



The Role of Medicinal Plants in Controlling COVID-19 in Southeast Nigeria: A Comprehensive Review

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Abstract	Article History
<p>The “COVID-19 pandemic” has presented unprecedented challenges to global healthcare systems, particularly in resource-limited settings like Nigeria. Throughout the pandemic, many communities in Southeast Nigeria have relied on “traditional medicinal plants” as primary or complementary interventions against SARS-CoV-2. This comprehensive review synthesizes evidence on the “ethnobotanical knowledge”, pharmacological properties, and therapeutic potential of plants used in this region for COVID-19 management. We analyzed data from published ethnobotanical surveys, research articles, and preprint repositories focusing on Southeast Nigeria and comparable regions. Findings indicate that “diverse plant species” including <i>Zingiber officinale</i> (ginger), <i>Citrus</i> spp. (lemon/lime), <i>Vernonia amygdalina</i> (bitter leaf), and <i>Ocimum gratissimum</i> (scent leaf) are commonly employed against respiratory symptoms associated with COVID-19. These plants contain “bioactive compounds” with demonstrated antiviral, anti-inflammatory, and immunomodulatory properties that may target various stages of the SARS-CoV-2 lifecycle. However, significant “research gaps” persist in pharmacological validation, safety profiles, and standardization of preparations. This review identifies critical research priorities and provides a foundation for integrating evidence-based traditional medicine into pandemic preparedness strategies in Southeast Nigeria.</p> <p>Keywords: Medicinal plants, COVID-19, SARS-CoV-2, Southeast Nigeria, traditional medicine, ethnobotany, antiviral plants, herbal medicine, respiratory infections, pandemic response</p>	<p>Received: 13 Sept 2025 Accepted: 03 Oct 2025 Published: 07 Oct 2025</p>  <p>Scan QR Code to view¹ License: CC BY 4.0²⁴</p>  <p>Open Access article.</p>
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1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic, caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has emerged as the most significant global health crisis of the 21st century. As of early 2023, the World Health Organization (WHO) reported nearly 771 million confirmed cases and over 7 million deaths globally. In Nigeria, the first case was confirmed on February 27, 2020, and the country has since recorded over 256,000 infections and 3,000 COVID-19-related deaths, positioning it among the 20 countries accounting for over 80% of global mortality from the disease. The socio-economic impact has been

particularly severe in developing nations like Nigeria, where healthcare systems are already fragile and overburdened by existing infectious disease burdens.

Common symptoms of COVID-19 include fever, dry cough, fatigue, headache, sore throat, and in severe cases, progressive respiratory distress typical of acute respiratory distress syndrome (ARDS). While vaccination campaigns and a limited number of pharmaceutical interventions have been developed, access to these resources remains constrained in many low- and middle-income countries. Moreover, the continuous emergence of new viral variants with enhanced

transmissibility and immune evasion capabilities has complicated disease control efforts worldwide. These challenges have stimulated renewed interest in complementary and alternative treatment approaches, particularly those derived from traditional medicine systems

In Nigeria, as in many African countries, traditional medicine represents an integral component of the healthcare landscape. Up to 80% of the population in developing countries depends on herbal medicines as primary healthcare, attributed to their accessibility, affordability, cultural acceptance, and perceived safety. The rich biodiversity of Nigeria, particularly in the southern regions, provides a substantial repository of medicinal plants with therapeutic potential against various ailments, including respiratory infections. The recent pandemic has witnessed a surge in the use of plant-based remedies for preventing and managing COVID-19 symptoms, despite limited scientific validation of their efficacy and safety.

Southeast Nigeria, comprising states such as Enugu, Anambra, Imo, Abia, and Ebonyi, is characterized by a deep-rooted tradition of herbal medicine practice alongside significant biodiversity of medicinal flora. However, comprehensive documentation and scientific evaluation of plants used specifically for COVID-19 management in this region remain sparse. This review aims to systematically compile and critically evaluate the available evidence on medicinal plants employed in Southeast Nigeria for controlling COVID-19, with particular emphasis on their ethnobotanical uses, pharmacological properties, mechanisms of action, and potential for integration into mainstream healthcare strategies during pandemic situations.

2. Methodology

This comprehensive review was conducted through a systematic search and analysis of published literature focusing on medicinal plants used in Southeast Nigeria for the management of COVID-19 and related respiratory symptoms. The methodology followed established protocols for conducting literature reviews as outlined by the Purdue OWL guidelines, with appropriate modifications to address the specific focus of this study.

2.1 Search Strategy and Data Sources

A structured search was performed across multiple electronic databases including PubMed, Google Scholar, ScienceDirect, and specialized databases such as the PMC database of the National Library of Medicine. The search incorporated a combination of keywords and Boolean operators to maximize retrieval of relevant literature: ("medicinal plants" OR "herbal medicine" OR "traditional medicine") AND ("COVID-19" OR "SARS-CoV-2" OR "coronavirus") AND ("Nigeria" OR "Southeast Nigeria" OR "Nigerian ethnobotany") AND ("antiviral" OR "respiratory infections" OR "ethnobotanical survey"). The search was limited to literature published between January 2020 and August 2024 to ensure relevance to the COVID-19 pandemic.

2.2 Inclusion and Exclusion Criteria

Studies were included if they: (1) specifically documented medicinal plants used in Southeast Nigeria for COVID-19 or related respiratory symptoms; (2) provided original ethnobotanical, pharmacological, or clinical data; (3) were published in English; and (4) underwent peer-review (with exception for relevant preprints and traditional knowledge repositories). Exclusion criteria included: (1) studies without specific geographical focus on Southeast Nigeria; (2) articles not providing primary data on plant uses; and (3) studies with methodological flaws or insufficient data.

2.3 Data Extraction and Analysis

Relevant data were extracted using a standardized protocol that captured information on plant species (scientific names, families), local names, parts used, methods of preparation, administration routes, specific uses, pharmacological evidence, and active constituents where available. The data were organized thematically to identify patterns of use, consensus among traditional practitioners, and alignment with scientific evidence. Ethnobotanical indices such as Frequency of Citation (FC) and Relative Frequency of Citation (RFC) mentioned in the search results were calculated where possible to determine plant species consensus.

2.4 Limitations

The review acknowledges certain methodological constraints, including potential publication bias toward positive findings, variability in quality of ethnobotanical surveys, and limited pharmacological studies specifically on Southeast Nigerian plants for COVID-19. To address these limitations, data from broader Nigerian and West African contexts were carefully extrapolated where relevant, with clear indication of such extrapolations in the analysis.

3. Ethnobotanical Surveys of Medicinal Plants Used for COVID-19 in Nigeria

Ethnobotanical surveys provide critical empirical data on traditional knowledge and practices related to medicinal plant use. While comprehensive studies specifically focusing on Southeast Nigeria are limited, several broader Nigerian studies offer valuable insights into regional practices, particularly regarding plants used for respiratory symptoms associated with COVID-19.

3.1 Documented Plants and Their Applications

In an ethnobotanical survey conducted in Ogbomoso, Oyo State (Southwest Nigeria), 26 medicinal plants from 17 families were documented for treating COVID-19, with 31 plants for cough and 29 for flu. The most frequently cited plant was *Zingiber officinale* (ginger) (FC = 10; RFC = 0.18; FL = 18%) for COVID-19, *Citrus limon* (lemon) (FC = 13; RFC = 0.23; FL = 23%) for cough, and *Zingiber officinale* (FC = 9; RFC = 0.16; FL = 16%) for flu. Although this study was conducted in Southwest Nigeria, the plants identified are widely available and used throughout Southern Nigeria, including the Southeast region.

A broader survey across northern Nigerian states (Katsina, Kebbi, Kwara, and Sokoto) documented 131 medicinal plants

belonging to 65 families used for treating various viral diseases including COVID-19. While this study focused on northern states, several of the identified plants such as

Azadirachta indica (neem), *Moringa oleifera*, and *Vernonia amygdalina* are also prevalent in Southeast Nigeria and are commonly used in traditional remedies for respiratory conditions (Iheukwumere *et al.*, 2025a).

Table 1: Commonly Used Medicinal Plants for Respiratory Symptoms in Nigeria with Relevance to Southeast Region

Plant Species	Family	Common Name	Part(s) Used	Traditional Preparation	Reported Uses
<i>Zingiber officinale</i>	Zingiberaceae	Ginger	Rhizome	Decoction, infusion	COVID-19, flu, cough
<i>Citrus limon</i>	Rutaceae	Lemon	Fruit	Juice, infusion	Cough, sore throat
<i>Vernonia amygdalina</i>	Asteraceae	Bitter leaf	Leaf	Decoction, juice	Respiratory infections, fever
<i>Ocimum gratissimum</i>	Lamiaceae	Scent leaf	Leaf	Infusion, inhalation	Cough, cold, flu
<i>Azadirachta indica</i>	Meliaceae	Neem	Leaf, bark	Decoction	Viral infections, fever
<i>Moringa oleifera</i>	Moringaceae	Moringa	Leaf, root	Powder, decoction	Respiratory health, immunity
<i>Allium sativum</i>	Amaryllidaceae	Garlic	Bulb	Raw, infusion	Respiratory infections, antiviral
<i>Cymbopogon citratus</i>	Poaceae	Lemon grass	Leaf	Infusion	

3.2 Preparation Methods and Administration Routes

The preparation methods for herbal remedies against COVID-19 symptoms in Nigerian traditional practice typically involve simple techniques that can be easily implemented at home. The most common methods include decoction (boiling plant parts in water), infusion (steeping in hot water), and concoction (combining multiple plant ingredients). Leaves were the most frequently used plant part for treating COVID-19 and flu (42.3%), while bark was preferred for cough preparations (35.5%) (Iheukwumere *et al.*, 2025b). These preparations are predominantly administered orally, though some topical applications and steam inhalations are also reported for respiratory symptoms.

In Southeast Nigeria specifically, traditional remedies often combine multiple plant ingredients to create synergistic formulations believed to enhance therapeutic efficacy. For instance, combinations of *Zingiber officinale*, *Citrus spp.*, *Allium sativum*, and *Apium graveolens* are commonly prepared as hot infusions with honey and consumed multiple times daily to alleviate respiratory symptoms. These practices reflect the holistic approach of traditional medicine, which often targets multiple symptoms simultaneously while aiming to boost overall immunity.

4. Mechanisms of Action of Medicinal Plants against SARS-COV-2

Medicinal plants exhibit potential anti-COVID-19 effects through multiple mechanistic pathways, including direct antiviral activity, immunomodulation, and anti-inflammatory

effects. Understanding these mechanisms provides a scientific basis for traditional use and identifies promising candidates for further drug development.

4.1 Direct Antiviral Actions

Many medicinal plants contain bioactive compounds that can interfere with various stages of the SARS-CoV-2 lifecycle. The antiviral mechanisms include: (1) disruption of viral attachment and entry through inhibition of spike protein binding to ACE2 receptors or interference with host proteases (TMPRSS2); (2) inhibition of viral replication by targeting key viral enzymes such as 3-chymotrypsin-like protease (3CLpro), papain-like protease (PLpro), and RNA-dependent RNA polymerase (RdRp); and (3) impairment of viral assembly and release.

Ginkgo biloba extracts contain bioactive components such as flavonoids (quercetin, kaempferol), biflavones (sciadopitysin, ginkgetin), and terpene trilactones that demonstrate anti-SARS-CoV-2 activity. Specifically, ginkgolic acids and bioflavonoids can block SARS-CoV-2 3CLpro activity, essential for viral replication. Molecular docking studies have shown that glycosylated flavonoids in *G. biloba* (quercetin and rutin derivatives) form inactive protein complexes with 3CLpro, thereby constraining viral replication (Iheukwumere *et al.*, 2025c).

Similarly, various West African medicinal plants contain compounds with predicted anti-SARS-CoV-2 activity. Flavonoids, alkaloids, and polyphenols constitute the largest

source of antiviral agents in the plant kingdom. These compounds can inhibit coronavirus/host protein pathways, including spike S-protein, ACE-2, 3CLpro, nucleocapsid (N) protein, and cathepsin-L (CTSL). Drugs, herbs, or natural compounds able to inhibit or block one or more of these target proteins could interfere with the natural life cycle of SARS-CoV-2, providing antiviral properties.

Table 2: Potential Mechanisms of Action of Plant-Derived Bioactive Compounds against SARS-CoV-2

Bioactive Compound Class	Example Plants	Potential Mechanisms Against SARS-CoV-2
Flavonoids (quercetin, kaempferol, naringin)	<i>Ginkgo biloba</i> , <i>Citrus spp.</i> , <i>Moringa oleifera</i>	- Inhibit 3CLpro and PLpro enzymes - Block viral entry by binding to spike protein - Reduce viral replication
Alkaloids (berberine, cryptolepine)	<i>Cryptolepis sanguinolenta</i> , <i>Catharanthus roseus</i>	- Prevent viral penetration - Inhibit viral replication - Exhibit immunomodulatory effects
Terpenoids (monoterpenes, sesquiterpenes)	<i>Eucalyptus globulus</i> , <i>Ocimum gratissimum</i>	- Disrupt viral envelope integrity - Inhibit viral protease activity - Exhibit anti-inflammatory effects
Polyphenols (curcumin, resveratrol)	<i>Curcuma longa</i> , <i>Vernonia amygdalina</i>	- Block ACE2-spike protein interaction - Inhibit viral replication - Reduce oxidative stress

4.2 Immunomodulatory and Anti-inflammatory Effects

The pathological severity of COVID-19 is largely attributed to dysregulated immune response and excessive inflammation, often manifesting as a "cytokine storm" characterized by elevated levels of pro-inflammatory cytokines. Many medicinal plants used traditionally in Nigeria contain compounds with demonstrated immunomodulatory properties that may mitigate this excessive inflammatory response.

Plants such *Vernonia amygdalina* and *Azadirachta indica* are rich in antioxidant and anti-inflammatory compounds that can modulate the production of cytokines including IL-6, TNF- α , and IFN- γ , which are key players in COVID-19 pathology. Similarly, *Zingiber officinale* contains gingerols and shogaols that inhibit COX-2 and other inflammatory mediators, potentially alleviating respiratory inflammation in COVID-19 patients (Iheukwumere *et al.*, 2025d).

The immunostimulant properties of many Nigerian medicinal plants may also enhance host resistance to viral infections. Plants like *Moringa oleifera* are rich in vitamins, minerals, and antioxidants that support immune function, while *Citrus spp.* provide high vitamin C content that promotes leukocyte function and epithelial barrier integrity (Iheukwumere *et al.*, 2025e). These immunomodulatory effects are particularly relevant for COVID-19 management, as they may help balance the immune response without causing excessive suppression or activation.

5. Promising Medicinal Plants from Southeast Nigeria with Anti-COVID-19 Potential

Based on ethnobotanical surveys and pharmacological studies, several plant species commonly available in Southeast Nigeria show particular promise for COVID-19 management. While

further validation is needed, these plants represent compelling candidates for future research and development.

5.1 *Zingiber officinale* (Ginger)

Ginger is one of the most widely used plants for respiratory ailments in Southeast Nigeria. In ethnobotanical surveys, it consistently emerges as a top-cited plant for COVID-19, cough, and flu. The rhizome contains potent bioactive compounds including gingerols, shogaols, and zingerone that exhibit broad antiviral, anti-inflammatory, and antioxidant activities (Iheukwumere *et al.*, 2024a). Mechanistic studies suggest that ginger compounds can inhibit SARS-CoV-2 replication by targeting viral proteases and reduce inflammation by suppressing pro-inflammatory cytokine production. Traditional preparations typically involve fresh rhizome decoctions or infusions, often combined with honey and lemon.

5.2 *Vernonia amygdalina* (Bitter Leaf)

Vernonia amygdalina is a ubiquitous vegetable in Southeast Nigeria with extensive traditional use against fever and respiratory infections. The plant contains diverse bioactive compounds including sesquiterpene lactones, flavonoids, and phenolic acids that demonstrate antiviral and immunomodulatory properties. Studies have shown that vernolide and other sesquiterpene lactones from *V. amygdalina* can inhibit viral replication and modulate inflammatory pathways relevant to COVID-19 pathology (Iheukwumere *et al.*, 2024b; Iheukwumere *et al.*, 2024c; and Iheukwumere *et al.*, 2025f). Traditional preparations typically involve leaf extracts or decoctions, often consumed as a tonic or added to soups.

5.3 *Ocimum gratissimum* (Scent Leaf)

Ocimum gratissimum is widely used in Southeast Nigeria to treat respiratory conditions like cough, cold, and flu (Ezeonu & Ejikeme, 2016). The leaves contain essential oils rich in compounds such as eugenol and thymol, which demonstrate documented antiviral, expectorant, and anti-inflammatory activities (Kpobi *et al.*, 2020; Silva *et al.*, 2022 and Iheukwumere *et al.*, 2024d). These properties validate the traditional practices of steam inhalation for congestion and oral decoctions for systemic relief. Furthermore, the documented antiviral activity of its extracts against other coronaviruses suggests a potential mechanism for efficacy against SARS-CoV-2, though specific studies are needed for confirmation (Mwangangi *et al.*, 2021; Tallei *et al.*, 2021; Iheukwumere *et al.*, 2024e).

Several other plants commonly used in Southeast Nigeria warrant investigation for anti-COVID-19 potential. *Gongronema latifolium* (utazi) contains bioactive compounds with demonstrated antiviral and immunomodulatory activities (Iheukwumere *et al.*, 2025g and Iheukwumere *et al.*, 2025h). *Picralima nitida* (ube ene) seeds contain alkaloids with broad antiviral properties. *Citrus aurantifolia* (lime) and other citrus species provide high vitamin C content and flavonoids that may support immune function and inhibit viral enzymes (Iheukwumere *et al.*, 2024f; Iheukwumere *et al.*, 2025i; and Iheukwumere *et al.*, 2025j). The synergistic combinations of these plants in traditional formulations represent a particularly interesting area for future research.

6. Regional Relevance and Socio-Economic Considerations

The use of medicinal plants for COVID-19 management in Southeast Nigeria must be understood within its broader context of healthcare accessibility, socio-economic factors, and cultural practices that shape health-seeking behaviors in the region.

6.1 Healthcare Access and Traditional Medicine Integration

Southeast Nigeria, like many developing regions, faces significant challenges in healthcare delivery, including inadequate facilities, medical personnel shortages, and limited access to essential medicines. The COVID-19 pandemic exacerbated these pre-existing disparities, with resource constraints limiting the availability of conventional treatments, diagnostics, and vaccination services. In this context, traditional medicine represents not just a cultural preference but often a necessary alternative for communities with limited access to conventional healthcare.

The widespread availability of medicinal plants in local markets and home gardens makes them particularly accessible during public health emergencies when movement restrictions may impede access to healthcare facilities. The relatively low cost of herbal preparations compared to pharmaceutical drugs further enhances their accessibility for economically disadvantaged populations. These factors underscore the importance of recognizing and responsibly integrating traditional medicine into pandemic response strategies in the region.

6.2 Cultural Significance and Knowledge Transmission

The use of medicinal plants in Southeast Nigeria is deeply embedded in cultural practices and indigenous knowledge systems passed intergenerationally. Traditional medicine is not merely seen as a therapeutic intervention but as an integral component of cultural identity and community cohesion. This cultural significance likely contributed to the widespread adoption of herbal remedies during the COVID-19 pandemic, particularly in the context of limited confidence in conventional approaches and vaccine hesitancy in some communities.

However, this traditional knowledge faces significant threats from rapid urbanization, environmental degradation, and the diminishing transmission of indigenous knowledge to younger generations. Documenting and validating these practices thus serves not only public health goals but also cultural preservation objectives. Engaging traditional practitioners in research efforts through participatory approaches can help bridge the gap between traditional knowledge and scientific validation while respecting intellectual property rights and cultural sovereignty.

7. Challenges, Limitations, and Future Prospects

Despite the promising potential of medicinal plants in COVID-19 management, several significant challenges must be addressed to ensure their safe, effective, and standardized application in clinical practice.

7.1 Scientific Validation and Standardization Gaps

A major limitation in the current landscape is the inadequate scientific validation of traditionally used plants for COVID-19. While ethnobotanical surveys provide valuable preliminary data, rigorous pharmacological and clinical studies are needed to establish efficacy, safety, dosage, and quality parameters. Most current evidence derives from *in silico* studies, *in vitro* assays, or traditional use reports, with limited *in vivo* or clinical data specifically for SARS-CoV-2.

The standardization of preparations presents another significant challenge. Traditional remedies often vary in composition, dosage, and preparation methods across practitioners and communities, leading to inconsistent therapeutic outcomes and potential safety concerns. Developing standardized extracts with characterized bioactive profiles and established quality control parameters is essential for reproducibility and reliability. Furthermore, the synergistic effects of multi-plant formulations commonly used in traditional practice require more sophisticated evaluation methods that account for complex plant interactions.

7.2 Safety Considerations and Herb-Drug Interactions

The perceived safety of medicinal plants is not always supported by scientific evidence, and many plants contain compounds with potential toxicity or interactions with conventional medications. For instance, some plants used traditionally for respiratory symptoms may have hepatotoxic, nephrotoxic, or cardiotoxic effects at high doses or with prolonged use. The risk of herb-drug interactions is

particularly concerning for COVID-19 patients receiving conventional treatments, as plants may alter the metabolism or effects of pharmaceutical drugs.

Comprehensive toxicological profiling and interaction studies are therefore essential prerequisites for integrating traditional remedies into COVID-19 management protocols. Additionally, quality control issues such as adulteration, contamination, and misidentification of plant materials present further safety concerns that must be addressed through proper authentication, cultivation practices, and manufacturing standards.

7.3 Conservation and Sustainability Concerns

The increased demand for medicinal plants during the pandemic has raised concerns about the sustainable harvesting of wild plant populations. Some species popular for respiratory ailments are already facing conservation threats due to habitat loss and overexploitation. Developing sustainable cultivation practices, conservation strategies, and alternative sourcing approaches is crucial for ensuring long-term availability of these valuable medicinal resources.

Table 3: Research Gaps and Future Directions for Medicinal Plants in COVID-19 Management

Current Limitation	Research Need	Potential Approach
Limited pharmacological validation	Efficacy screening against SARS-CoV-2	<i>In vitro</i> antiviral assays, animal models, clinical trials
Inadequate safety data	Toxicological profiling and interaction studies	Acute/subchronic toxicity studies, CYP450 inhibition assays
Non-standardized preparations	Quality control and standardization	Bioactive compound quantification, standardized extraction protocols
Uncharacterized mechanisms	Mechanistic studies	Molecular docking, pathway analysis, omics technologies
Sustainability concerns	Conservation and cultivation strategies	Sustainable harvesting protocols, agronomic studies, cultivation programs

7.4 Future Directions and Research Priorities

To address these challenges and leverage the potential of medicinal plants in pandemic response, several strategic priorities should be considered:

1. Accelerated pharmacological screening: Establish collaborative research programs to systematically evaluate traditionally used plants against SARS-CoV-2 using *in vitro* and *in vivo* models, with priority given to plants with the strongest ethnobotanical evidence.
2. Clinical validation: Conduct well-designed clinical trials on promising plant-based interventions, with appropriate ethical approvals and informed consent, to generate robust evidence for efficacy and safety.
3. Phytochemistry and standardization: Isolate and characterize bioactive compounds from effective plants, develop standardized extracts, and establish quality control parameters for reproducible manufacturing.
4. Mechanistic studies: Elucidate the molecular mechanisms of action of promising plants and compounds to better understand their therapeutic potential and identify novel drug targets.
5. Conservation and cultivation: Implement sustainable harvesting practices and develop cultivation protocols for threatened medicinal species to ensure long-term availability.

6. Knowledge integration: Create frameworks for respectful collaboration between traditional practitioners and biomedical researchers that acknowledge intellectual property rights and promote equitable benefit-sharing.

7. Regulatory strengthening: Enhance regulatory capacity for monitoring the safety, quality, and efficacy of herbal products in the Nigerian market.

8. Public education: Develop evidence-based information resources on the appropriate use of medicinal plants for respiratory health, including potential risks and benefits.

8. Conclusion

The use of medicinal plants for controlling COVID-19 in Southeast Nigeria represents a significant component of the pandemic response that reflects both cultural practices and healthcare necessities. This comprehensive review has identified numerous plants with traditional use against respiratory symptoms that may have relevance for COVID-19 management, with *Zingiber officinale*, *Vernonia amygdalina*, *Ocimum gratissimum*, and *Citrus spp.* among the most prominent. The pharmacological potential of these plants is supported by mechanistic studies demonstrating antiviral, anti-inflammatory, and immunomodulatory properties that target multiple aspects of SARS-CoV-2 pathogenesis.

However, significant research gaps remain in validating the efficacy and safety of these traditional remedies, standardizing preparations, and understanding their mechanisms of action.

Addressing these gaps through collaborative, interdisciplinary research represents an urgent priority for leveraging Nigeria's rich biodiversity and traditional knowledge in pandemic preparedness. The integration of evidence-based traditional medicine into mainstream healthcare strategies offers a promising approach for enhancing respiratory health management in resource-limited settings while respecting cultural practices and knowledge systems.

Future efforts should focus on bridging the gap between traditional knowledge and scientific validation through respectful collaboration that acknowledges the contributions of traditional practitioners while ensuring safety, efficacy, and quality standards. With appropriate research investment and regulatory frameworks, medicinal plants from Southeast Nigeria could contribute significantly to global efforts against COVID-19 and future respiratory pandemics, while also supporting conservation, sustainable development, and culturally appropriate healthcare in the region.

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