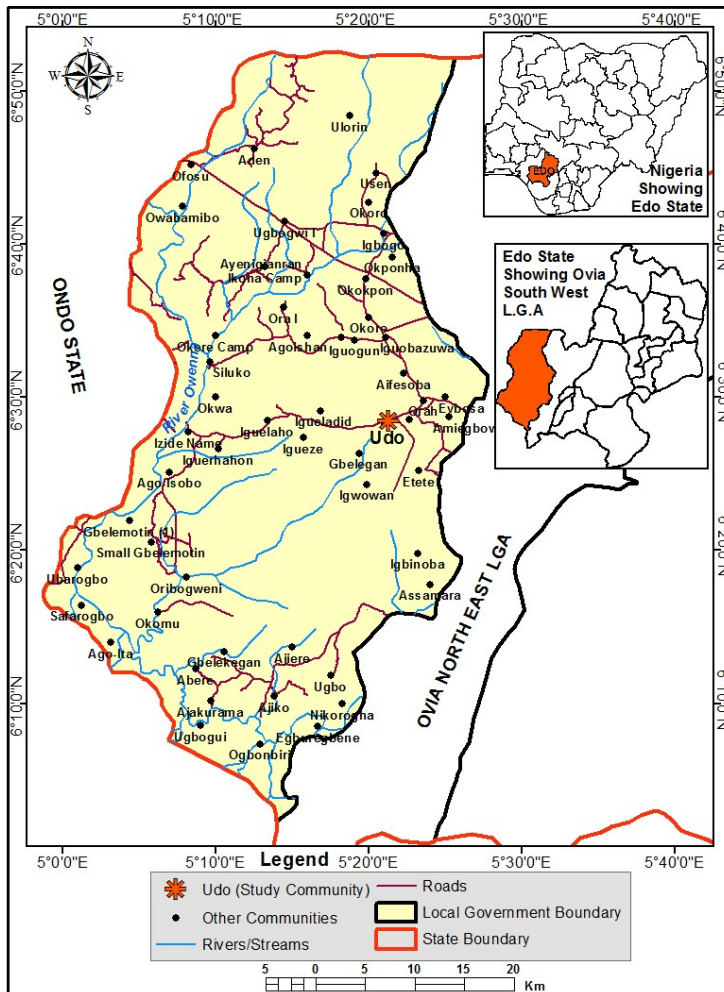


Figure 1: Map of Edo state showing Udo community

Ethical consideration

Approval was obtained from the Research and Ethics Committee of the University of Benin Teaching Hospital. Additionally, the community ruler, the local government chairman, and notable town union representatives were informed and also gave their approval and permission. The community members were informed about the health screening program by the community ruler, village heads, and through local community meetings, market meetings, and doctors at the Udo health centre about 12 weeks before screening day for adequate preparation.

Sample size

The minimum sample size was 363, calculated using Fisher's formula for a cross-sectional study conducted in a rural region with a 21.5 percent prevalence rate and a 10 percent attrition rate. However, the sample size was increased to 428 to improve the validity of our results.

Data collection

Participants were instructed to eat dinner no later than 10 pm the day before the study began. They were asked to observe an overnight fast and arrive fasting at 7 am on the day of screening. They were requested to present at the community hospital,

University of Benin Teaching Hospital (UBTH), Udo chapter, where the screening program was organized as part of the activities to celebrate World Diabetes Day by UBTH, Benin. Participants received a briefing from study investigators and assistants, including 40 trained medical personnel, on the morning of the screening, and they also provided verbal informed consent. 435 subjects participated, and ultimately 428 completed the study.

Informed consent was obtained, and a researcher-administered modified WHO-STEPs questionnaire was used to collect participants' socio-demographic characteristics and clinical history. Blood pressure (BP), anthropometric measurements, including weight, height, and waist circumference, were obtained using standard procedures. Also, the fasting plasma glucose (FPG) of each participant was assessed.

Clinical assessment

Weight was measured with subjects in light clothing without shoes, using a pre-calibrated weighing scale and recorded in kilograms, to the nearest 0.1kg. The height was measured in meters using a stadiometer, with the subject not wearing shoes or headgear, standing upright and looking straight ahead (along the coronal plane) and this was recorded to the nearest 0.01m. The body mass index (BMI) was calculated by dividing the weight (kg) by the of the height (m²) with unit as kg/m² (WHO Technical Report series, 1995). The waist circumference (WC) was measured with a non-stretch measuring tape to the nearest 0.1 cm at the midpoint between the inferior margin of the ribcage and the superior border of the anterior iliac crest, along the midaxillary line.

After a 5-minute rest period upon arrival with the subject seated, two blood pressure measurements were taken from the subject's right arm using a standard mercury sphygmomanometer (Accoson) following the recommendations of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (James et al., 2014). The average of these readings was used as the patient's blood pressure. Blood pressure (BP) was measured to the nearest two mmHg in the sitting position, with the arms and sphygmomanometer at heart level. The first (1st) and fifth (5th) Korotkoff sounds were recorded as the systolic and diastolic BP, respectively. Fasting blood glucose was estimated using capillary blood obtained by fingertip pinprick using pre-standardized Accu-Chek Active glucometers and test strips, pre-calibrated by the manufacturer Roche Diagnostics GmbH, Germany, using the

hexokinase method. Hence, the results correspond to blood glucose concentrations in venous plasma, as recommended by the International Federation of Clinical Chemistry and Laboratory Medicine.

Definition of study criteria

Normal fasting plasma glucose (FPG) is less than 6.1 mmol/L (<110 mg/dL). Impaired fasting glucose (IFG), which was used to define prediabetes, is defined as an FPG between 6.1 and 6.9 mmol/L (110-125 mg/dL) with a 2-hour plasma glucose post 75g glucose load of less than 7.8 mmol/L (<140 mg/dL) World Health Organisation (WHO) criteria (WHO, 2006).

Diabetes was defined by FPG > 7.0 mmol/L (>126 mg/dL) according to WHO criteria as either undiagnosed diabetes mellitus or the presence of a previous diagnosis based on self-report of having been diagnosed with diabetes by a physician and/or on antidiabetic medications, as diagnosed diabetes mellitus.

Hypertension was defined as a systolic blood pressure (SBP) of 140 mmHg or higher and/or a diastolic blood pressure (DBP) of 90 mmHg or higher, according to the WHO/International Society of Hypertension guidelines (James et al., 2014). Additionally, individuals who self-report a diagnosis of hypertension from a physician and/or those taking antihypertensive medication are classified as having hypertension (James et al., 2014).

Obesity was defined according to the 1999 WHO criteria, using the following BMI cut-off points to establish diagnosis (WHO, 2000): a) Normal BMI- 18.5 – 24.9 kg/m², b) Overweight- 25.0 – 29.9 kg/m², c) Obesity- ≥ 30kg/m², d) Underweight- ≤ 18.5kg/m²

Central obesity was determined according to the International Diabetes Federation (IDF) guidelines, which define a waist circumference of ≥ 94 cm for males and ≥ 80 cm for females as elevated (Alberti et al., 2006).

Statistical Analysis

Data were entered into MS Excel 2007 and analysed using the Statistical Package for the Social Sciences (SPSS) version 21. (SPSS Inc., Chicago, IL, USA). Quantitative variables were summarized with means and standard deviations, while categorical variables were expressed as percentages. Chi-square and Fisher's exact tests were used to analyse differences between categorical variables. The Student's t-test compared continuous variables. Binary logistic regression was performed to identify factors

predictive of IFG and diabetes. A probability value (p-value) of < 0.05 was considered statistically significant.

RESULTS

Sociodemographic characteristics of participants

A total of 428 participants took part in this study, 272 (63.6%) were females and 156 (36.4%) were males, with a female-to-male ratio of 1.74:1. The mean age of participants in this study was 48.8 ± 18.3 years, with an age range of 18 to 90 years. Majority of the participants were farmers,

accounting for 164 (38.3%) of the population, while 134 (31.3%) were engaged in business activities. 156 (36.4%) of the participants had a primary education level (Table 1).

Relationship between the socio-demographic characteristics and fasting plasma glucose of participants

The mean fasting plasma glucose (6.68 ± 2.61, 120.29 ± 47.0) was highest in individuals aged 46-60 years, while the mean FPG was 116.03 ± 45.42 among females and 113.96 ± 38.80 among males (Table 2).

Table 1: Sociodemographic characteristics of the participants

Variables	Frequency (n = 428)	Percentage (%)
Age	Mean ± SD = 48.8 ± 18.3	
18 – 30	70	16.4
31 – 45	105	24.5
46 – 60	119	27.8
61 – 75	97	22.7
> 75	37	8.6
Sex		
Male	156	36.4
Female	272	63.6
Marital Status		
Single	77	18.0
Married	332	77.6
Divorced	11	2.6
Widowed	8	1.9
Occupation		
Artisan	34	7.9
Business	134	31.3
Civil Servant	29	6.8
Farming	164	38.3
Retired	18	4.2
Student	38	8.9
Others *	11	2.6
Religion		
Christianity	389	90.9
Muslim	11	2.6
ATR	28	6.5
Level of Education		
No Formal Education	111	25.9
Primary	156	36.4
Secondary	124	29.0
Tertiary	37	8.6

* Others – Pastor, Porter, Traditional ruler, Driver, Cleaner ,SD – Standard Deviation
ATR – African Traditional Religion

Table 2: Relationship between sociodemographic characteristics and mean Fasting Plasma glucose of participants

Variables	FPG (Mean ± SD) (mmol/L)	F	p-value
Age		0.659	0.992
18 – 30	5.79 ± 0.78		
31 – 45	6.53 ± 2.91		
46 – 60	6.68 ± 2.61		
61 – 75	6.49 ± 2.15		
> 75	5.75 ± 0.84		
Sex		0.874	0.784
Male	6.33 ± 2.16		
Female	6.46 ± 2.52		
Marital Status		1.092	0.283
Single	5.90 ± 0.95		
Married	6.48 ± 2.48		
Divorced	5.95 ± 0.73		
Widowed	7.26 ± 4.01		
Religion		1.327	0.035*
Christianity	6.32 ± 2.14		
Muslim	6.13 ± 1.20		
ATR	7.15 ± 3.89		
Level of Education		0.851	0.828
No Formal Education	6.10 ± 1.64		
Primary	6.48 ± 2.33		
Secondary	6.46 ± 2.69		
Tertiary	6.49 ± 2.43		
Occupation		0.867	0.798
Artisan	6.06 ± 1.62		
Business	6.56 ± 2.84		
Civil Servant	6.55 ± 1.89		
Farming	6.34 ± 1.96		
Retired	6.72 ± 3.07		
Student	5.57 ± 0.71		
Others *	7.30 ± 3.69		

* Others – Pastor, Porter, Traditional ruler, Driver, Cleaner , ATR – African Traditional Religion
SD – Standard Deviation, *p* – value – probability value

Prevalence of Prediabetes and Diabetes Among Participants

Prediabetes was observed in 103 (23.6%) of the participants in this study, and diabetes in 78 (18.2%) of participants using IFG and FPG, respectively. This is shown in Table 3 and Figure 2. Among the 78 diabetic participants, 75.6% (59) were undiagnosed, and 24.4% (19) were diagnosed diabetics. (Table 4)

Clinical risk factors for Prediabetes and Diabetes in participants

Of those aged 45 years and above, 62 (14.5%) participants had prediabetes, including 25 (40.3%) males and 37 (59.7%) females. In the same age group, 8 (1.86%) participants had diabetes, consisting of 3 (37.5%) males and 5 (62.5%) females, as shown in Table 5

Obesity and overweight were observed in 118 (27.6%) and 108 (24.8%) of participants, respectively. Among these individuals, obesity and/or overweight were present in 29 (6.77%) of those with diabetes and 16 (3.7%) of those with prediabetes.

Hypertension was significantly associated with prediabetes, including both elevated systolic and diastolic blood pressure.

Predictors of glycaemic status

Sociodemographic and clinical factors related to diabetes and prediabetes were analyzed. The independent predictors of diabetes included age over 45 years and a family history of DM (*p*=0.037 and *p*<0.0001), as shown in Table 6.

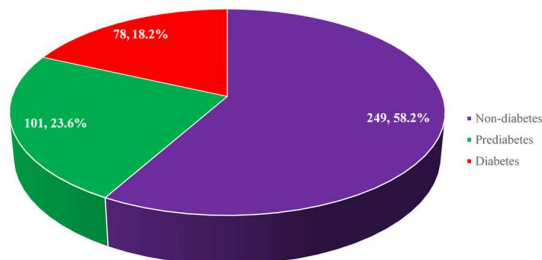


Figure 2: Prevalence of non diabetes, prediabetes and diabetes

Table 4: Prevalence of diabetes showing diagnosed and undiagnosed diabetes

Variables	All n(%)	Male n(%)	Female n(%)
Diagnosed Diabetes	19(24.4)	8(42.1)	11(57.9)
Undiagnosed Diabetes	59(75.6)	27(45.8)	32(54.2)

Table 5: Prevalence of clinic risk factors for prediabetes and diabetes

Variables	Male n (%)	Female n (%)	Total n (%)	p-value
Prediabetes				
Age > 45 years	25(40.3)	37(59.7)	62(14.5)	0.671
Hypertension	36(97.3)	1(2.7)	37(8.6)	<0.0001*
Elevated SBP	13(61.9)	8(38.1)	21(4.9)	0.019*
Elevated DBP	12(70.6)	5(29.4)	17(4.0)	0.004*
Overweight/Obesity	8(50.0)	8(50.0)	16(3.7)	0.293
Family History of DM	1(100.0)	0(0.0)	1(0.23)	0.364
Diabetes				
Age > 45 years	3(37.5)	5(62.5)	8(1.86)	1.0
Hypertension	7(35.0)	13(65.0)	20(4.67)	1.0
Elevated SBP	1(25.0)	3(75.0)	4(0.93)	1.0
Elevated DBP	8(38.1)	13(61.9)	21(4.91)	1.0
Overweight/Obesity	9(31.0)	20(69.0)	29(6.77)	0.690
Family History of DM	2(50.0)	2(50.0)	4(0.93)	0.625

* statistically significant, *p* – value – probability value

Table 6: Relationship Between Prediabetes, Diabetes, and Selected Clinical Characteristics of Participants.

Factors	B	p-value	Exp(B)	95% C.I. for EXP(B)	
				Lower	Upper
PREDIABETES					
Constant	-1.268	0.037*	0.281		
Age					
< 45			1	0.765	1.938
> 45	-0.197	0.406	0.821		
Sex					
Male			1	0.531	5.106
Female	-0.498	0.388	0.608		
BMI					
Not Obese			1	0.357	1.054
Obese	0.488	0.077	1.629		
Presence of HTN					
Yes			1	0.245	2.191
No	0.311	0.578	1.365		
Family history of DM					
Yes			1	0.307	3.047
No	0.034	0.954	1.034		
DIABETES					
Constant	-0.043	0.935	0.958		
Age					
< 45			1	1.035	3.076
> 45	0.579	0.037*	1.785		
Sex					
Male			1	0.625	7.325
Female	0.761	0.226	2.140		
BMI					
Not Obese			1	0.633	1.939
Obese	0.102	0.721	1.107		
Presence of HTN					
Yes			1	0.170	1.825
No	-0.585	0.334	.557		
Family history of DM					
Yes			1	0.045	.324
No	-2.115	<0.0001*	.121		

a. Variable(s) entered on step 1: Age, Sex, BMI Group, Hypertension, Family History of DM.

* statistically significant Exp(B) – Odd ratio, B – Coefficient of odd ratio, CI -Confidence interval *p* – value – probability value

DISCUSSION

This study assessed the prevalence and factors associated with prediabetes and DM among community members in Udo, a rural agrarian community in Edo State, South-South Nigeria. It also highlights the rising rates of prediabetes and DM in rural areas of Nigeria. The mean age of participants was 48.8 ± 18.3 years, which was similar to the findings by Ubani et al. (2022) and Nwafor et al. (2024).

In this population, the prevalence of diabetes was high at 18.2% based on FPG, and the prevalence of prediabetes was even higher at 23.6% based on IFG. This confirms that the diabetic epidemic is increasing in Nigeria, as prediabetes is a strong predictor of diabetes and is usually present in an individual several years before a DM diagnosis (Garber et al., 2008). The elevated prevalence observed here may be due to westernization, which could have resulted from changing dietary patterns in rural communities, shifting occupational patterns, population growth, and a rising prevalence of risk factors such as obesity, hyperlipidemia, and hypertension. Also noteworthy is that the percentage of prediabetes is higher than that of diabetes for both males and females-21.8% vs 17.3% for males and 24.6% vs 18.8% for females.

The prevalence of prediabetes in this study at 23.6%, is comparable to the overall pooled prevalence reported in a study conducted in Mosogar, a suburban community in Delta State, South South Nigeria (22%) (Ejenobo et al., 2022), as well as those reported by Enang et al. (2014) in a community study in Calabar (23.6%) and Nwantu et al. (2015) in Enugu (21.5%). However, the prevalence observed in the present study is higher than the prevalences of 6.0% reported by Rasaki et al. (2017), 8.7% by Ubani et al. (2022), 10.7% by Essiet & Osadolor, (2019), and 16% by Kabir et al. (2020) in different Nigerian communities. An earlier study conducted among civil servants by Ejenobo et al. (2024) in the same state, but in an urban area reported a lower prevalence of 14.3%. Furthermore, the prevalence in this study exceeds the pooled prevalence of 13.2% for prediabetes reported in Nigeria in a systematic review and meta-analysis of 15 studies, as well as the global prevalence rate of 5% in Africa, reported by the International Diabetes Federation in 2024. In the early 1970s, a much lower prevalence of prediabetes, 0.4% was reported by Osuntokun et al. (1971) The current study, along with other findings reported in Nigeria and globally, clearly indicates an increasing prevalence of prediabetes.

The high prevalence of prediabetes in rural areas, as reported in this study, when compared with the prevalence of diabetes in urban areas, does not align with the general understanding (Assah et al., 2011; Saquib et al., 2012; Uloko et al., 2018; Issaka et al., 2023) that there is a rural-urban disparity in the burden of DM in both regions; instead, it shows that this disparity is gradually diminishing over time. A similar observation was reported in a study by Ramchandra et al. (2008) in India, who found no significant urban-rural difference in the prevalence of IGT (8.7% and 7.8%, respectively), which was attributed to rapid conversion of IGT to DM in the urban community. Reasons that may be attributed to this include the increasing prevalence of associated medical conditions, such as hypertension, which are risk factors for prediabetes and diabetes, changing occupational patterns, as well as variation in dietary habits, and the influence of proximity of rural areas to major urban areas.

The prevalence of diabetes in this study was 18.2%; 75.6% of these participants were undiagnosed. This prevalence is comparable to the 13.9% reported by Egbi & Ahmed, (2020) in a similar community-based study conducted in a rural area of the same Edo state. However, it is higher than the 4.6%-9.5% prevalence reported in other studies in Nigeria (Gezawa et al., 2015; Isara & Okundia, 2015; Aladeniyi et al., 2017; Rasaki et al., 2017; Omorogiuwa et al., 2021; Ejenobo et al., 2024; Nwafor et al., 2024). The difference in geographical location, increasingly sedentary lifestyle, unhealthy eating habits, and rapid progression from prediabetes to diabetes (noting the high prevalence of prediabetes observed in this study) are factors that may contribute mainly to the high prevalence of diabetes observed in our study when compared with other studies. This prevalence is also higher than the 5% reported by the International Diabetes Federation for Africa in 2024. Additionally, it exceeds the pooled prevalence of diabetes in Nigeria in 2018 (5.77%). This increase can be attributed to a rising prevalence of diabetes driven by lifestyle changes, such as sedentary habits and consumption of high-calorie foods, along with an increase in risk factors for diabetes. This is supported by the fact that, according to the IDF in 2024, although Africa has the lowest DM prevalence estimate of 5% among IDF regions, it has the highest projected growth rate in the number of people with diabetes, 142% by 2050, reaching 60 million (IDF Diabetes Atlas, 2024). Similarly, as projected by IDF, Africa is expected to see the highest increase in the number of people with IGT and IFG by 2050, with

projections of 135 million (138% increase) and 88 million (134% increase), respectively (IDF Diabetes Atlas, 2024). Recognizing that prediabetes often precedes the development of diabetes, there is a need for regular screening, appropriate dietary and lifestyle modifications, and the use of suitable medications for early detection of the prediabetic population to prevent this epidemic increase in diabetes prevalence.

Hypertension was significantly associated with prediabetes in this study, consistent with findings reported in another research (Ulasi et al., 2011; Nwatu et al., 2015; Kabir et al., 2020). A total of thirty-seven (8.6%) of the prediabetics in this study had hypertension. Both higher systolic and diastolic blood pressures were significantly associated with prediabetes. Hypertension is a known risk factor for prediabetes. Impaired glucose metabolism and insulin resistance are the main underlying causes of T2DM. Several studies have explored the link between insulin resistance and diastolic dysfunction in heart function. These studies have identified a significant connection between insulin resistance and diastolic dysfunction. Fontes et al. found that individuals with greater insulin resistance had worse diastolic function parameters and a significantly increased risk of left ventricular (LV) diastolic dysfunction, independent of other factors that affect diastolic function (Fontes-Carvalho et al., 2015). Di Pino et al. (2017) reported that individuals with HbA_{1c} levels in the prediabetes range exhibited higher left atrial volume (LAV). Liberty et al. also observed that individuals with a diastolic blood pressure of 80-89 mmHg were at greater risk of prediabetes than those with normal blood pressure (Liberty et al., 2023).

Increasing age and family history of DM were significant predictors of DM observed in this study, consistent with another research. Type 2 diabetes is known to show strong familial aggregation (Puepet & Chuhwak, 2002). Eleven (14.1%) of the diabetics identified in this study had a positive family history of DM. Most studies on family history of DM in Africans have focused on probands with DM (Osuntokun et al., 1971; Mengesha et al., 1990). Similar to this study, Puepet & Chuhwak, (2002) found a positive family history of DM in 23.8% of 150 probands with diabetes among parents and siblings of Nigerian diabetics in Jos. Additionally, increasing age (over 45 years) was an independent predictor of DM in this study, as reported by Aladeniyi et al. (2017), who observed a linear relationship between DM and aging. They found a lower DM prevalence of 1.9% among individuals aged 25–34 years, rising to 21.4%

among those aged 65 years and older. In our study, the DM prevalence rate was 10% among those aged 18-30 years, rising to 21.6% among those aged 61-75 years. Due to the combined effects of insulin resistance and impaired islet cell function, older adults (≥ 65 years) are at higher risk for developing DM (Kirkman et al., 2012). With aging, pancreatic islet cell function and proliferative capacity decline, leading to new-onset DM. Effective screening measures should be implemented to detect prediabetes early, and with appropriate dietary and lifestyle modification, the rising prevalence of DM can be reduced.

CONCLUSION

There is a rising prevalence of diabetes and prediabetes in the Udo community. Hypertension is a significant risk factor linked to prediabetes. Age over 45 years and a positive family history of DM are independent predictors of DM in the community. Routine screening for hypertension and prediabetes would allow for early detection of these metabolic disorders, which can reduce cardiovascular burden and inadvertently help lower the incidence of DM in the community. This will also help prevent overburdening the overstretched healthcare system.

RECOMMENDATIONS

The results of the present study emphasize the importance of early detection through regular fasting plasma glucose screening to identify IFG or IGT, which helps diagnose prediabetic and diabetic populations, especially those at risk. This ensures early intervention with lifestyle modifications and appropriate referrals to secondary centres for effective management. Additionally, it is crucial to promote regular screening for hypertension by encouraging blood pressure checks during village meetings, church gatherings, local festivals, and schools, and through community education about visiting health centres for routine health checks. Measures to prevent and address obesity and sedentary lifestyles, which further increase the risk of hypertension and diabetes, should also be implemented. Promoting healthy eating habits among community residents is equally important. Future studies with a larger number of community residents using an appropriate sampling method, such as a multistage stratified sampling technique, are recommended as a follow-up to validate these findings and ensure proper measures are in place for screening and managing these medical conditions.

LIMITATION

Glucometers were used to estimate participants' fasting plasma glucose levels from capillary whole blood rather than venous plasma. However, the strips used had been pre-calibrated by the manufacturers to convert capillary whole-blood glucose values to equivalent venous plasma glucose levels. In this study, screening for other risk factors of prediabetes, such as dyslipidemias, was not performed due to financial constraints.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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