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Epidemiology, Burden, and Prevention of Diabetes Mellitus: A Narrative Review

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Abstract

Diabetes mellitus is a rapidly increasing non-communicable disease and a major global public health concern, particularly in low- and middle-income countries. This study aimed to synthesize current evidence on the epidemiology, burden, and prevention of diabetes mellitus, with emphasis on global trends and implications for Nigeria. A narrative review was conducted using literature from databases including PubMed, Scopus, and Google Scholar, alongside reports from international organizations such as the World Health Organization and the International Diabetes Federation.

Globally, an estimated 537 million adults were living with diabetes in 2021, with projections rising to 643 million by 2030 and 783 million by 2045. The burden is increasing disproportionately in Africa due to rapid urbanization, lifestyle transitions, weak health systems, and a high proportion of undiagnosed cases. In Nigeria, diabetes prevalence continues to rise, driven by unhealthy diets, physical inactivity, and increasing obesity rates, with significant clinical and economic consequences. Current evidence suggests that diabetes prevalence in Nigeria ranges from approximately 3.0% to over 5.9% among adults, with higher rates observed in urban populations.

Preventive strategies, including lifestyle modification, early screening, and effective disease management, are essential to reduce disease burden. Strengthening primary healthcare systems, improving access to essential medicines, and promoting multi-sectoral interventions are critical for effective control. Coordinated efforts at individual, community, and health system levels are required to improve outcomes and reduce long-term complications. Urgent prioritization of diabetes within national health policies and increased investment in preventive and primary healthcare services are essential to curb the rising burden and achieve sustainable health outcomes.

Keywords: Diabetes mellitus; Epidemiology; Burden; Prevention; Nigeria.

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Introduction

Diabetes mellitus is a chronic, non-communicable metabolic disorder characterized by persistent hyperglycaemia resulting from defects in insulin secretion, insulin action, or both (American Diabetes Association, 2023; World Health Organization, 2023). It represents one of the most significant global public health challenges of the 21st century due to its rapidly increasing prevalence, associated complications, and substantial socioeconomic burden (GBD 2021 Diabetes Collaborators, 2023; International Diabetes Federation, 2021). The major types of diabetes mellitus include type 1 diabetes, which is primarily autoimmune in origin; type 2 diabetes, which accounts for approximately 90–95% of all cases and

is strongly associated with lifestyle and genetic factors; and gestational diabetes, which occurs during pregnancy and increases the risk of future diabetes in both mother and child (American Diabetes Association, 2023).

Globally, the burden of diabetes mellitus has increased markedly over recent decades, driven largely by urbanization, population ageing, unhealthy dietary patterns, physical inactivity, and rising levels of overweight and obesity (International Diabetes Federation, 2021; World Health Organization, 2023). According to the International Diabetes Federation, an estimated 537 million adults (aged 20–79 years) were living with diabetes in 2021, and this number is projected to rise to 643 million by 2030 and 783 million by 2045 if current trends persist (International Diabetes Federation, 2021). Diabetes was also responsible for approximately 6.7 million deaths globally in 2021, highlighting its substantial contribution to global mortality (International Diabetes Federation, 2021). This growing burden is particularly pronounced in low- and middle-income countries, where health systems are often inadequately equipped to manage chronic non-communicable diseases (World Health Organization, 2023).

In Africa, the prevalence of diabetes mellitus is increasing rapidly, largely due to demographic transitions, urbanization, and changing lifestyle patterns (Atun et al., 2017; International Diabetes Federation, 2021). The region is projected to experience the highest proportional increase in diabetes prevalence globally by 2045. A significant proportion of cases in Africa remain undiagnosed, resulting in late presentation and a higher risk of complications such as cardiovascular diseases, neuropathy, nephropathy, and retinopathy (World Health Organization, 2023). Nigeria, the most populous country in Africa, is undergoing a similar epidemiological transition, with a rising burden of non-communicable diseases including diabetes mellitus (Adeloye et al., 2017; Uloko et al., 2018). Current evidence suggests that diabetes prevalence in Nigeria ranges from approximately 3.0% to 5.9% among adults, with higher rates observed in urban populations (Uloko et al., 2018). Despite this growing burden, awareness, screening, and effective management remain suboptimal in many parts of the country.

The consequences of diabetes mellitus extend beyond individual health outcomes to include substantial economic costs for individuals, families, and healthcare systems. Diabetes contributes significantly to disability-adjusted life years (DALYs) through both premature mortality and long-term disability (GBD 2021 Diabetes Collaborators, 2023). Clinically, poorly controlled diabetes leads to severe microvascular and macrovascular complications, which significantly reduce quality of life and increase healthcare utilization (World Health Organization, 2023). Economically, the cost of diabetes care – including medications, monitoring, and management of complications – places a considerable financial burden on households, particularly in low-resource settings where out-of-pocket expenditure is high (Bommer et al., 2017).

Given the rising magnitude and consequences of diabetes mellitus, there is an urgent need for comprehensive evidence to inform effective prevention and control strategies. This narrative review aims to synthesize existing literature on the epidemiology, burden, and prevention of diabetes mellitus, with a focus on global trends and implications for Nigeria. By integrating current evidence, this review seeks to provide insights that can guide public health policy, strengthen health systems, and improve clinical practice in addressing this growing public health challenge.

Methods

This study adopted a narrative review design to synthesize evidence on the epidemiology, burden, and prevention of diabetes mellitus from a global to Nigerian perspective. Literature was sourced from major electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar, alongside reports from the World Health Organization and the International Diabetes Federation.

Search terms included “diabetes mellitus,” “epidemiology,” “risk factors,” “burden,” “prevalence,” “prevention,” “Africa,” and “Nigeria,” combined using Boolean operators. The search was limited to studies published between 2015 and 2025, with relevant seminal studies included where necessary.

Eligible studies comprised peer-reviewed articles, systematic reviews, meta-analyses, and institutional reports addressing diabetes epidemiology, risk factors, burden, and prevention, with emphasis on low- and middle-income countries, particularly Africa and

Nigeria. Non-English articles, studies without full text, and those not relevant to the review scope were excluded.

Studies were screened for relevance and appraised based on methodological rigor and consistency of findings. Data were extracted and synthesized thematically, focusing on epidemiological patterns, risk factors, disease burden, screening, and prevention. Findings were presented using a narrative approach integrating descriptive summaries and critical analysis to highlight regional variations and key evidence gaps.

Epidemiology and Risk Factor Distribution

Diabetes mellitus is a multifactorial disease influenced by behavioural, genetic, and environmental determinants that shape its distribution across populations. Its epidemiology has shifted significantly in recent decades due to urbanization, demographic transitions, and lifestyle changes (International Diabetes Federation, 2021; World Health Organization, 2023). Type 2 diabetes mellitus accounts for approximately 90–95% of cases and is largely driven by modifiable risk factors (American Diabetes Association, 2023).

Key risk factors include unhealthy diets, physical inactivity, obesity, and harmful use of alcohol and tobacco (Guthold et al., 2018; World Health Organization, 2023). Genetic predisposition also contributes to disease risk, particularly among individuals with a family history of diabetes, with evidence suggesting increased susceptibility among populations of African descent (American Diabetes Association, 2023; International Diabetes Federation, 2021). These factors interact with socioeconomic conditions such as urbanization and limited access to healthcare, further increasing disease burden in low- and middle-income countries (Atun et al., 2017).

Globally, diabetes remains a major public health concern, with an estimated 537 million adults affected in 2021 and projections indicating a continued rise (International Diabetes Federation, 2021). In Africa, the burden is increasing rapidly, characterized by a high proportion of undiagnosed cases and weak health system capacity (World Health Organization, 2023). Nigeria reflects this trend, with prevalence estimates ranging from approximately 3% to 6%, higher in urban populations and driven by lifestyle transitions (Adeloye et al., 2017; Uloko et al., 2018).

A summary of diabetes prevalence and burden across global, regional, and national contexts is presented in Table 1.

Table 1: Summary of Diabetes Prevalence and Burden Across Regions

Region	**Estimated prevalence (%)**	**Number of cases**	**Key characteristics**	**Source**
Global	∼10.5%	537 million (2021)	High and increasing burden; ageing and urbanization	International Diabetes Federation (2021)
Africa	∼4–7%	∼24 million	High undiagnosed cases; rapid increase	International Diabetes Federation (2021); World Health Organization (2023)
Nigeria	∼3–6%	Varies	Higher in urban areas; underdiagnosis common	Uloko et al. (2018); Adeloye et al. (2017)

As shown in Table 1, diabetes prevalence varies across regions, with Africa and Nigeria experiencing a rapidly increasing burden alongside a high proportion of undiagnosed cases.

The consequences of diabetes are substantial. Poor glycaemic control leads to microvascular complications such as retinopathy, nephropathy, and neuropathy, as well as macrovascular complications including cardiovascular diseases and stroke (World Health Organization, 2023). These outcomes significantly increase morbidity, mortality, and reduce quality of life. Economically, diabetes imposes a considerable burden on individuals and healthcare systems, particularly in low-resource settings like Nigeria, where high out-of-pocket costs often result in catastrophic health expenditure (Bommer et al., 2017).

Screening and Preventive Strategies

Screening and preventive strategies are essential components in reducing the growing burden of diabetes mellitus, particularly in low- and middle-income countries where late diagnosis and poor disease outcomes are common. Effective interventions span across primary, secondary, and tertiary levels of prevention and require a comprehensive, population-based approach (World Health Organization, 2023).

Screening for diabetes mellitus aims to facilitate early detection of individuals with undiagnosed disease or those at high risk of developing the condition. Common screening methods include fasting plasma glucose (FPG), oral glucose tolerance test (OGTT), and glycated haemoglobin (HbA1c) measurements (American Diabetes Association, 2023). Current guidelines recommend routine screening for adults aged 35 years and above, as well as younger individuals with risk factors such as obesity, family history of diabetes, hypertension, and sedentary lifestyle (American Diabetes Association, 2023). In resource-limited settings such as Nigeria, risk-based screening approaches implemented at the primary healthcare level are often more feasible and cost-effective (World Health Organization, 2023).

Primary prevention focuses on reducing the incidence of diabetes by addressing modifiable risk factors. Lifestyle modification remains the cornerstone of primary prevention and includes adoption of healthy dietary practices, increased physical activity, maintenance of healthy body weight, and reduction of harmful alcohol consumption and tobacco use (American Diabetes Association, 2023; World Health Organization, 2023). Evidence consistently demonstrates that lifestyle interventions can significantly reduce progression from prediabetes to type 2 diabetes. Public health strategies such as community-based interventions, school health programs, and mass health education campaigns are essential for promoting sustainable behavioural change.

Secondary prevention involves early detection and prompt management of diabetes to prevent or delay complications. This includes regular screening of high-risk populations, timely initiation of pharmacological treatment, and continuous monitoring of blood glucose levels (American Diabetes Association, 2023). Patient education on self-management, adherence to medication, and lifestyle modification is critical for achieving optimal glycaemic control. In Nigeria, strengthening primary healthcare systems and integrating diabetes screening into routine health services are essential for improving early diagnosis and disease outcomes.

Tertiary prevention focuses on minimizing the impact of established diabetes through prevention of complications and improvement of quality of life. This includes comprehensive management of diabetes-related complications such as retinopathy, nephropathy, neuropathy, and cardiovascular diseases through regular clinical assessments, appropriate pharmacological therapy, and multidisciplinary care approaches (World Health Organization, 2023). Long-term follow-up, rehabilitation services, and patient support systems are also important components of tertiary prevention.

At the population level, preventive strategies should be reinforced through strong health policies and multisectoral collaboration. Interventions such as taxation of sugar-sweetened beverages, regulation of unhealthy food marketing, promotion of active urban design, and integration of non-communicable disease services into primary healthcare are critical for effective diabetes prevention (World Health Organization, 2023). In Nigeria, implementation of national non-communicable disease control strategies, expansion of awareness programs, and improved access to screening and treatment services are essential steps toward reducing the growing burden of diabetes mellitus.

Health System Interventions

Effective health system interventions are critical for addressing the growing burden of diabetes mellitus, particularly in low- and middle-income countries where healthcare systems often face significant constraints. A comprehensive and integrated approach that strengthens all components of the health system is required to improve prevention, early detection, treatment, and long-term management of diabetes (World Health Organization, 2023).

Strengthening primary healthcare systems remains one of the most effective strategies for diabetes control. As the first point of contact for most individuals, primary healthcare provides an opportunity for early detection, continuous care, and community-based interventions. Integrating diabetes services into primary healthcare can significantly improve access, particularly in underserved populations (World Health Organization, 2023).

Access to essential medicines and diagnostic tools remains a major challenge in many low-resource settings. Ensuring availability and affordability of insulin, oral hypoglycaemic agents, and diagnostic tools is fundamental for effective disease management (International Diabetes Federation, 2021).

Health workforce capacity building, robust health information systems, and sustainable financing mechanisms are also essential. Expanding health insurance coverage and strengthening universal health coverage frameworks can reduce financial barriers to care (World Health Organization, 2023).

Multisectoral collaboration is critical in addressing broader determinants. In Nigeria, strengthening health system capacity requires scaling up primary healthcare services, improving access to affordable care, enhancing workforce training, and integrating diabetes services into existing public health programs.

Discussion

This review demonstrates that diabetes mellitus in Nigeria is characterized by a rising prevalence, a substantial proportion of undiagnosed cases, and increasing exposure to modifiable risk factors such as unhealthy diets, physical inactivity, and obesity. These findings are consistent with national estimates reported by Uloko et al. (2018) and Adeloye et al. (2017), which indicate a growing burden of diabetes, particularly in urban populations. Similar trends have been observed across sub-Saharan Africa, where rapid urbanization and lifestyle transitions are accelerating the epidemiological shift toward non-communicable diseases (Atun et al., 2017). However, compared to high-income countries where structured screening and long-term management systems are well established, Nigeria continues to face substantial gaps in early detection, awareness, and continuity of care.

The predominance of type 2 diabetes mellitus and its strong association with behavioural risk factors observed in this review aligns with global evidence (International Diabetes Federation, 2021; World Health Organization, 2023). However, while high-income countries have implemented large-scale preventive interventions that have contributed to stabilization or slower increases in diabetes prevalence, many low- and middle-income countries – including Nigeria – are experiencing a more rapid rise. This divergence can be attributed to differences in health system capacity, policy implementation, and population-level preventive strategies. In particular, weak regulatory environments around food systems, urban planning, and health promotion contribute to sustained exposure to risk factors.

The magnitude of the global burden identified in this review, including over 537 million adults living with diabetes, is consistent with estimates from the Global Burden of Disease study (GBD 2021 Diabetes Collaborators, 2023). Nevertheless, variations in prevalence estimates across regions and within Nigeria reflect differences in diagnostic criteria, study design, and surveillance capacity. For example, studies relying on self-reported diagnoses may underestimate prevalence compared to those using biochemical measurements. This methodological heterogeneity highlights a critical gap in standardized data collection and underscores the need for nationally representative surveillance systems in Nigeria.

The clinical and economic consequences identified in this review are well documented in the literature (World Health Organization, 2023). However, their impact is disproportionately greater in low-resource settings. In Nigeria, the high prevalence of undiagnosed and poorly controlled diabetes contributes to increased rates of complications such as retinopathy, nephropathy, and cardiovascular diseases. At the same time, the predominance of out-of-pocket healthcare financing exacerbates the economic burden on households. In contrast, high-

income countries benefit from stronger health insurance systems and social protection mechanisms that mitigate the financial impact of long-term disease management.

This review further highlights that screening and preventive strategies – particularly lifestyle modification and early detection – are effective in reducing diabetes risk and complications. Evidence from high-income settings demonstrates that structured screening programs and community-based interventions improve early diagnosis and disease outcomes. However, in Nigeria, screening remains largely opportunistic rather than systematic, limiting its population-level impact. This gap reflects broader structural challenges, including limited primary healthcare capacity, inadequate workforce distribution, and insufficient integration of non-communicable disease services into routine care.

Health system interventions identified in this review, including strengthening primary healthcare, improving access to essential medicines, and enhancing workforce capacity, are consistent with global recommendations for non-communicable disease control (World Health Organization, 2023). Nonetheless, implementation remains uneven in Nigeria. Persistent challenges such as inadequate infrastructure, fragmented health information systems, and limited financing continue to constrain effective service delivery. Addressing these barriers requires sustained policy commitment, increased investment, and strengthened governance mechanisms to ensure effective implementation of national strategies.

Despite the comprehensive scope of this review, certain limitations should be acknowledged. As a narrative review, the study is inherently subject to selection bias and does not follow the standardized procedures of systematic reviews or meta-analyses. Additionally, heterogeneity in study designs, populations, and diagnostic criteria across included studies may limit comparability of findings. However, efforts were made to include recent, high-quality, and widely cited sources to enhance the reliability and relevance of the evidence synthesized.

Conclusion

Diabetes mellitus remains a significant and growing public health challenge, particularly in low- and middle-income countries such as Nigeria. Its increasing burden is driven by modifiable behavioural risk factors, demographic transitions, and rapid urbanization.

Marked disparities persist between high-income and resource-constrained settings in terms of prevention, early detection, and management. In Nigeria, these challenges are compounded by low awareness, limited screening coverage, weak health system capacity, and high out-of-pocket healthcare expenditure.

Addressing this burden requires integrated and sustained strategies that prioritize prevention, early diagnosis, and effective disease management. Strengthening primary healthcare systems, improving access to essential services, and implementing multisectoral interventions are critical.

Ultimately, sustained political commitment, increased investment in health systems, and context-specific, evidence-based interventions are essential to reduce the burden of diabetes and improve population health outcomes.

Limitations

This review has some limitations. As a narrative review, it is subject to selection bias due to the absence of a fully systematic search strategy. Additionally, heterogeneity in study designs, populations, and diagnostic criteria may limit comparability of findings. Much of the evidence, particularly in Nigeria, is derived from subnational or hospital-based studies, which may affect generalizability. Furthermore, reliance on secondary data sources, including reports from the World Health Organization and the International Diabetes Federation, may be influenced by data gaps and underdiagnosis in low-resource settings.

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