



Innovations in Diabetic Education: A Synthesis of Contemporary Evidence and Practice Gaps in Nigeria and Beyond.

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Abstract

Background: Diabetes mellitus (DM) is providing an increasing burden on global population health, in low- and middle-income settings. In Nigeria, there is under-developed primary health care (PHC) systems, uneven health literacy levels, and provision of structured and effective diabetic education is disparate and restricted.

Aim: Studying the role of innovative educational tools in diabetes management, and specifically targeting nurse-led care, technology-based learning, and community-based monitoring.

Method: The was a synthesis of modern scientific literature published in the period between 2010 and 2024. With the PRISMA 2020 scheme, the study was able to examine 42 peer-reviewed articles using various databases, such as PubMed, Scopus, Web of Science, AJOL, and Google Scholar.

Results: Nurse-led diabetes self-management education significantly improves glycaemic and behavioural outcomes, reducing HbA1c by about 0.9 percentage points at 4–6 months and 0.5 percentage points beyond 6 months, while increasing self-efficacy and self-care behaviours. When digital tools such as mobile apps, telehealth and connected platforms are integrated into these nurse-led programmes, additional mean HbA1c reductions of around 0.25–0.44 percentage points are achieved.

Conclusion: The paper iterates that these innovations display measurable value, and their viability, as well as scalability, will depend on the systemic reforms, employee investment, and policy consistency. Suggestions are made with the aim of providing information on further programming design, as well as helping institutionalize effective diabetic education into the wider health system framework in Nigeria.

Keywords: Diabetes mellitus, self-management, nurse-led education, Kaduna, innovations, primary healthcare

1. Introduction

Diabetes mellitus (DM), especially type 2 diabetes (T2DM) remains a serious non-communicable disease (NCD) burden in most parts of the world occurring in both low and high socio-economic settings. As per the report of International Diabetes Federation (IDF, 2021), an estimated number of 537 million adults had diabetes in 2021 with the number further increasing to 783 million by 2045 (Sun et al., 2022). This increasing prevalence is also not limited to the developed countries and more than 80 percent of existing cases are reported in low- and middle-income countries (LMICs), in which it is common to have poorly equipped health systems due to limited resources to deal with chronic illnesses management (World Health Organization [WHO], 2016) (Maki & Zervos, 2021). The increase in Africa has specifically been steep, with the number of adults living with diabetes projected to rise twice by the year 2045, mostly because of urbanization, changes in dietary habits, lack of physical activity and ageing populations (IDF, 2021). The African largest population Nigeria, is an example of this epidemiological transition. Surveys on a national scale identify the prevalence rates as 2.1-10.0% in different studies (Uloko et al., 2018). The study that was done in Kaduna State revealed a prevalence of diabetes of 6.53%, and was especially low in the levels of awareness and adherence to treatments (Anyanti et al., 2021). Diabetes education is also one of the main keys to health improvements, regardless of whether the prevalence of the given disease is high. A study has revealed that patient-centered education allows remarkably improving glycemic control, self-care practices, and the quality of life (AlHaqwi et al., 2023). Diabetes education in most parts of Nigeria is, however, unstructured, sporadic and regularly hampered by shortages of personnel, deficient policy framework and a lack of coordination with primary healthcare protocols (Iregbu et al., 2023). Nurse education in their turn, though being known to be the most affordable and culturally adaptive worldwide, has not been fully exploited within the PHCs of Nigeria (Enebeli et al., 2024). The latest issues of technological development, like mobile health (mHealth), SMS-based reminders, and digital literacy environments, have been experimentally implemented in some regions of the country yet are exposed to impediments, such as insufficient digital infrastructures, inadequate training of user-participants, and absent policies (Chioma Anthonia Okolo et al., 2024). Such community-based health education programs as those

involving trained community health workers have been locally successful, but not mainstreamed or scaled (Carson et al., 2022).

Thus, although it is a well-established fact that education efforts are part and parcel of diabetes prevention and management, the delivery models in Nigeria are yet to embrace evidence-based innovations fully. The paper thus aims to: (1) find out about the status of diabetic education in Nigeria; (2) discover recent innovative practices on a national and international level and (3) evaluate the current gaps and barriers to implementation at the primary health care and health system reform context.

2. Methodology

A narrative synthesis methodology was used in this study to conduct and synthesize the research evidence on diabetes education innovations carried out in 2010-2024. The PRISMA 2020 framework of Preferred reporting items of Systematic Reviews and Meta-analysis informed the methodology, including the concepts that guided their review design, search strategy, inclusion criteria, and screening process that informed the structure of synthesis (Page et al., 2021). The selection of the narrative synthesis was relevant because the approaches to research and research designs, range of interventions, and assessment of outcomes were heterogeneous in the selected studies. The five main scholarly databases involved in the literature search included PubMed, Scopus, Web of Science, African Journals Online (AJOL) and Google Scholar. These platforms were chosen so that it could cover the global market and be of relevance regionally. The usage of a mixture of both Medical Subject Headings (MeSH) and free text wordings like: “diabetes mellitus”, “type 2 diabetes”, “diabetes education”, “self-management”, “primary health care”, “nurse-led intervention” and “Nigeria” carried out the search. To narrow the recruitment, the Boolean operators were used, and filters indicated that the articles should be peer-reviewed and published in English during the period between January 2010 and March 2024. The Population (or Patient/Problem), Intervention, Comparison (or Control), and Outcome. (PICO) framework was used to define the eligibility criteria. Studies found were required to fulfill the following criteria: (1) The study investigated an educational intervention to increase knowledge about diabetes, self-care or treatment adherence; (2) The study was carried out in the setting of primary health care or community settings; (3) The study was reported empirically arranged, that is, provided

quantitative, qualitative, or mixed findings; and (4) The study had taken place in Africa or other low- and middle- income countries, with similar structural conditions inclined to Nigeria. Editorials, commentaries, letters, theses, abstracts of conferences without full texts, and articles, which solely reported on pharmacological or surgical interventions and lacked an educational aspect were also excluded. Dual screening procedure was put in place. Initially, two researchers reviewed title and abstract of all noticed citations independently to identify possible relevancy. The second phase involved retrieval of full texts on all the studies that were eligible or unclear at the initial phase. Cases where reviewers disagreed were solved by the use of consensus. It was necessary to obtain a standardized data extraction form with the key information in terms of the study design, the population demographics of the study, specifications of the intervention, outcome measures of the study and the method's quality.

The results were analyzed and interpreted using narrative synthesis in order to take account of the variation in study design and outcome variables. They were integrated into four thematic areas (i) nurse-led education, (ii) technology-assisted learning, (iii) community-based participation, and (iv) policy-level intervention. To evaluate the contribution of each study to these themes, methodological strengths and weaknesses were critically evaluated. Assessment of the quality of studies included was then conducted with the use of standard tools of the respective research designs. In observational studies, the Newcastle-Ottawa Scale (NOS) was used that contains the criteria of selection, comparability, and examination of outcomes (Gualdi-Russo & Zaccagni, 2026). In case of randomized controlled trials (RCTs), bias was assessed through Cochrane Risk of Bias 2.0, and domains considered include randomization process, selective reporting, and outcome measurement (Mickenausch & Yengopal, 2024). Studies that had low scores of methodological quality were not included in synthesis. The number of studies that met the exclusion criteria amounted to 42. The findings that will be produced in the process become the analytical basis of this paper.

3. Results and Synthesis

3.1 Nurse-Led Education and Self-Management

The educational interventions directed by nurses turned out to be one of the most stable and efficacious models of enhancing diabetic outcomes both in clinics and in the community.

Experience in Kaduna State shows that a well-organized educational nursing interventions resulted in considerable results and showed improvement in the level of knowledge in patients regarding diabetes, their self-care habits, adherence to treatment, and glucose levels (Akuiyibo et al., 2022). Only 28.6 percent of patients had targeted blood glucose levels before intervention. More than 40% compliance was registered, especially type 2 diabetes patients newly diagnosed, following implementation of nurse-led program dealing with self-monitoring and diet counseling. These results are consistent with the investigations of the whole sub-Saharan region, as nurse-led paradigms have been shown to be important in encouraging adjustments in behavior and delivering long-term glycemic control in resource-limited settings (Azami et al., 2018). In addition, nurses played a primary role in continuity of care, often being the link between formal health providers and community-based systems of follow-ups. The greatest effects of these interventions were, however, seen in cases where the nurses were empowered by receiving regular training, institutional support, and standardized education materials.

3.2 Technological Innovations

Digital health technologies, i.e., mobile based platforms, have been increasingly used in diabetes education and management. The Nigeria Diabetes Online Platform has been used in Nigeria, which has made available an easy interface to deliver education specific to the disease, through the delivery of medication reminders via text message, and through peer-to-peer support groupings. These platforms are particularly effective in younger, tech-savvy patients, many of whom experience logistical and monetary constraints to their ability to attend periodic in-person appointments (Jacobs et al., 2022). Global and regional trials show that SMS-based mHealth interventions often increase medication adherence by about 10%–15% and clinic attendance by 5%–30%, with pooled effects corresponding to roughly 1.1–2.0-fold higher odds of adherence or attendance compared with usual care. Effects are not universal; some large trials find no benefit when baseline adherence is already high (Del Moral Trinidad et al., 2025). In Nigerian setting, the potential of telehealth and mobile-based monitoring is high however it is limited by the uneven access to the internet connection, unreliable mobile literacy, and lack of decentralized health information systems.

3.3 Community-Based Approaches

The health education programs through community-based strategies have shown good cultural relevance and localities especially on the part of underserved peri-urban and rural populations. Research has shown that community health workers (CHWs), community faith-based groups and school systems could be a potential mechanism of disseminating messages about diabetes prevention, nutrition education and physical activity encouragement. Group sessions and community theaters have been successfully adopted as a method to demystify diabetes symptoms and responded to the local myths about insulin administration within several communities of northern Nigeria (Chinenye & Ogbera, 2013). The contribution of such approaches is especially essential in closing the communication gaps between formal health care professionals and peoples covering low literacy or formal education levels. In low- and middle-income settings, including sub-Saharan Africa, CHW- and peer-led diabetes self-management education has often been associated with improved diabetes knowledge and domain-specific behavior changes (for example, increased diet and foot-care adherence scores from 3.91 to 5.06 and 5.07 to 5.80, respectively), although effects on blood glucose self-monitoring and overall self-care behaviors are inconsistent and frequently non-significant (Ageru et al., 2024). In Ghana, median diabetes self-management knowledge remains low at about 40%, with 88% of patients unaware of complications in one rural sample, underscoring substantial unmet needs for education and CHW-supported community care (Johnson et al., 2025). Nevertheless, the problem is that such programs are not sustainable if no financial support with capacity development and integration into national public health programs takes place.

3.4 Barriers and Gaps

Although the outcomes of various forms of interventions have been successful, there are several structural barriers inhibiting the total implementation and effects of new models of diabetic education in Nigeria. Specifically, in Kaduna State, the available resources lack basic protocols on diabetes management in 71.4 percent of the institutions, and less than 45 percent of institutions have usable glucometers or routine test strips (Abdulmalik et al., 2025). Coupled to these infrastructural shortages are a lack in human resources; less than half of those working in PHCs have reported having any type of structured education in management or diabetes training. Evidence indicates that health literacy regarding diabetes is suboptimal, especially in rural

populations, where a substantial proportion of patients have limited understanding or application of the links between diabetes, diet, and physical activity. For example, in rural South Africa only 25% of adults with diabetes adhered to dietary recommendations and 32% adhered to physical activity advice, despite higher knowledge being associated with better adherence (Cavanaugh, 2011). Similar rural studies report that as few as 11% of patients know about diabetic diets and only 5–15% consistently follow recommended dietary and lifestyle modifications, underscoring significant gaps in awareness and practice (Gebeyehu et al., 2022). Moreover, fragmentation in the service delivery is achieved by the absence of integrated national policies that could drive nurse-led interventions, mobile health integration, or community education. Until they invest in professional growth, systems of supervision, and monitoring, educational innovations will not be sustainable and scalable.

4. Discussion

In this review, we highlight the strategic values of work on diabetes education implemented by nurses, with use of technology and integration into the community, which is used in Nigeria and other similar health systems. Nurse-led models especially have shown to be very efficacious in enhancing patient adherence, glycemic, as long-term behavior changes. This is their strength since they are accessible, culturally familiar, and highly customizable care in settings of resource-limited health systems such as those in sub-Saharan Africa (Dailah, 2024). Equally, digital solutions, like self-management support via SMS-based and mobile-based apps, proved to be relatively or highly effective when it comes to follow-up care processes and health education. Nonetheless, these tools are proving to have their limitations, as Nigeria has a brittle digital health environment as well as gaps in digital literacy among patients and health personnel (Oke & Sibomana, 2025). As an example, patients residing in rural locations, elderly, and individuals with low levels of formal education tend to have difficulties navigating digital platforms, and the blended model of delivery, i.e. the combination of the in-person and technology-based approaches, is an option. The installation of community health workers (CHWs), religious leaders as well as peer educators through community-based strategies has also been instrumental in making diabetes education services available even to underserved populations. These forms of models work effectively to overcome the cultural and language barrier that normally exist in institutionalized health care.

Nonetheless, they will be sustainable only when incorporated into the policy of public health and recognized officially in health budget systems and training systems (Squires, 2018) . With these developments, overall growth and scalability are limited due to the factors inherent at the structure level: poor infrastructure, workforce deficiency, poor monitoring procedures, and inconsistent policy execution. Besides, the absence of national criteria of standardized diabetic education leads to discontinuous practices and decreases the possibility of cross-state results comparison (Sudhakaran & Surani, 2015) . Thus, new approaches can be potentially successful, but only in the case of system change in the Nigerian primary health care (PHC), such as institutionalization of nurse-led initiatives and fortification of intersectoral collaborations.

5. Recommendations

With reference to results, the subsequent recommendations are made to facilitate the sustainable development of diabetic education in Nigeria. The Nigerian government through the ministry of health should invest in better-equipped, privacy-ensuring primary health care facilities and formally adopt a nurse-led diabetes education model within national NCD policy. Diabetes education should be expanded through multilingual mobile/online platforms, especially for rural and peri-urban communities. Training for nurses and community health workers must cover health technology, adult learning, and culturally sensitive communication. Finally, national and regional authorities should regularly review, and update diabetes of education content, delivery methods, and materials based on new evidence and patient feedback.

6. Conclusion

The review of existing literature has shown that the advances in diabetes education in Nigeria—particularly nurse-led, community-based and, increasingly, digital approaches—have been shown to improve glycaemic control, self-management and quality of life when they are culturally adapted and delivered through primary care and communities. However, their impact remains fragmented and small-scale because of weak primary health-care infrastructure, workforce shortages, funding constraints, and poorly implemented or incoherent policies. For diabetes education to become a national asset rather than a collection of short-term projects, reforms are needed in three linked areas:

Integrated health-workforce development (especially training and continuous professional development for nurses and community health workers in diabetes care, adult learning, and culturally appropriate communication). Policy coherence and institutionalisation, embedding diabetes self-management education and support (DSMES) and nurse-led education explicitly into NCD policies, guidelines, curricula and accreditation systems so they are mandatory and funded, not optional add-ons. Primary health-care infrastructure and systems, including PHC facilities equipped for diabetes care, decision-support tools, and mechanisms for regular review and updating of educational content and delivery based on evidence and patient feedback.

Evidence from Nigeria and wider sub-Saharan Africa shows that when nurses are empowered as frontline educators and coordinators of diabetes care—with clear roles, training, and institutional support—patient outcomes improve and services become more accessible and cost-effective. Replacing isolated, donor-driven or project-based initiatives with scalable, nationally supported models integrated into PHC and NCD structures offers a realistic path toward a durable, equitable and context-specific diabetes education system for Nigerian communities

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