Evidence-Based Integration of Traditional Medicine in Nigeria: Translational Impacts on Healthcare Access, Quality, and Resilience

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Abstract. Traditional medicine remains the primary source of healthcare for an estimated 80% of Nigerians, yet unresolved issues of standardisation, safety, and clinical efficacy hinder its integration into the formal healthcare sector. This perspective synthesises current evidence and global best practices to outline a translational roadmap for incorporating validated traditional remedies into Nigeria's primary care system. We review methodological adaptations – ranging from pragmatic clinical trials to N-of-1 designs – that accommodate the multi-component nature of herbal formulations, and we highlight the regulatory reforms and practitioner-training programmes now being piloted by NAFDAC and allied institutions. Particular attention is given to infectious diseases: pharmacological and preclinical data for six widely used antimalarial and antibacterial plants are summarised, underscoring their relevance to drug-resistant malaria and typhoid. Digital innovations, including mobile health apps, knowledge repositories, and AI-driven phytochemical screening, are presented as catalysts for data capture, quality control, and accelerated drug discovery. By framing traditional medicine as a complementary resource rather than an alternative, the article argues that evidence-based integration can expand access, improve care quality, and strengthen system resilience – especially in underserved communities – while preserving indigenous knowledge and stimulating local biopharmaceutical innovation.

Keywords: Traditional medicine; Herbal medicine; evidence-based evaluation; health outcomes; Nigeria; Healthcare systems; Regulation

INTRODUCTION

Traditional medicine (TM) has long been an integral part of Nigerian healthcare, with deep cultural roots and widespread use across diverse communities. In rural and underserved areas, herbal remedies and indigenous therapies often serve as the first line of treatment for ailments ranging from malaria to mental health conditions. Despite this extensive utilisation, TM largely operates outside the formal health system, leading to gaps in safety oversight, standardisation, and collaboration with conventional medicine [1]. In recent years, a strategic push has been made to bridge this divide by rigorously evaluating traditional remedies and integrating proven therapies into primary healthcare. The Nigerian government's initiatives, such as establishing dedicated traditional medicine departments and developing regulatory frameworks through agencies like NAFDAC, reflect growing institutional support for this integration [2]. This perspective article focuses on the translational impact of integrating evidence-backed traditional medicine into Nigeria's healthcare system. In particular, it examines how current developments (including digital innovations and targeted research on infectious diseases) are enhancing healthcare access, quality, and resilience. By framing traditional medicine as a complementary resource to modern healthcare, we explore how Nigeria can leverage its rich medicinal heritage in a scientifically robust manner to improve public health outcomes.

RESULTS AND DISCUSSION

Current Challenges in Integrating Traditional Medicine. Integrating TM into mainstream healthcare in Nigeria presents numerous challenges. A key concern is the lack of rigorous quality control and standardisation of herbal products. Many remedies are prepared informally, resulting in variability in dosage and potency that can compromise safety and efficacy. Cases of contamination or adulteration, such as the presence of harmful additives or misidentified plant species, have been documented, highlighting the need for stricter quality assurance measures [3].

Another challenge is the limited documentation and preservation of traditional knowledge. Historically, traditional medical knowledge in Nigeria has been transmitted orally from one generation to the next, which risks losing valuable medical information as older healers pass away. The paucity of written records or databases makes it difficult for researchers and clinicians to verify claims, reproduce remedies, or build upon indigenous knowledge [1].

Moreover, traditional healers often work in parallel with the formal healthcare sector rather than in collaboration, resulting in fragmented care for patients who may simultaneously use both systems. This separation is exacerbated by scepticism from some biomedical practitioners regarding the efficacy of herbal treatments, as well as mistrust from traditional practitioners who fear appropriation or marginalisation [4]. Addressing these challenges is essential for any meaningful integration, requiring policy support, capacity building, and frameworks that protect intellectual property while promoting knowledge sharing.

Despite the hurdles, progress is being made. Nigeria has developed a National Herbal Pharmacopoeia that compiles information on commonly used medicinal plants, their phytochemical profiles, and safety data. Regulatory guidelines now exist for registering herbal products and mandating basic quality and toxicity evaluations before marketing. Research institutes, such as the Nigerian Institute for Pharmaceutical Research and Development (NIPRD), in collaboration with universities, are increasingly conducting pharmacological studies and clinical trials on traditional remedies [5].

These efforts, though nascent, signal a shift toward evidence-based validation of TM. By systematically addressing quality, safety, and efficacy, Nigeria aims to create an environment where traditional therapies can be prescribed with confidence by healthcare professionals or used in conjunction with conventional treatments. The next sections explore how leveraging modern innovations and prioritising health needs can accelerate the translational integration of traditional medicine.

Benefits of Standardising Traditional Medicine in Nigeria. Standardising and scientifically validating traditional medicine offers multiple benefits for Nigeria's healthcare system. Firstly, it can improve safety and quality of care. Establishing standardised preparations (e.g., fixed dosages, purified extracts) for popular herbal remedies helps ensure that patients receive consistent and contamination-free treatments. This reduces the risk of adverse effects and builds public trust. For

example, enforcing good manufacturing practices for herbal product manufacturers and requiring certification of herbal clinics have been suggested as ways to enhance safety. Secondly, standardisation facilitates the evaluation of clinical efficacy [3].

When traditional remedies are prepared uniformly, it becomes easier to conduct clinical trials or observational studies to test their therapeutic effects. Indeed, Nigeria has begun encouraging research protocols that evaluate herbal treatments for prevalent conditions (such as using randomised controlled trials or comparative effectiveness studies). Successful trials can lead to the formal approval of certain herbal medicines, as seen in countries like China and India, where standardised traditional remedies are part of national formularies. Thirdly, integrating standardised TM can expand healthcare access [6]. In remote or resource-limited regions with limited access to doctors, trained traditional practitioners using vetted remedies can help fill service gaps. By legitimising and training these providers within the health system, Nigeria can mobilise an existing workforce to deliver primary care, thereby increasing coverage.

Finally, embracing standardised TM may foster innovation and economic development. Systematic research into Nigeria's rich biodiversity could lead to the discovery of novel drug leads or nutraceuticals, potentially yielding local pharmaceutical products. The cultivation and processing of medicinal plants can create jobs and encourage the sustainable use of indigenous flora. In summary, standardisation is a critical step in translating traditional remedies into reliable, adjunct therapies that complement conventional medicine and strengthen the overall health system [7].

Evidence-Based Approaches and Global Best Practices. To achieve effective integration of traditional medicine, Nigeria is drawing on evidence-based approaches and lessons from other countries. Figure 1 outlines the translational roadmap for integrating traditional medicine into Nigeria's healthcare system, highlighting the key phases from knowledge preservation to clinical adoption. One key strategy is the adoption of rigorous research methodologies to evaluate traditional remedies. Rather than relying solely on anecdotal success stories, researchers employ pharmacological assays, toxicity studies, and clinical trials to establish a scientific basis for herbal treatments. For instance, partnerships between universities and herbal clinics have enabled the collection of clinical data on patients using traditional therapies, providing insight into outcomes and potential side effects. Adaptive trial designs and pragmatic clinical trials (which assess efficacy in real-world settings) are particularly useful for traditional remedies that are multi-component and individualised. Such approaches can accommodate the complexity of herbal formulations while still yielding reliable data [8].

Nigeria is also looking abroad for models of integration and regulation. In China, traditional medicine is practised alongside conventional medicine in hospitals, and treatments such as acupuncture or standardised herbal formulations are covered by health insurance. This has been facilitated by a strong regulatory framework and the incorporation of traditional medicine education into medical training [9]. Likewise, India's creation of a Traditional Knowledge Digital Library (TKDL) to document Ayurvedic formulations has helped prevent biopiracy and supported research by making ancient texts accessible in modern formats.

Nigeria has begun to develop its repositories of herbal knowledge, learning from India's example to protect indigenous intellectual property while encouraging innovation. On the regulatory front, the World Health Organisation's benchmarks for training traditional health practitioners and guidelines for assessing herbal medicine provide a template that Nigeria can adapt to its context. For example, training programs and certification for herbal practitioners are being piloted in some states, ensuring that practitioners meet minimum standards of practice and refer cases to hospitals when necessary [10]. By aligning with these global best practices – rigorous evidence generation, knowledge documentation, integrative policy frameworks, and provider training – Nigeria is gradually creating an environment that enables traditional medicine to contribute more formally to healthcare delivery.

A flowchart illustrating the sequential steps involved in translating traditional medicinal knowledge into formal healthcare delivery. The roadmap begins with community-held ethnomedicinal knowledge and progresses through documentation, scientific validation, regulatory evaluation, and practitioner training, culminating in integration within primary healthcare settings.

Figure 1 –Translational Roadmap for Integrating Traditional Medicine into Nigeria's Healthcare System

Digital Innovations for Traditional Medicine. Digital technology is emerging as a powerful enabler for the preservation and integration of traditional medicine knowledge in Nigeria. One of the most significant advances is the digitisation of herbal knowledge. Libraries and research centres are working on recording and digitising ethnomedicinal information that was once passed down orally [11].

By creating online databases and digital libraries of medicinal plants and their uses, Nigeria aims to safeguard indigenous knowledge for future generations while making it accessible to scientists and healthcare providers. For example, the Nigerian Natural Medicine Development Agency (NNMDA) has launched efforts to develop a digital knowledge repository and a virtual library of Nigeria's medicinal flora [12]. This repository catalogues details about each plant's traditional uses, active compounds, safe preparation methods, and any existing clinical evidence. Such digital documentation not only preserves knowledge but also supports standardisation, as researchers can reference a centralised database when formulating herbal products or designing clinical trials [13].

In parallel, mobile health (mHealth) technologies and telemedicine platforms are being explored to support traditional healthcare delivery. Mobile apps can help identify medicinal plants, provide dosage guidance, or offer information on verified traditional remedies for common ailments. Community health workers and herbal practitioners equipped with mobile decision-support tools can ensure safer prescribing of herbal treatments by checking for contraindications or integrating patient records [14]. Notably, the concept of "tele-herbal medicine" is gaining traction, where patients consult with traditional medicine practitioners via phone or video calls. This approach can significantly expand access to care, particularly for rural patients, who can receive guidance from experienced herbalists without the need for long-distance travel.

A recent survey of Nigerian herbal medicine practitioners found that over 80% are willing to adopt modern technologies, such as telehealth, to enhance their practice, recognising that digital tools can improve diagnosis, record-keeping, and patient follow-up. However, the same study noted practitioners' concerns about cost, digital literacy, and data privacy, indicating that capacity-building and secure, user-friendly platforms are necessary for widespread uptake [15].

Another frontier of digital innovation is the application of artificial intelligence (AI) and data analytics in traditional medicine research. Machine learning algorithms and cheminformatics platforms can rapidly analyse phytochemical databases to predict the therapeutic potential of natural compounds. African scientists have been at the forefront of creating digital databases of bioactive molecules derived from medicinal plants in the region. By leveraging AI-driven virtual screening, researchers can sift through millions of molecules in a matter of hours to identify those most likely to have, for example, antimalarial or antiviral activity. This approach markedly accelerates drug discovery from natural products, focusing laboratory testing on the most promising candidates. During the COVID-19 pandemic, such AI-based screening was used to evaluate hundreds of African plant compounds for potential activity against the SARS-CoV-2 virus [16].

In Nigeria, integrating AI into traditional medicine research is still in its early stages; however, active collaborations are aiming to utilise data mining on ethnomedical records to identify patterns, such as which herbs are repeatedly used for specific symptoms, and correlate them with biomedical findings. These digital innovations

collectively enhance the translational pipeline, from preserving traditional knowledge and standardising it to scientifically validating it and finally making it available through modern healthcare delivery systems. By embracing digital tools, Nigeria can ensure that its rich traditional medicine heritage is not only preserved but continually refined and safely integrated into contemporary practice [17].

Traditional Medicine and Infectious Diseases in Nigeria. Infectious diseases remain a leading cause of morbidity and mortality in Nigeria, and traditional medicine plays a significant role in their management at the community level. Malaria is a prime example: it is endemic in Nigeria and disproportionately affects rural populations. Long before the advent of modern antimalarial drugs, communities relied on various medicinal plants to treat malarial fevers[18]. This traditional knowledge has guided scientific inquiry in recent years. Researchers have identified and tested several Nigerian plants with potent antimalarial properties. For instance, Morinda lucida (commonly known as the brimstone tree) and Alstonia boonei (pattern wood) are two indigenous plants traditionally used to alleviate symptoms of fever and malaria [19]. Pharmacological studies have confirmed that extracts from these plants exhibit significant antiplasmodial activity in animal models, reducing parasite levels in the blood. Such findings support the efficacy that healers have observed for generations and underscore the value of these plants as sources for new antimalarial drugs [20].

Indeed, some compounds isolated from Morinda lucida and Alstonia boonei are being investigated further as potential leads for treating drug-resistant diseases. Another widely used plant is Azadirachta indica (neem), which, though not native to Nigeria, has been incorporated into Nigerian traditional medicine for the treatment of malaria and other infections. Neem leaves are used in decoctions for fever, and studies have shown that bioactive compounds in neem (such as gedunin and nimbolide) have strong antimalarial effects against Plasmodium falciparum. The continued reliance on these remedies, alongside increasing scientific validation, highlights a translational pathway in which traditional antimalarial therapies inform modern, evidence-based interventions [21].

Traditional remedies are also prominent in the treatment of bacterial infections, such as typhoid fever, which is caused by a Salmonella infection and is prevalent in Nigeria due to challenges with water and sanitation. Communities have developed herbal treatments for typhoid symptoms, often using polyherbal concoctions. Scientific evaluations are beginning to shed light on the efficacy of these practices [22]. A screening study of medicinal plants used for typhoid in South-West Nigeria found that several herbs have remarkable activity against Salmonella typhi, including strains resistant to common antibiotics. Notably, aqueous extracts of Ocimum gratissimum (African basil, known locally as scent leaf) and Morinda lucida were effective at inhibiting S. typhi growth in vitro, with minimum inhibitory concentrations indicating strong antibacterial potency. These findings lend support to the traditional use of Ocimum gratissimum leaf infusions for treating typhoid fever and other gastrointestinal infections. Similarly, Terminalia avicennioides and Combretum paniculatum – tree species whose barks are used in folk medicine for fever – showed anti-Salmonella activity in the same study [21].

While most of this evidence is preclinical, it provides a scientific rationale for the continued use of these plants and paves the way for developing adjunct therapies for typhoid. Beyond typhoid, many Nigerian medicinal plants exhibit broad-spectrum antibacterial effects. For example, Garcinia kola (bitter kola) seeds are chewed in traditional practice to prevent or relieve throat infections; research has demonstrated that extracts of G. kola can inhibit bacterial pathogens such as Salmonella and Staphylococcus, corroborating some of these traditional claims [23].

Integrating such proven remedies into public health strategies, such as using them in mild cases or as preventive measures, could be beneficial in contexts where access to antibiotics is limited or antibiotic resistance is prevalent. The role of traditional medicine has also been highlighted during outbreaks of emerging infectious diseases. In the face of novel viral diseases, communities often turn to available herbal resources for protection and treatment. During the Ebola virus outbreaks in West Africa, for instance, Nigerian communities cited the use of Garcinia kola (bitter kola) as a protective chewable to ward off illness. Subsequent laboratory research found that compounds from G. kola (such as kolaviron, a biflavonoid) exhibited anti-Ebola activity in vitro, although this has not translated into an approved treatment [24].

Similarly, the COVID-19 pandemic spurred renewed interest in traditional remedies across Nigeria. Without any early proven cure for COVID-19, many people resorted to herbal concoctions – steam inhalation with eucalyptus or neem, teas made from ginger and garlic, and other antiviral herbs – as supportive therapy. The Nigerian government and research community responded by formally evaluating some of these remedies. The National Agency for Food and Drug Administration and Control (NAFDAC) received dozens of submissions for COVID-19 herbal formulations and approved several clinical observation studies [25].

Three promising herbal preparations were selected by the federal government for funded clinical trials to rigorously test their efficacy and safety against COVID-19 [26, 27]. This unprecedented move demonstrated a commitment to evidence-based integration even amid a public health emergency. Although results have been mixed, and none of the remedies emerged as a standalone cure, the process established protocols for how traditional medicine could be investigated during a fast-moving outbreak. It also built research capacity and trust, as traditional healers collaborated with biomedical scientists in the trials. Beyond COVID-19, the renewed infrastructure for testing herbal remedies can be applied to other emerging infectious diseases (such as Lassa fever or new influenza strains), ensuring that potentially beneficial traditional treatments are not overlooked [27]. Table 1 presents several commonly used Nigerian medicinal plants and summarises their traditional uses alongside documented pharmacological effects, illustrating the interface between ethnomedicine and scientific evidence in the context of infectious diseases. Figure 2 is an infographic that serves as a visually enhanced version of Table 1, summarising key information for quicker understanding and improved engagement. This visual illustrates how traditional herbal knowledge aligns with biomedical evidence, particularly for conditions such as malaria, typhoid, and viral infections.

Table 1 – Commonly Used Nigerian Medicinal Plants and Their Documented Efficacy

Medicinal Plant (Scientific Name)	Selected Traditional Uses in Nigeria	Documented Pharmacological Effects	References
Azadirachta indica (Neem)	Fevers, malaria, skin infections, and general immune support.	Contains active limonoid compounds (e.g., gedunin, nimbolide) with potent antimalarial activity; also exhibits broad antibacterial and antifungal properties in vitro	[28]
Morinda lucida (Brimstone tree)	Malaria fever, jaundice, typhoid, and diabetes management.	Antiplasmodial effects demonstrated in animal models (significantly reduce Plasmodium parasitemia) also show antibacterial activity against Salmonella typhi and other pathogens.	[29]
Alstonia boonei (Pattern wood)	Malaria and other febrile illnesses; rheumatic pains.	It contains alkaloids with antimalarial properties; extracts have yielded significant parasite suppression in mice with malaria infections.	[30]
Ocimum gratissimum (African basil)	Typhoid fever, diarrhoea, and respiratory infections.	Essential oils and extracts exhibit strong antibacterial effects, including the inhibition of Salmonella species responsible for typhoid, as well as antifungal and antiviral properties in laboratory studies.	[21]
Garcinia kola (Bitter kola)	Coughs and throat infections are believed to provide immune-boosting and prophylactic benefits in viral outbreaks.	Displays broad antimicrobial activity: bioactive compounds from G. kola inhibit bacteria such as S. typhi. Laboratory studies also report antiviral effects (e.g., a biflavonoid from G. kola was observed to impede Ebola virus replication in vitro)	[31]
Vernonia amygdalina (Bitter leaf)	Malaria, intestinal parasite infections, and a general tonic for fevers.	Exhibits antimalarial activity: clinical trial data suggest that V. amygdalina leaf extract can significantly reduce the density of malaria parasites in patients, supporting its traditional use. It also has documented anti-parasitic and anti-inflammatory effects.	[21]

Nigerian Medicinal Plants and Their Role in Infectious Disease Management

Medicinal Plant	Traditional Use	Scientific Validation	Target Disease
Azadirechta indica	Malaria, fever, skin issues	Antimalarial antibacterial	Malaria
Morinda lucida	Malaria typhoid	Antiplasmodial anti-Salmonnella	Malaria typhoid
Ocimum gratissimum	Typhod, GI H infections	Antibacterial antifungal	Typhoid GI infections
Garcinia kola	Throat infections immunity	Broad antimicrobial Anti–Ebola (*n vitro*)	Viral – bacterial infections

Figure 2 – Nigerian Medicinal Plants and Their Role in Infectious Disease Management

An infographic table showcasing selected Nigerian medicinal plants, their traditional applications, scientific validations, and the infectious diseases they target.

CONCLUSIONS

The ongoing integration of traditional medicine into Nigeria's healthcare system exemplifies a translational approach – bridging historical knowledge and modern science to improve health outcomes. By addressing challenges such as quality control, documentation, and practitioner training, Nigeria is creating pathways for traditional remedies to complement conventional care safely and effectively.

The translational impact of these efforts is increasingly evident in improved healthcare access, quality, and resilience. Enhanced access is achieved by empowering trained traditional practitioners and leveraging digital health tools to deliver culturally accepted care to underserved communities. Improved quality is achieved through standardisation and rigorous evaluation of herbal medicines, turning age-old remedies into evidence-based treatments with known efficacy and safety profiles. Perhaps most importantly, a more integrative and diverse healthcare system boosts resilience. In the face of public health crises—whether it is the surge of drug-resistant infections or emerging diseases—Nigeria can draw upon both biomedical and traditional therapeutic resources, making the overall system more adaptable and self-reliant. The integration process has also catalysed local research and development, from clinical trials of herbal treatments to AI-driven drug discovery, which strengthens Nigeria's capacity to innovate within its cultural context.

The prospects for traditional medicine in Nigeria's healthcare sector are promising. With sustained investment in research infrastructure, there is potential for more indigenous herbal products to pass through clinical trials and gain formal approval as phytomedicines for national use. Policy support, such as integrating proven traditional therapies into health insurance coverage or hospital services, could further institutionalise the role of TM. Additionally, continuing to build digital databases and perhaps developing mobile apps for herbal medicine will aid knowledge dissemination among younger generations of healthcare providers and researchers [32]. It is equally crucial to involve traditional healers as stakeholders in this journey, ensuring

that benefit-sharing mechanisms and intellectual property rights are respected when their knowledge contributes to the development of new therapeutics.

In conclusion, Nigeria's experience illustrates that traditional and modern medicine need not exist in separate silos. Through a careful, evidence-guided integration process – amplified by digital innovation and focused on pressing health challenges, such as infectious diseases – traditional medicine can be transformed into a valuable component of a holistic, resilient healthcare system. This blended approach holds great promise not only for improving health outcomes in Nigeria but also for serving as a model for other nations seeking to harmonise diverse medical paradigms for the betterment of all.

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