# Prevalence of Diabetes Mellitus among Patients in Healthcare Facilities in Ikwerre LGA, Rivers State, from 2019-2023

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## Abstract

Diabetes mellitus is an important public health concern, but facility-level evidence from Ikwerre Local Government Area is limited. The study determined the annual and subgroup prevalence of documented diabetes mellitus among patient records in selected healthcare facilities in Ikwerre LGA from 2019 to 2023. A retrospective review of 336,820 eligible patient records identified 354 documented diabetes diagnoses. Frequencies, prevalence rates per 10,000 records, and chi-square tests were used. Results revealed that overall period prevalence was 10.5 per 10,000 records, while the unweighted mean annual rate was 11.1 per 10,000. Recorded rates were higher among males than females and among patients with formal education than those with informal education. Documented diabetes diagnoses varied by year and subgroup, but the facility-based design, changing attendance, and possible differences in screening and record completeness limit community-level inference.

**Keywords:** Prevalence, Diabetes mellitus, Patients, Healthcare facilities

## Introduction

Diabetes mellitus (DM), a chronic and debilitating non-communicable disease, has emerged as a major public health concern globally. Sun et al. (2022) reported that global diabetes prevalence had reached alarming proportions, with an estimated 537 million adults affected in 2021. In Africa, 1 in 22 adults, approximately 24 million people were living with diabetes, and the number was projected to increase substantially by 2045 (Sun et al., 2022). Nigeria faces a substantial and growing diabetes burden (International Diabetes Federation, 2023).

Diabetes mellitus is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces (World Health Organization, 2016). The International Diabetes Federation (2021) similarly describes diabetes mellitus as a serious long-term condition in which blood glucose levels rise because the body cannot produce enough insulin or cannot effectively use the insulin it produces. Operationally, diabetes is a condition characterized by elevated blood glucose resulting from insufficient insulin production, ineffective insulin action, or both. Type 1 diabetes mellitus is an autoimmune condition in which the immune system destroys insulin-producing beta cells in the pancreas, leading to absolute insulin deficiency (Atkinson *et al*., 2014). Type 2 diabetes results from a combination of insulin resistance and relative insulin deficiency and is often associated with excess body weight and physical inactivity (American Diabetes Association, 2010). Gestational diabetes mellitus is glucose intolerance first recognized during pregnancy and is associated with pregnancy-related insulin resistance.

Symptoms of diabetes can be subtle, particularly in type 2 diabetes, and vary among individuals. Common symptoms include frequent urination, excessive thirst, increased hunger, unexplained weight loss, fatigue, blurred vision, slow-healing wounds, genital itching or thrush, and tingling or numbness in the hands and feet (Diabetes UK, 2026; World Health Organization, 2024). Diabetes can also cause acute and long-term complications, including hypoglycaemia, diabetic ketoacidosis, cardiovascular disease, neuropathy, nephropathy, retinopathy, foot ulcers and amputation, periodontal disease, and other organ damage (Diabetes UK, 2025; World Health Organization, 2024). The global burden of diabetes has continued to rise.

Prevalence is the proportion of a population with a disease, condition, or characteristic at a specified point or during a defined period (Centers for Disease Control and Prevention, 2020). Point prevalence refers to the proportion affected at one point in time, whereas period prevalence refers to the proportion affected during a stated interval. Prevalence estimates help quantify disease burden, plan healthcare services, and allocate resources. Uloko et al. (2018) estimated diabetes prevalence in Nigeria at 5.77%. Globally, diabetes prevalence was estimated at 9.3% in 2019 and was projected to increase by 2045 (Saeedi et al., 2019).

Diabetes prevalence may vary by sex or gender and educational level. Several studies have reported sex-related differences, although the direction and magnitude vary across populations (Sujata & Thakur, 2021; Zhang et al., 2019). Kautzky-Willer et al. (2023) reported that males often have a higher prevalence of type 2 diabetes at younger ages and lower body fat percentages, while Ciarambino et al. (2022) described broader sex-related differences in diabetes and its complications. These findings do not establish the mechanisms responsible for the differences observed in the present facility records.

Education level may also be associated with diabetes prevalence. Seiglie et al. (2020) found complex relationships among education, wealth, body mass index, and diabetes across low- and middle-income countries. Steele et al. (2017) examined factors that may mediate the association between educational attainment and type 2 diabetes, while Bartolini et al. (2020) reported educational inequalities in diabetes prevalence and outcomes. These studies show that the association can reflect multiple social, behavioural, and healthcare-related factors and should not be interpreted as a simple causal effect of education.

The high prevalence of diabetes is a serious public-health problem. The World Health Organization projects that diabetes will become a leading cause of death, with low- and middle-income countries bearing a substantial share of the burden. Globally, diabetes contributed to millions of deaths among adults aged 20–79 years in 2021, and more than 1.2 million children and adolescents were living with type 1 diabetes (International Diabetes Federation, 2021). In Africa, approximately 24 million adults were living with diabetes in 2021 (Sun et al., 2022). Nigeria faces a substantial and growing diabetes burden (International Diabetes Federation, 2023). Cookey et al. (2022) also reported a diabetes prevalence of 8.6% in a Nigerian study, highlighting the burden of the condition in this setting.

Despite the growing diabetes burden, facility-level evidence from Ikwerre LGA remains limited. Local estimates based on routinely collected records can show how documented diagnoses vary over time and across demographic groups, helping participating facilities identify gaps in screening, documentation, and service use. Such evidence can support more consistent surveillance and guide locally appropriate planning for diabetes prevention, early detection, and management, while recognising that facility records cannot establish community-wide

prevalence. This study addressed the local evidence gap by estimating the prevalence of documented diabetes mellitus among patient records from selected healthcare facilities in Ikwerre LGA, Rivers State, from 2019 to 2023. Specifically, it determined annual prevalence and examined whether recorded diabetes prevalence differed by gender and educational level.

## Methods

### Study design and setting

This retrospective record-review study used existing healthcare data to examine diagnosed diabetes mellitus among patients attending Madonna University Teaching Hospital and selected primary healthcare centres in Ikwerre Local Government Area, Rivers State, Nigeria, from 2019 to 2023. The teaching hospital is a tertiary facility affiliated with Madonna University, while the primary healthcare centres provide first-contact services within the local government area. The study population, denominator, and unit of analysis comprised patient records for the defined study period.

### Study population

The study population comprised 336,820 patient records from attendances at the selected healthcare facilities in Ikwerre LGA between 2019 and 2023. All eligible records available during the study period were reviewed; therefore, no sample was drawn. Among these records, 354 documented a diabetes mellitus diagnosis and formed the numerator for prevalence calculations. Records were eligible if they related to patients attending the selected facilities between 1 January 2019 and 31 December 2023 and contained the variables required for analysis. Records outside the study period, duplicate entries, and records lacking sufficient information to establish diabetes status or the relevant demographic category were excluded. A diabetes case was counted only when the medical record documented a diagnosis made according to the facility's clinical or laboratory criteria.

For consistency across facilities and years, a documented diabetes diagnosis was accepted only when it met the clinical or laboratory criteria used by the reporting facility. The extraction checklist recorded the source facility, year, diabetes status, gender, and educational level. Records with conflicting entries were reviewed against the original register, while unverifiable entries were excluded.

### Data collection instrument

Data were extracted from the medical-record units of Madonna University Teaching Hospital and the participating primary healthcare centres using a structured checklist. Section A captured gender and educational level, while Section B captured year of attendance, total patient records, and documented diabetes diagnoses from 2019 to 2023. Three public-health experts at Madonna University reviewed the checklist for alignment with the study objectives and for the relevance, clarity, and suitability of its items. Their comments were incorporated before data collection. Extracted data were checked for completeness, internal consistency, and duplicate entries before analysis.

**Data collection procedure**

A letter of introduction from the Head of the Department of Public Health, Madonna University Nigeria, explained the purpose of the study and was submitted to the management of each participating facility. After permission was granted, the researchers used the approved checklist to extract the required information from eligible medical records. Patient contact was not required because the study used existing records. Confidentiality was maintained throughout data collection.

Approval to access the medical records was obtained from the relevant healthcare-facility authorities. Only information required for the study objectives was extracted, and no personally identifying information was included in the analysis. Records were handled confidentially and used solely for research purposes.

**Data analysis**

Data were summarised using frequencies and percentages. Annual prevalence was calculated by dividing the number of recorded diabetes cases by the total number of eligible patient records for the corresponding year and multiplying by 10,000. Subgroup prevalence was calculated using the corresponding gender- or education-specific denominator. Gender and educational-level differences in diabetes status were assessed from contingency tables using chi-square tests. Statistical significance was set at $p \leq 0.05$.

**Results**

Table 1: **Annual Prevalence of Diagnosed Diabetes Mellitus among Patient Records in Selected Healthcare Facilities in Ikwerre LGA, Rivers State, 2019–2023**

| S/N | Year | Total Population of Patients | Diagnosed Patients (N = 354) | Prevalence Rate (per 10,000) |
|---|---|---|---|---|
| **1** | 2019 | 76,596 | 80 | 10.4 |
| **2** | 2020 | 19,642 | 28 | 14.3 |
| **3** | 2021 | 75,925 | 82 | 10.8 |
| **4** | 2022 | 82,761 | 117 | 14.1 |
| **5** | 2023 | 81,896 | 47 | 5.7 |
| | **Average** | | | **11.1** |

Table 1 shows that 80 diabetes cases were recorded among 76,596 patient records in 2019, corresponding to 10.4 cases per 10,000. In 2020, 28 cases among 19,642 records produced the highest annual rate, 14.3 per 10,000. The rate was 10.8 per 10,000 in 2021 and 14.1 per 10,000 in 2022. In 2023, 47 cases among 81,896 records produced the lowest rate, 5.7 per 10,000. Across the full five-year period, 354 cases occurred among 336,820 patient records, equivalent to an overall period prevalence of 10.5 per 10,000. The unweighted mean annual rate for the five years understudy was 11.1 per 10,000.

Table 2: **Prevalence of Diabetes Mellitus among Patients by Gender (2019-2023) (n = 354)**

| | | Male | | | Female | | |
|---|---|---|---|---|---|---|---|
| **S/N** | **Year** | Diagnosed Patients | Total Population | Prevalence Rate (per 10,000) | Diagnosed Patients | Total Population | Prevalence Rate (per 10,000) |
| 1 | 2019 | 48 | 38,100 | 12.60 | 32 | 38,496 | 8.31 |
| 2 | 2020 | 18 | 9,988 | 18.02 | 10 | 9,654 | 10.36 |
| 3 | 2021 | 49 | 38,698 | 12.66 | 33 | 37,227 | 8.86 |
| 4 | 2022 | 65 | 41,460 | 15.68 | 52 | 41,301 | 12.59 |
| 5 | 2023 | 21 | 30,643 | 6.85 | 26 | 51,253 | 5.07 |
| | **Average** | | | **13.16** | | | **9.04** |

Table 2 shows that the mean annual prevalence rate was 13.16 cases per 10,000 among males and 9.04 per 10,000 among females. The highest male rate was recorded in 2020 at 18.02 per 10,000, while the lowest was recorded in 2023 at 6.85 per 10,000. Among females, the highest rate was 12.59 per 10,000 in 2022 and the lowest was 5.07 per 10,000 in 2023. These findings describe recorded diagnoses in the study facilities without establishing changes in risk or causes of the annual variation. The pooled comparison indicated a statistically significant association between gender and recorded diabetes status, $\chi^2 = 32.15$, $p < .001$. This association describes differences in recorded diagnoses within the selected facilities and does not establish causation.

Table 3: **Prevalence of Diabetes Mellitus by Educational Level (2019-2023) (N = 354)**

| | | **Formal Education** | | | **Informal Education** | | |
|---|---|---|---|---|---|---|---|
| **S/N** | **Year** | **Diagnosed Patients** | **Population** | **Prevalence Rate (per 10,000)** | **Diagnosed Patients** | **Population** | **Prevalence Rate (per 10,000)** |
| 1 | 2019 | 72 | 53,617 | 13.43 | 8 | 22,979 | 3.48 |
| 2 | 2020 | 28 | 14,732 | 19.01 | 0 | 4,910 | 0.00 |
| 3 | 2021 | 81 | 60,740 | 13.34 | 1 | 15,185 | 0.66 |
| 4 | 2022 | 115 | 66,209 | 17.37 | 2 | 16,552 | 1.21 |
| 5 | 2023 | 41 | 61,422 | 6.68 | 6 | 20,474 | 2.93 |
| | **Average** | | | **13.27** | | | **1.66** |

Table 3 shows higher recorded diabetes prevalence among patient records classified as having formal education than among those classified as having informal education during each study year. The mean annual rates were 13.27 and 1.66 cases per 10,000, respectively. The pooled comparison was statistically significant, $\chi^2 = 28.39$, $p < .001$. These facility-based differences may reflect variation in healthcare use, screening, documentation, or category classification.

## Discussion

The annual rate of recorded diabetes diagnoses fluctuated from 5.7 to 14.3 cases per 10,000 patient records. Direct comparison with national or global population prevalence estimates is limited because this study used facility-attendance records, included only documented diagnoses, and expressed prevalence per 10,000 attendances rather than as the proportion of unique community residents with diabetes (Atun et al., 2017; Uloko et al., 2018; Sun et al., 2022). The unusually small denominator in 2020 and possible changes in attendance, screening, diagnostic practice, and record completeness may have affected the annual rates (Atun et al., 2017; American Diabetes Association, 2020). Consequently, the apparent increases and decreases should be interpreted as variation in recorded facility diagnoses rather than evidence of changes in community incidence or lifestyle risk.

Male patient records had a higher mean annual rate of recorded diabetes diagnoses than female patient records, at 13.16 versus 9.04 cases per 10,000. This direction is consistent with studies reporting sex-related differences in diabetes prevalence (Ciarambino et al., 2022; Kautzky-Willer et al., 2023; Sujata & Thakur, 2021), but the present data cannot identify the biological, behavioural, or healthcare-access mechanisms responsible for the difference. The finding should therefore be interpreted as an association within the selected facilities, subject to possible differences in attendance, screening, age distribution, and record completeness between males and females.

The higher recorded prevalence among patients with formal education may reflect a combination of underlying diabetes burden, healthcare-seeking behaviour, screening opportunity, socioeconomic circumstances, and the completeness with which education was documented (Bartolini et al., 2020; Seiglie et al., 2020; Steele et al., 2017;). Although studies from low- and middle-income countries have reported complex relationships between education, wealth, body mass index, and diabetes (Seiglie et al., 2020), the present retrospective data did not measure these explanatory factors. The very low rates among patients with informal education, including no recorded cases in 2020, may indicate underdiagnosis, limited facility use, small numbers, or classification problems rather than a genuinely protective effect (Atun et al., 2017; Seiglie et al., 2020). The result should therefore be presented as a facility-based association that requires further investigation.

The findings represent diagnosed cases recorded in the selected healthcare facilities and should not be interpreted as community-wide prevalence. Differences in patient attendance, screening practices, record completeness, and healthcare access across years may have influenced the observed rates. The unusually low attendance in 2020 and the decline in diagnosed cases in 2023 may therefore reflect service-use or recording changes rather than true reductions in diabetes occurrence. Because the study used retrospective records, unmeasured factors could not be controlled.

## Conclusion

Among patient records from the selected healthcare facilities in Ikwerre LGA between 2019 and 2023, 354 documented diabetes diagnoses were identified among 336,820 records, giving an overall period prevalence of 10.5 per 10,000. Annual rates fluctuated, with the highest recorded rate in 2020 and the lowest in 2023. These changes cannot be interpreted as improvements or

deterioration in community diabetes control because attendance, screening, diagnostic practice, and record completeness may have varied across years. Higher recorded rates among males and among patients with formal education indicate facility-based differences that warrant further investigation rather than causal conclusions.

**Recommendations**

1. Healthcare providers need to adopt more rigorous screening protocols to identify at-risk individuals early, particularly in years with high prevalence rates
2. Continuous health education campaigns focused on diabetes risk factors, lifestyle modifications, and early detection strategies should be emphasized especially among the male folks

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