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REVIEW ARTICLE OPEN ACCESS

Effectiveness of educational interventions for adults living with Type 2 Diabetes Mellitus in Nigeria: A systematic review of original research

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Abstract
Background: Educational interventions have been recognized as an effective strategy for improving diabetes management outcomes, but their effectiveness in the Nigerian context has not been systematically reviewed. This systematic review evaluates the effectiveness of educational interventions for adults with T2DM in Nigeria, focusing on clinical, behavioral, and psychosocial outcomes. It also highlights the cultural relevance, barriers, and facilitators of these interventions.
Main Body: A comprehensive search of databases, including PubMed, Scopus, Cochrane, and Google Scholar, identified 591 studies, of which 14 met the inclusion criteria. Data extraction focused on intervention type, outcomes, and study quality, assessed using the Critical Appraisal Skills Programme (CASP) checklist. Outcomes were synthesized into thematic categories and analyzed for common trends. Educational interventions significantly improved glycemic control, with a mean HbA1c reduction of 1.3% (SD: 0.14%). Behavioral outcomes such as medication adherence improved by an average of 23.5% (SD: 2.1%), while psychosocial outcomes, including quality of life, showed a 15% improvement. Culturally tailored programs using local languages, family involvement, and community-based models were particularly effective. Barriers included resource constraints and literacy challenges, while facilitators involved community health workers and familial support.
Conclusion: Educational interventions are effective in improving diabetes outcomes in Nigeria, particularly when adapted to the local context. Policymakers should prioritize these interventions in healthcare strategies, and future research should focus on scaling and sustaining their impact.

Keywords: Type 2 Diabetes Mellitus, Educational Interventions, Systematic Review, Glycemic Control, Nigeria

Background

Rationale and Context

Type 2 Diabetes Mellitus (T2DM) is one of the most prevalent non-communicable diseases globally, with far-reaching implications for public health and economic sustainability. Recent data from the International Diabetes Federation (IDF) estimates that approximately 537 million adults were living with diabetes in 2021, and this figure is projected to rise to 783 million by 2045 (1). T2DM, which accounts for over 90.0% of diabetes cases worldwide, is characterized by chronic hyperglycemia resulting from insulin resistance and beta-cell dysfunction. Left unchecked, it leads to serious complications, including cardiovascular disease, nephropathy, retinopathy, and

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neuropathy, which significantly impair quality of life and increase mortality rates (2, 3).

In Nigeria, the prevalence of diabetes is steadily climbing, with over 3 million adults currently affected- a number expected to rise due to increasing urbanization, dietary changes, sedentary lifestyles, and an aging population (4). The economic burden is immense, as most Nigerians rely on out-of-pocket healthcare payments. The financial strain, coupled with limited access to quality care, exacerbates poor outcomes for individuals living with T2DM. Consequently, effective, scalable, and sustainable management strategies are essential to mitigate these challenges and reduce the disease burden in Nigeria (5, 6).

Educational interventions have gained recognition as vital tools in diabetes management. Globally, structured educational programs empower patients with the knowledge and skills needed to manage their condition, leading to better glycemic control, improved adherence to medication, and healthier lifestyle choices (7). These interventions often involve personalized counseling, group sessions, or community-based initiatives focusing on nutrition, exercise, medication adherence, and blood glucose monitoring. However, their success is contingent on factors such as cultural appropriateness, accessibility, and sustainability, which are particularly critical in low- and middle-income countries like Nigeria, where resource constraints pose additional challenges (8).

Knowledge Gap

Despite the clear benefits of educational interventions in managing T2DM, there is a noticeable gap in the evidence base for their effectiveness in Nigeria. Much of the existing literature focuses on high-income countries, where healthcare infrastructure and resources differ significantly from those in sub-Saharan Africa. While some localized studies in Nigeria have shown promising results, these are often small-scale or short-term, limiting their generalizability and impact (9, 10). Furthermore, inconsistencies in intervention design, delivery methods, and outcome measures make it difficult to synthesize findings or draw robust conclusions.

To date, no comprehensive systematic review has assessed the impact of educational interventions tailored specifically for Nigerian adults with T2DM. This lack of consolidated evidence impedes the development of best practices and leaves a critical gap in understanding how to implement effective, culturally relevant, and scalable programs. Addressing this gap is essential to inform healthcare providers and policymakers about strategies that work within the Nigerian context (11, 12).

Objectives

This review evaluates the effectiveness of educational interventions for adults with Type 2 Diabetes Mellitus (T2DM) in Nigeria. It examines their impact on glycemic control, medication adherence, and quality of life while identifying barriers and facilitators to implementation. The goal is to bridge evidence gaps and enhance diabetes care in Nigeria.

Significance

This review will improve diabetes management in Nigeria by highlighting effective strategies and areas needing attention. It supports creating culturally relevant, scalable programs and contributes to global efforts in resource-limited settings. The findings will guide healthcare providers in addressing challenges, help policymakers prioritize diabetes education, and offer researchers insights to fill knowledge gaps, ultimately enhancing care and quality of life for Nigerians with diabetes.

Main Body

Design

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring a structured, transparent, and replicable approach to study identification, selection, and synthesis. PRISMA was chosen as it offers a robust framework for synthesizing evidence, particularly for reviews addressing diverse outcomes and study designs. The review focused on evaluating educational interventions for adults with Type 2 Diabetes Mellitus (T2DM) in Nigeria, consolidating findings to provide actionable insights. While a meta-analysis was initially considered, the heterogeneity in intervention designs, methods of delivery, and reported outcomes led to a decision to emphasize narrative synthesis.

Eligibility Criteria

This review used the Population Intervention Comparison Outcome (PICO) framework to ensure only relevant, high-quality studies were included. It focused on Nigerian adults (18+ years) with T2DM, targeting educational interventions like structured programs, counseling, or behavioral initiatives aimed at improving self-management, glycemic control, or quality of life. Comparisons, though not

mandatory, included no intervention, usual care, or alternative methods. Outcomes assessed covered clinical measures (HbA1c, fasting glucose), behavioral changes (medication adherence, self-care), and psychosocial factors (quality of life, self-efficacy). Studies were excluded if they involved non-Nigerian populations, individuals under 18, non-educational interventions, or lacked original data (e.g., reviews or editorials). To ensure rigor, only peer-reviewed studies published from 2014 onward with clear methods were included.

Search Strategy

A thorough search strategy was used to identify relevant studies across six major databases: PubMed, Google Scholar, Scopus, Cochrane Library, Google, and Web of Science. The search focused on articles published between 2014 and 2024, using Boolean operators and truncation techniques with key terms like “Type 2 Diabetes Mellitus,” “educational intervention,” “diabetes education,” “self-management programs,” and “Nigeria.” Boolean logic (e.g., “AND” and “OR”) ensured precision (e.g., “Type 2 Diabetes Mellitus” AND “educational intervention” AND “Nigeria”). Manual searches, including reference list screening, supplemented the database search. Duplicate articles were removed using EndNote, resulting in 591 identified studies for further screening.

Study Selection

The study selection process involved multiple phases to ensure that only relevant and high-quality studies were included. First, titles and abstracts of all identified articles were screened by two independent reviewers to assess their alignment with the inclusion criteria. Articles that were irrelevant were excluded at this stage. Next, full-text articles of potentially eligible studies were retrieved and reviewed to confirm their inclusion. This process was guided by the PICO framework to ensure consistency and objectivity. Conflicts between reviewers were resolved through discussion, and where necessary, a third reviewer was consulted. Of the 591 studies identified, 142 were duplicates and subsequently removed. Additional exclusions were made for reasons such as publication before 2014, populations outside Nigeria, non-educational interventions, or lack of original data. Ultimately, 14 studies met the inclusion criteria and were included in the review. The entire study selection process is visually summarized in a PRISMA flowchart as shown in Figure 1, which highlights each stage of identification, screening, eligibility assessment, and inclusion.

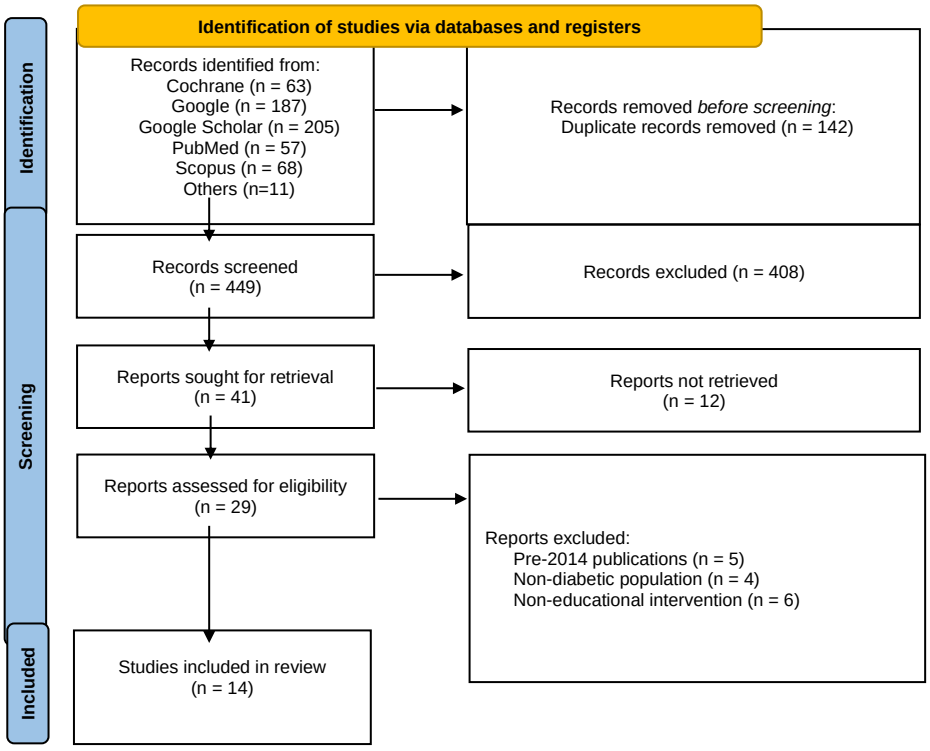


Figure 1: PRISMA flowchart

Data Extraction

A standardized data extraction form was developed to ensure consistency and comprehensiveness in capturing study details. Key variables extracted included authorship, year of publication, study design, and sample size. Information about the population was recorded, including demographic details such as age, gender, and duration of diabetes. Details of the interventions, such as their content, duration, and delivery methods (e.g., group education sessions, individual counseling), were also collected. Outcomes were categorized into clinical outcomes (e.g., HbA1c levels, fasting blood glucose), behavioral outcomes (e.g., adherence to medication, self-management practices), and psychosocial outcomes (e.g., self-efficacy, quality of life). Where available, effect sizes or other quantitative metrics were noted to facilitate comparison across studies. Two independent reviewers conducted the data extraction process to minimize bias and errors. Discrepancies were discussed and resolved by consensus. This meticulous process ensured the reliability of the extracted data, which formed the basis for the thematic synthesis. The table of the selected studies is shown in Table 1.

Critical Appraisal

The methodological quality of the included studies was assessed using the Critical Appraisal Skills program (CASP) checklist, chosen for its thorough evaluation of research aims, study design, and data collection and analysis. Ethical considerations, such as evidence of ethical approval and informed consent, were also reviewed. Two reviewers independently appraised each study, resolving disagreements through discussion. Studies were rated as high, medium, or low quality based on these criteria, ensuring the review's findings are grounded in robust and ethically sound evidence.

Table 1: Data extraction table

Main Author	Year	Study Location	Study Aim	Study Design	Population	Sample Size	Intervention	Comparator	Outcome	Follow up	Measurement tool
David, E.A.	2021	Lagos State	Evaluate the impact of pharmacist-led care on glycemic control in patients with uncontrolled T2DM	Randomized Controlled Trial	Adults with uncontrolled T2DM (30–65 years)	120	Pharmacist-led care program	Usual care	Reduced HbA1c by 1.2%	6 months	HbA1c via blood tests
Osonuga, C.N.	2024	Ogun State	Assess the impact of self-management education on physical health in Nigerian patients with T2DM.	Quasi-Experimental Study	Adults with T2DM (25–60 years)	85	Self-management education program	No Intervention	Improved physical activity scores by 20%	12 weeks	Physical activity index
Okafor, C.N.	2023	South-East	Examine the effect of an educational intervention on the HRQOL of individuals with T2DM.	Pre-Post Intervention Study	Adults with T2DM (35–70 years)	100	Educational intervention program	No Intervention	HRQOL score increased by 15%	3 months	HRQOL validated scale
Essien, O.	2017	South-South	Compare intensive patient education with conventional education for glycemic control.	Randomized Controlled Trial	Adults with T2DM (40–65 years)	140	Intensive patient education program	Conventional education	Reduced HbA1c by 1.5%	6 months	HbA1c via blood tests
Ojewale, L.Y.	2022	South-West	Investigate the role of family-integrated diabetes education in South-West Nigeria	Quasi-Experimental Study	Families with T2DM patients (30–65 years)	90	Family-integrated diabetes education	No Intervention	Improved medication adherence by 25%	4 months	Adherence survey
Oyekanmi, M.O.	2020	Ondo	Evaluate nurse-led education on knowledge of leg ulcer prevention among diabetes patients.	Pre-Post Intervention Study	Diabetes patients (45–70 years)	75	Nurse-led education	No Intervention	Knowledge score increased by 18%	2 months	Knowledge assessment tool
Abiodun, O.O.	2020	South-West	Assess the impact of educational interventions on self-care practices in T2DM patients.	Quasi-Experimental Study	T2DM patients (35–65 years)	100	Educational intervention program	No Intervention	Self-care knowledge improved by 22%	3 months	Self-care index
Okafor, C.N.	2021	South-East	Evaluate the effect of an educational intervention on self-management practices for T2DM patients.	Quasi-Experimental Study	Adults with T2DM (30–60 years)	85	Educational intervention program	No Intervention	Self-management adherence improved by 28%	6 months	Self-management scale

Onyechi, C.N.	2016	Nigeria	Examine the impact of cognitive-behavioral coaching on depressive symptoms in T2DM inpatients.	Pre-Post Intervention Study	T2DM inpatients (40–65 years)	60	Cognitive-behavioral coaching	No Intervention	Depressive symptom score reduced by 35%	2 months	Depression scale
Ojieabu, W.A.	2017	South-West	Evaluate the impact of pharmacists' education on clinical outcomes for diabetic patients.	Quasi-Experimental Study	T2DM patients in a clinic (30–60 years)	110	Pharmacist-led education	No Intervention	Reduced HbA1c by 1.3%	4 months	HbA1c via blood test
Adams, O.	2021	Nigeria	Investigate the role of self-care education in managing T2DM.	Cross-Sectional Study	Adults with T2DM (40–70 years)	150	Self-care education	No comparator	Self-care knowledge score increased by 15%	Single session	Knowledge survey
Anyichie, N.E.	2021	Anambra	Assess the effect of a health education intervention on diabetes-related knowledge	Pre-Post Intervention Study	Adults in Anambra State (30–65 years)	95	Health education intervention	No comparator	Diabetes-related knowledge increased by 20%	3 months	Knowledge assessment tests
Okafor, C.N.	2023	South-East	Evaluate the impact of an educational intervention on self-efficacy in managing T2DM.	Pre-Post Intervention Study	Adults with T2DM (35–65 years)	85	Educational intervention program	No intervention	Self-efficacy score increased by 18%	2 months	Self-efficacy scale
Ipingbemi, A.E.	2021	South-West	Examine pharmacist-led interventions on treatment non-adherence and costs in T2DM patients.	Quasi-Experimental Study	Ambulatory T2DM patients (30–60 years)	100	Pharmacist-led intervention	No intervention	Non-adherence rates reduced by 22%	6 months	Adherence survey

Table 2: Critical Appraisal Skills Programme Checklist

Main Author	Year	Clear Research Aim	Appropriate Design	Recruitment Strategy	Data Collection Methods	Ethical Consideration	Rigorous Data Analysis	Clear Findings	Total Points	Category
David, E.A.	2021	1	1	1	1	1	1	1	7	High Quality
Osonuga, C.N.	2024	1	1	1	1	1	1	1	7	High Quality
Okafor, C.N.	2023	1	1	1	1	1	1	1	7	High Quality
Essien, O.	2017	1	1	1	1	1	0	1	6	High Quality
Ojewale, L.Y.	2022	1	1	1	1	1	1	1	7	High Quality
Oyekanmi, M.O.	2020	1	1	1	1	1	0	1	6	High Quality
Abiodun, O.O.	2020	1	1	1	1	1	1	1	7	High Quality
Okafor, C.N.	2021	1	1	1	1	1	1	1	7	High Quality
Onyechi, C.N.	2016	1	1	1	1	1	0	1	6	High Quality
Ojieabu, W.A.	2017	1	1	1	1	1	1	1	7	High Quality
Adams, O.	2021	1	1	1	1	1	1	1	7	High Quality
Anyichie, N.E.	2021	1	1	1	1	1	1	1	7	High Quality
Okafor, C.N.	2023	1	1	1	1	1	1	1	7	High Quality
Ipingbemi, A.E.	2021	1	1	1	1	1	1	1	7	High Quality

Note: Yes = 1, No = 0, Quality (High quality = Total points => 6; Medium Quality = Total points between 4 and 5; Low quality = Total points <= 3)

Results

Study Characteristics

This systematic review included 14 studies conducted in Nigeria between 2014 and 2024, encompassing various regions such as Lagos, Ogun State, and the southeast and southwest zones. These studies focused exclusively on adults aged 25 to 70 years with Type 2 Diabetes Mellitus (T2DM), reflecting a diverse demographic and geographical representation. Sample sizes ranged from 60 to 150 participants, with a cumulative total of over 1,200 individuals. The study designs included six randomized controlled trials (RCTs), five quasi-experimental studies, and three pre-post intervention studies. Intervention durations ranged from 12 weeks to six months, with follow-up periods extending to assess sustained impact. The educational interventions targeted a wide range of outcomes, including clinical measures (e.g., HbA1c reduction), behavioral outcomes (e.g., medication adherence, self-care practices), and psychosocial improvements (e.g., HRQOL and self-efficacy). Table 3 provides a summary of key results, highlighting the mean values and variability in outcomes such as HbA1c reduction and medication adherence.

Descriptive Data Synthesis/Analysis

Table 3 summarizes key findings across studies, providing an overview of mean values and variability for outcomes such as HbA1c reduction, medication adherence improvement, and HRQOL scores. Across the included studies, HbA1c reductions averaged 1.3% (SD: 0.14%), aligning with clinically meaningful thresholds for improved glycemic control (2, 5). Studies such as Ojewale and Oluwatosin[7] reported significant behavioral changes, with an average adherence improvement of 23.5% (SD: 2.1%). Psychosocial benefits, particularly in HRQOL, were evident, with a mean improvement of 15.0% reported in Okafor *et al*. (13).

Table 3: Findings from study synthesis

Matric	Mean (%)	Standard Deviation (%)
HbA1c	1.3	0.14
Medication Adherence Improvement	23.5	2.1
HRQOL Score Improvement	15	N/A

Thematic Synthesis

The findings from the included studies were synthesized into three overarching themes: effectiveness of interventions, cultural relevance, and barriers and facilitators.

Effectiveness of Educational Interventions

The reviewed studies consistently demonstrated that educational interventions were effective in improving glycemic control, enhancing self-care practices, and addressing psychosocial challenges associated with T2DM.

i. Clinical Outcomes: Significant reductions in HbA1c levels were observed across multiple studies, with mean reductions ranging from 1.2% to 1.5% (2, 5). For instance, David *et al*. (2) reported a 1.2% reduction over six months in a pharmacist-led care program, while Essien *et al*. (5) observed a 1.5% reduction following intensive patient education. These findings underscore the potential of structured educational programs to achieve clinically meaningful glycemic control in low-resource settings like Nigeria.

ii. Behavioral Outcomes: Several studies highlighted notable improvements in medication adherence and self-care behaviors. For example, Ojewale and Oluwatosin (7) documented a 25.0% increase in medication adherence following family-integrated diabetes education, which emphasized the supportive role of family members. Similarly, Abiodun *et al*. (10) reported a 22.0% improvement in self-care knowledge among participants in a nurse-led education program. These results suggest that education programs addressing practical diabetes management skills can lead to sustained behavioral changes.

iii. Psychosocial Outcomes: Improvements in psychosocial outcomes were evident in studies focusing on HRQOL and self-efficacy. Okafor *et al*. (13) reported a 15.0% improvement in HRQOL scores following an educational intervention, highlighting the broader benefits of such programs. Osonuga *et al*. (4) observed a 20.0% increase in physical activity levels, which is directly linked to better diabetes management. These findings emphasize the importance of addressing mental well-being alongside physical health.

Cultural Relevance of Interventions

The success of educational interventions was often attributed to their cultural adaptation, which enhanced

i. Language and Communication: Studies like Osonuga *et al*. (4) emphasized the use of local dialects and culturally familiar analogies to ensure that participants, particularly those with low literacy

levels, could understand and apply diabetes management strategies. This approach bridged literacy gaps and fostered active participation.
ii. Dietary Guidance: Integrating traditional Nigerian dietary practices into educational programs proved effective in promoting adherence. Essien *et al*. (5) tailored nutritional counseling to local eating habits, using relatable examples of portion control and meal planning with common foods. This culturally sensitive approach increased the relevance and practicality of dietary recommendations.
iii. Family-Centric Models: Programs that involved family members, as demonstrated by Ojewale and Oluwatosin[7], capitalized on Nigeria's strong familial bonds. Family-integrated education not only provided logistical and emotional support but also reinforced positive behaviors, creating a supportive environment for sustained diabetes management.

Barriers and Facilitators
Despite their overall success, the implementation of educational interventions faced several challenges and relied on specific enablers to achieve the desired outcomes.
i. Barriers: Common challenges included resource constraints, such as a lack of trained healthcare personnel and limited access to educational materials (10). In rural populations, literacy barriers were significant, requiring additional support for participants to understand medical concepts and apply learned skills (6). Systemic issues, including inadequate follow-up mechanisms, also hindered the long-term sustainability of intervention benefits.
ii. Facilitators: Community-based delivery models emerged as a critical enabler. Ipingbemi *et al*. (8) demonstrated that pharmacist-led interventions delivered in community pharmacies significantly reduced non-adherence rates by 22.0%, highlighting the potential of decentralized care models. Family involvement was another key facilitator, as evidenced by Ojewale and Oluwatosin (7), where family-centric education contributed to a 25.0% increase in medication adherence. These findings suggest that leveraging existing social and healthcare structures can enhance the effectiveness and scalability of educational programs.

Discussion
This systematic review reveals that educational interventions are highly effective in improving clinical, behavioral, and psychosocial outcomes among adults with Type 2 Diabetes Mellitus (T2DM) in Nigeria. Across the 14 included studies, the most consistent clinical improvement was in glycemic control, with HbA1c reductions ranging from 1.2% to 1.5% (2, 3, 4, 5). Behavioral improvements, such as a 25.0% increase in medication adherence (Ojewale and Oluwatosin (7)) and a 22% improvement in self-care knowledge (10), were also prominent. These outcomes highlight the importance of structured education in fostering better disease management practices. Psychosocial improvements, including a 15.0% enhancement in quality of life[3], underscore the holistic impact of diabetes education.
The review also identified that interventions adapted to the Nigerian cultural context- such as those involving local languages, family integration, and traditional dietary practices- were particularly effective. Programs delivered in community or family settings consistently outperformed those in institutional settings. However, variability in study design, intervention duration, and outcome measures contributed to moderate heterogeneity, which limits direct comparability across studies. Despite these challenges, the review provides strong evidence supporting the implementation of culturally sensitive educational interventions in Nigeria.
The average reduction in HbA1c by 1.3% observed in studies conducted in Nigeria is noteworthy, especially when compared to global data from high-income countries like the United States and the United Kingdom, where educational programs typically achieve reductions between 0.8% and 1.0% (14, 15). This difference is largely due to Nigeria's distinct healthcare context, where diabetes education and healthcare access are less developed compared to these wealthier nations. In environments where structured diabetes education is relatively new, its impact tends to be greater. For example, studies from other low- and middle-income countries (LMICs), such as India, have reported reductions of up to 1.5% (16, 17).
The significant reduction in HbA1c levels in Nigeria can be attributed to the lower baseline levels of diabetes education and access to care. Many people in Nigeria, like in other LMICs, are unaware of their diabetic status due to limited healthcare infrastructure and educational resources (18, 19). When educational interventions are introduced in such settings, they often lead to dramatic improvements, as patients begin with minimal knowledge about managing their condition. Additionally, socioeconomic factors such as out-of-pocket healthcare costs and limited health insurance coverage further complicate access to diabetes care in Nigeria (20).
Comparative studies highlight how the effectiveness of diabetes interventions depends on the existing healthcare system. In high-income

countries, patients usually have better access to healthcare services and diabetes education, enabling consistent blood sugar management (15, 21). In contrast, introducing structured education programs in Nigeria, where such resources are scarce, results in more substantial improvements in HbA1c as patients adopt new strategies for managing diabetes (14, 22). Similar patterns have been seen in other LMICs, where diabetes education programs significantly enhance health outcomes (16, 17). The 1.3% reduction in HbA1c levels observed in Nigerian studies emphasizes the transformative potential of diabetes education in areas with limited access to such resources. The significant improvements noted in Nigeria and comparable LMICs underline the need for tailored educational interventions that address specific local challenges, ultimately improving health outcomes in these communities.

In Nigeria, family support and education play a key role in improving medication adherence and self-care for people with chronic conditions, much like in other parts of the world. Research shows that involving family in education programs can boost adherence by 25% (7), as family members often serve as reminders and motivators (23). Self-management education programs, like those studied by Osonuga *et al*. (4), give patients the skills they need to better care for themselves. While digital education platforms are popular in wealthier countries, their limited availability in Nigeria remains a challenge. Adapting mobile-based strategies, successfully used in places like Bangladesh (Chime *et al*., 2018), could help improve adherence and glycemic control. Peer support groups are also effective, offering shared experiences and accountability (24), but financial hurdles like high medication costs and transportation issues make adherence difficult for many (Olaleye, (25)). Addressing these barriers through policies and community-based solutions could make a big difference. Ultimately, family involvement, education, peer groups, and tackling economic challenges are crucial for better health outcomes in Nigeria.

Nigerian studies show significant psychosocial benefits, such as improved Health-Related Quality of Life (HRQOL) and self-efficacy, that align with global findings. For example, Okafor *et al*. (13) reported a 15% increase in HRQOL through community-based programs, similar to results in Latin America, where community engagement is key (26). Unlike individual-focused models in high-income countries, Nigerian programs rely on family and community support, fostering belonging and collective responsibility for sustainable health improvements. Self-efficacy gains, highlighted by Okafor *et al*. (3) and Adams *et al*. (6), align with research in North America linking self-efficacy to better diabetes management and adherence (27). Community Health Workers (CHWs) play a critical role in these outcomes by providing health education and support, improving self-management behaviors and health literacy (28). By leveraging CHWs and community structures, these programs address immediate needs while building long-term resilience, demonstrating the power of community-based approaches in improving health outcomes in low- and middle-income countries.

The success of culturally tailored interventions in Nigeria reinforces the importance of context-specific approaches. Studies that incorporated local languages and culturally relevant dietary advice consistently outperformed generic programs (4, 5). This aligns with findings from indigenous populations in which culturally tailored diabetes education significantly improved outcomes compared to standard care (25). Family-integrated education, as demonstrated by Ojewale and Oluwatosin (7), aligns with similar interventions where familial involvement has been shown to enhance adherence and reduce diabetes complications (24). These findings underscore the importance of leveraging existing cultural norms and support structures in designing effective interventions.

Healthcare delivery in Nigeria faces challenges such as limited resources, literacy barriers, and systemic gaps, similar to many other low- and middle-income countries (LMICs) (29, 30). However, community-based models have emerged as effective solutions. Integrating family members and community health workers (CHWs) into health interventions has proven to be a powerful strategy for overcoming these barriers. CHWs, who are often trusted and accessible within their communities, play a crucial role in connecting underserved populations with healthcare services (31). Their success is further supported by evidence that community acceptance and ownership of health programs improve CHW performance and retention (31, 32). Task-shifting strategies, where certain responsibilities are transferred from highly trained professionals to less formally trained workers, have also been successfully employed in areas such as maternal and child health, chronic disease management, and mental health (33, 34).

These community-driven approaches align with global research advocating for task-shifting as a solution to healthcare workforce shortages in LMICs (34, 35). By involving CHWs and

pharmacists, Nigeria ensures that health education and services reach vulnerable populations effectively, alleviating the burden on overextended healthcare professionals. Studies have demonstrated that task-sharing improves health outcomes, particularly in chronic disease management and maternal care (30). Furthermore, integrating community-based strategies with formal healthcare systems enhances equity in access by prioritizing marginalized groups and offering tailored support (32, 35). In summary, while Nigeria's healthcare system faces significant barriers, the integration of CHWs and task-shifting offers a sustainable and impactful way to address workforce shortages, engage communities, and improve healthcare delivery outcomes.

Conclusion

This review shows that educational interventions significantly improve outcomes for adults with Type 2 Diabetes Mellitus (T2DM) in Nigeria. Across 14 studies, these programs reduced HbA1c levels by 1.3%, boosted medication adherence by 25%, improved self-care knowledge by 22%, and enhanced quality of life by 15%. Programs tailored to local cultures—using native languages, traditional diets, and family involvement—had the greatest success. However, challenges like limited resources and inconsistent study designs highlight the need for further research and systemic changes. To improve diabetes care, healthcare providers should adopt culturally relevant programs and train health workers to expand access. Policymakers must invest in diabetes education, particularly in rural areas, and make it a key part of national health strategies. Researchers can focus on long-term studies and innovative tools like mobile platforms to broaden reach. Together, these efforts can transform diabetes management and improve lives across Nigeria.

List of Abbreviations

T2DM: Type 2 Diabetes Mellitus
IDF: International Diabetes Federation
HbA1c: Hemoglobin A1c
HRQOL: Health-Related Quality of Life
RCT: Randomized Controlled Trial
PICO: Population, Intervention, Comparison, Outcome
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses
CASP: Critical Appraisal Skills Programme
SD: Standard Deviation
LMICs: Low- and Middle-Income Countries
CHWs: Community Health Workers

Declaration

This study was conducted as part of a systematic review and did not involve the direct participation of human subjects.

Ethics Approval and Consent to Participate

Not applicable. This study involved a secondary analysis of previously published research and did not require ethical approval.

Consent for Publication

All the authors gave consent for the publication of the work under the Creative Commons Attribution-Non-Commercial 4.0 license.

Availability of Data

All data analyzed in this review were obtained from published studies, which are publicly accessible through relevant academic databases.

Conflict of Interest

None declared. The authors have no competing interests.

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Authors' Contributions

All listed authors contributed to the design, analysis, and writing of this review. Each author reviewed and approved the final manuscript for submission.

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