Int J Ayurvedic Med,Vol 17 (1), 2026; 1-8

Ayurveda Sahiti Prabha's

International Journal of Ayurvedic Medicine

ISSN No: 0976-5921

Review Article

AYUSH in Rural Healthcare: A Two-Decade Bibliometric Analysis of Research Trends and Policy Linkages (2000–2024)

Sandip Baheti[1], Amit Gajarmal[2*], Rashmi Patekar[3], Mahesh S[4], Manisha Talekar[5]

1. Research Officer (*Ayu.*), Central Council For Research In Ayurvedic Sciences (CCRAS) - Central Ayurveda Research Institute (CARI), Moti Bagh Road, Patiala, Punjab - 147001, India.
2. Research Officer (*Ayu.*),Central Council For Research In Ayurvedic Sciences (CCRAS) - Central Ayurveda Research Institute (CARI), Moti Bagh Road, Patiala, Punjab - 147001, India.
3. Assistant professor, Department of Dravyaguna Vigyana, R.A. Podar Medical College (Ayu.), Worli, Mumbai, Maharashtra - 400018, India.
4. Research Officer (*Ayu.*),Central Council For Research In Ayurvedic Sciences (CCRAS) - Central Ayurveda Research Institute (CARI), Moti Bagh Road, Patiala, Punjab - 147001, India.
5. Research Officer (*Ayu.*), Central Council For Research In Ayurvedic Sciences (CCRAS) - Regional Ayurveda Research Institute (RARI), Nandanvan, Nagpur, Maharashtra - 440009, India.

Received: 28-08-2025 Accepted: 16-03-2026 Published: 31-03-2026

Abstract

Rural health continues to be a critical challenge in India, where the AYUSH systems [*Ayurveda*, *Yoga & Naturopathy*, *Unani*, *Siddha*, Homeopathy, and *Sowa Rigpa*] offer culturally relevant and affordable healthcare options. Despite long-standing policy commitments, systematic evidence on their integration into rural health remains limited. This study presents a two-decade (2000–2024) bibliometric analysis of AYUSH research in rural health, based on data retrieved from PubMed and Scopus. Network visualization through VOSviewer was used to examine publication trends, authorship and institutional collaborations, keyword co-occurrence, and citation patterns. A total of 421 publications were identified (PubMed = 108; Scopus = 313), with a notable surge in output after 2014, concurrent with the launch of the National AYUSH Mission. India emerged as the leading contributor, while international collaborations, though limited, are growing with partners such as the USA, UK, and Australia. *Ayurveda* and *Yoga* dominated the research landscape, whereas *Siddha* and *Unani* received comparatively less attention. Collaboration networks revealed significant fragmentation, reflecting institutional silos. Overall, AYUSH scholarship in rural health is expanding but remains uneven. Addressing gaps through stronger cross-institutional collaborations, focus on underrepresented systems, and inclusion of cost-effectiveness and implementation research will be crucial. These findings are consistent with national and global frameworks such as the National Health Policy 2017, the WHO Traditional Medicine Strategy 2014–2023, and the Gujarat Declaration 2023, and they provide actionable insights for advancing evidence-informed rural health strategies.

Keywords: *AYUSH, Rural Healthcare, Bibliometric Analysis, VOSviewer, Traditional Medicine, Ayurveda*

Access this article online

Website: https://ijam.co.in

DOI: https://doi.org/10.47552/ijam.v17i1.6498

Introduction

India's public health ecosystem has witnessed a growing emphasis on the integration of traditional systems of medicine with contemporary healthcare services. AYUSH (1), an acronym encompassing *Ayurveda* (2), *Yoga* (3) & *Naturopathy* (4), *Unani* (5), *Siddha* (6), *Sowa Rigpa* (7) and Homeopathy (8) has emerged as a strategic pillar in national health policy, especially with the establishment of the Ministry of AYUSH in 2014 (9). This integration seeks to offer comprehensive, affordable, and culturally consonant healthcare by leveraging centuries-old indigenous practices alongside modern biomedical approaches (10). The **Ministry of AYUSH (11)** is playing a pivotal role in leading India's efforts to integrate traditional systems into the national healthcare framework. It is actively promoting holistic health approaches. Under its administrative umbrella, the ***Central Council for Research in Ayurvedic Sciences*** **(CCRAS) (12),** ***Central Council for Research in Homoeopathy*** **(CCRH) (13),** ***Central Council for Research in Unani Medicine*** **(CCRUM) (14),** ***Central Council for Research in Siddha*** **(CCRS) (15)** and ***Central Council for Research in Yoga & Naturopathy*** **(CCRYN)** (16) are collectively making significant strides in advancing scientific research, clinical trials, and pharmacological validation of AYUSH interventions, thereby strengthening the evidence base

*** Corresponding Author:**
Amit Gajarmal
Research Officer (*Ayu.*),CCRAS-Central Ayurveda Research Institute (CARI), Moti Bagh Road, Patiala, Punjab – 147001 (Under Ministry of AYUSH, Government of India, New Delhi). India.
Email Id: dgalaxy78@gmail.com

for India's traditional medicine systems. The Ministry of AYUSH issued evidence-informed guidelines promoting *Ayurveda* formulations and lifestyle practices to support public health resilience. Numerous AYUSH institutions also contributed to integrative clinical management and research trials in collaboration with modern medical systems (17). Complementary and Alternative Medicine (CAM), including systems like *Ayurveda* and homeopathy, has been successfully integrated into healthcare frameworks in several developed countries as well (18), Over the past two decades, several policy frameworks such as the National Health Policy (2017) (19), National AYUSH Mission (2014), and guidelines issued under the National Rural Health Mission (NRHM).

Rural India continues to face significant challenges in equitable healthcare delivery due to a shortage of health professionals and limited infrastructure. To address disparities, the National Rural Health Mission (NRHM), now part of the National Health Mission (NHM), initiated the mainstreaming of AYUSH systems into primary health centers (PHCs), community health centers (CHCs), and district hospitals across the country (20). By June 2018, over 7,600 PHCs, 2,776 CHCs, and nearly 500 district hospitals were co-located with AYUSH services, providing access to more than two million rural beneficiaries (21). Notably, NSSO data indicate that approximately 46% of rural households utilized AYUSH systems in the preceding year, highlighting the cultural relevance and outreach of traditional health practices in underserved regions.

In order to bridge healthcare gaps, the Ministry of AYUSH has spearheaded policy-led integration through the deployment of AYUSH practitioners in rural health settings and strategic schemes like the National AYUSH Mission. These initiatives have facilitated the inclusion of *Ayurveda*, *Unani*, *Siddha*, *Yoga*, *Naturopathy* and Homeopathy services alongside allopathic care (22). Clinical integration under these programs has been supported by evidence-based approaches such as pharmacovigilance, diagnostic module development, and traditional drug standardization. As a result, AYUSH contributes significantly to primary healthcare delivery in rural India, not only by filling human resource gaps but also by enriching the evidence base for culturally responsive and affordable health interventions (23).

Bibliometric analysis provides a systematic method to evaluate and visualize the structure, trends, and impact of scholarly literature. Through tools like VOSviewer, researchers can explore patterns in co-authorship, keyword co-occurrence, institutional collaboration, and citation networks. This analytical approach is especially valuable for a multidisciplinary domain like AYUSH, where research spans clinical, epidemiological, and sociopolitical dimensions. This study presents a two-decade bibliometric review (2000–2024) of AYUSH system access in rural healthcare, based on data from Scopus and PubMed databases. By employing VOSviewer software, we aim to uncover knowledge networks, identify leading contributors and institutions, visualize keyword and citation patterns, and highlight research gaps. The findings are intended to inform researchers, policymakers, and practitioners about the trajectory of AYUSH access in rural healthcare and to support strategic planning for future research and health policy development.

Methodology

Literature search

To explore global research trends on AYUSH system access in rural healthcare, bibliographic data were retrieved from the PubMed and Scopus databases (Elsevier), the most comprehensive and widely accepted abstract and citation platforms for scientific literature. The search strategy employed the Boolean query as TITLE-ABS-KEY ("AYUSH" OR *Ayurveda* OR *Yoga* OR *Naturopathy* OR *Unani* OR *Siddha* OR "*Sowa Rigpa*" OR Homeopathy) AND ("Rural Healthcare"), which was designed to capture peer-reviewed articles and review papers related to AYUSH system in rural healthcare across disciplines. The search was restricted to publications from 1 January 2000 to 31 December 2024 to ensure a focus on recent scientific developments. Only English-language documents from peer-reviewed sources were considered. We used full counting and selected thresholds (≥10 occurrences for keywords; ≥10 documents per author/institution) to balance network stability and interpretability. A sensitivity check with ±20% thresholds produced qualitatively similar cluster structures. The bibliometric data were exported in .CSV format and analyzed using VOSviewer software (version 1.6.20) (www.vosviewer.com) a well-established tool for constructing and visualizing bibliometric networks based on co-authorship, co-citation, and keyword co-occurrence (24). Key data extracted included authorship, institutional affiliations, country of origin, keywords and citation counts to map the research landscape and thematic evolution of AYUSH system in rural healthcare.

Inclusion criteria

This bibliometric analysis includes publications indexed in the Scopus and PubMed databases from the year 2000 to 2024. Eligible studies must specifically mention AYUSH systems such as *Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa Rigpa* and Homeopathy in the context of rural healthcare. Articles focusing on healthcare access, utilization patterns, public health interventions, or social equity involving AYUSH practices in rural healthcare were included. The review considered original research articles, review papers, case studies, and policy-oriented documents published in English or those with English abstracts and complete bibliographic metadata, including authorship, keywords, and citation details. These records were analyzed using VOSviewer software (25).

Exclusion criteria

Studies were excluded if they did not directly address both AYUSH systems and rural healthcare in their content. Articles published outside the defined time frame (2000–2024), in languages other than English without an English abstract, or those lacking complete bibliographic metadata were also excluded. Editorials, opinion pieces, news reports, and non-peer-reviewed literature were not considered. Additionally, documents with duplicate records or superficial references to AYUSH systems without substantial analytical content were omitted to maintain the rigor and thematic relevance of the review.

PubMed database

PubMed is a free, publicly accessible database maintained by the U.S. National Library of Medicine. It provides access to a vast collection of biomedical literature, including research articles, reviews, and clinical studies from trusted scientific journals worldwide (26). Upon search, a total of 108 documents related to AYUSH system access in rural healthcare were retrieved from the PubMed database for the period 2000–2024 and analyzed using VOSviewer for bibliometric and visual mapping.

Co-authorship analysis

The author co-authorship analysis (Fig. 1) reveals a dispersed and weakly connected research landscape in the domain of AYUSH

and rural healthcare. The bibliometric mapping through VOSviewer identified small, discrete clusters of collaboration, such as between *Mukerji*, *Mitali* and an unnamed co-author, and between *Loudon*, *Annette* and *Barnett*, *Tony*. However, a majority of the nodes, including key contributors like *Raghuram Nagarathna* and *Jon Adams*, appeared as isolated entities. This fragmented structure highlights a lack of inter-institutional and cross-disciplinary collaboration over the past two decades, pointing to an opportunity for fostering integrated research efforts and policy-aligned networks to strengthen AYUSH's role in rural healthcare systems.

Figure 1: Author clustering in AYUSH related rural healthcare publications (PubMed, 2000–2024)

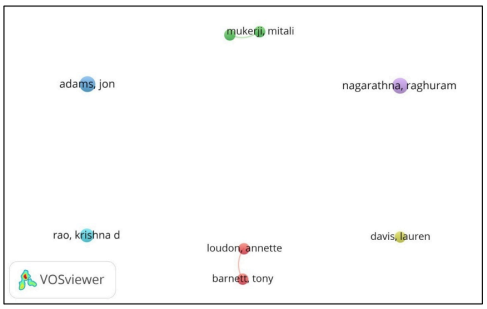


Figure 2: Institutional Collaboration Network in AYUSH-Related Rural Healthcare Research (PubMed, 2000–2024)

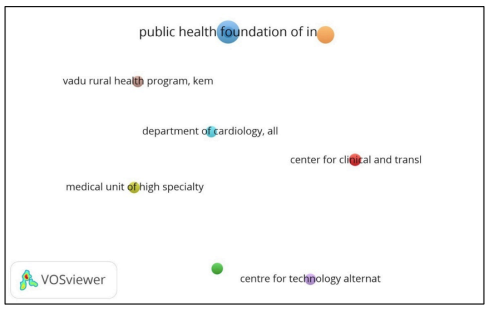
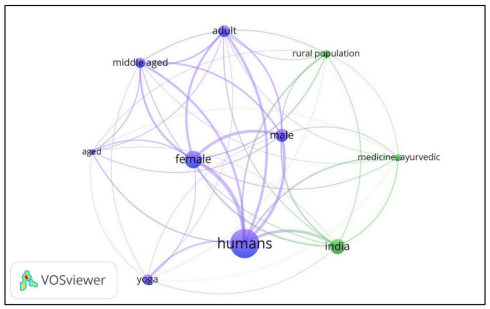


Figure 3: Keyword co-occurrence network in AYUSH related rural healthcare research (PubMed, 2000–2024)



Institutional collaboration based on co-authorship data

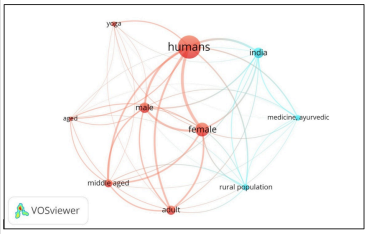
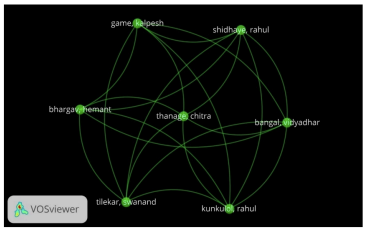
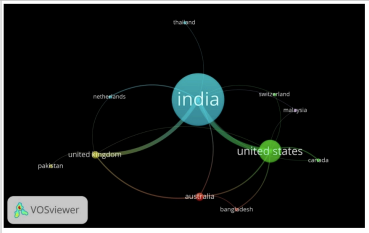
The institutional collaboration network (Fig. 2), mapped through VOSviewer, highlights a decentralized pattern of institutional engagement in AYUSH-related rural healthcare research over the last two decades. The ***Public Health Foundation of India*** emerges as a relatively central node, indicating its prominent role in this domain. However, most institutions, including ***Vadu Rural Health Program (KEM), Centre for Technology Alternatives***, and ***Center for Clinical and Translational Research,*** appear as isolated or weakly linked entities. This reflects a limited degree of cross-institutional synergy and suggests that collaborative research on AYUSH in rural health remains siloed. The presence of diverse entities, such as the ***Department of Cardiology*** and ***Medical Unit of High Specialty***, also hints at some level of interdisciplinary interest, although not yet well integrated into a cohesive research network. Strengthening institutional partnerships, especially between public health organizations, rural health centers, and AYUSH institutions, could be vital for enhancing both research output and policy impact in rural healthcare delivery.

Keyword co-occurrence network

The keyword co-occurrence analysis (Fig. 3) provides insights into the thematic focus of AYUSH-related research in rural healthcare between 2000 and 2024. The visualization reveals two prominent thematic clusters. The first cluster, represented in purple, centers around demographic and clinical descriptors such as "humans," "female," "male," "adult," "middle aged," and "aged," indicating a strong focus on human subject research with age- and gender-specific subgroups. Terms like "yoga" also appear within this cluster, reflecting the consistent integration of yogic practices in AYUSH healthcare interventions. The second cluster, marked in green, connects terms such as "India," "rural population," and "medicine, ayurvedic." This highlights the geographical and cultural anchoring of the research in rural Indian contexts, with a clear emphasis on Ayurvedic modalities. The strong linkage between "India" and both "rural population" and "Ayurvedic medicine" suggests a sustained policy and research interest in deploying traditional systems of medicine to address rural healthcare challenges. Overall, the co-occurrence patterns indicate that while the demographic focus of AYUSH research is well-articulated, thematic depth in areas like disease-specific interventions, implementation models, and health systems research remains underrepresented, pointing to avenues for future investigation.

MeSH Keyword Co-occurrence Network

*The co-occurrence analysis of MeSH (Medical Subject Headings) terms (Fig. 4) reveals the predominant themes and demographic focus areas in AYUSH-related rural healthcare research between 2000 and 2024. The term **"humans"** is the most frequently occurring and centrally positioned MeSH term, showing strong linkages with demographic descriptors such as **"female," "male," "adult," "middle aged,"** and **"aged."** This indicates a wide demographic inclusion in the study populations, with a strong emphasis on human-centered clinical and observational studies. The co-occurrence of **"yoga"** within this demographic cluster suggests that yogic interventions are commonly studied across different age and gender groups. The second cluster, highlighted in green, connects **"India," "rural population,"** and **"medicine, ayurvedic,"** reflecting the geographic and therapeutic anchors of the literature. The strong linkage between **"India"** and **"rural population"** confirms the focus of the research within the Indian healthcare landscape, while **"medicine, ayurvedic"** indicates the centrality of Ayurveda systems within AYUSH-focused studies. These co-occurrences point to a dual emphasis in the literature: a clinical-demographic focus and a geographic-therapeutic axis rooted in India's rural health system. This MeSH-based mapping suggests that while AYUSH research demonstrates broad demographic coverage and a rural public health orientation, future research could benefit from greater thematic diversification, especially in areas such as implementation science, policy evaluation, and systems-level integration.*

Figure 4: Co-occurrence Network of MeSH Terms in AYUSH and Rural Healthcare Literature (PubMed, 2000–2024)	Figure 5: Co-authorship network visualization of key authors in AYUSH related rural healthcare research (Scopus, 2000–2024)	Figure 6: Institutional collaboration network in AYUSH related rural healthcare research (Scopus, 2000–2024)	Figure 7: International collaboration network in AYUSH related rural healthcare research (Scopus, 2000–2024)
			

Scopus database

Scopus is a comprehensive abstract and citation database maintained by Elsevier. It covers a wide range of peer-reviewed literature across science, technology, medicine, social sciences, and the arts and humanities, making it a valuable tool for academic research and literature analysis (27). Upon search, a total of 313 documents related to AYUSH system access in rural healthcare were retrieved from the Scopus database for the period 2000–2024 and analyzed using VOSviewer for bibliometric and visual mapping (28).

Co-authorship Analysis of the data from Scopus

*The co-authorship network derived from Scopus data (Fig. 5) demonstrates a robust and cohesive collaborative cluster among key researchers contributing to AYUSH-based rural healthcare research. Notably, the authors **Thanage Chitra**, **Kunkulol Rahul**, and **Shidhaye Rahul** appear as central nodes within this tightly knit network, indicating high levels of co-publication activity and leadership in collaborative scholarly efforts. Peripheral yet well-connected contributors such as **Bhargav Hemant**, **Game Kalpesh**, and **Tilekar Swanand** suggest the emergence of a research group with shared institutional affiliations and thematic alignment, particularly in areas such as yoga-based mental health interventions, maternal health, and rural implementation science. This dense and reciprocal collaboration structure highlights the maturation of a core research team, primarily operating from Maharashtra, India, and linked with institutions such as Pravara Institute of Medical Sciences and the Public Health Foundation of India. The formation of such collaborative nodes is a promising trend in AYUSH literature, emphasizing the increasing role of interdisciplinary and community-based research methodologies within rural health systems. However, the visualization also underscores the absence of broader inter-institutional linkages across states or international borders, suggesting that future bibliometric development could benefit from increased external collaborations.*

Institutional Collaboration Network

*The institutional co-authorship network derived from Scopus-indexed publications (Fig. 6) presents a fragmented and sparsely connected landscape of AYUSH-related rural healthcare research between 2000 and 2024. The **Public Health Foundation of India (PHFI)** stands out as the most prominent node in terms of publication volume and visibility, indicating its leading role in generating evidence and policy-oriented research within the AYUSH sector. However, the visualization reveals limited inter-institutional connectivity, as PHFI operates largely in isolation from other academic or clinical institutions. Smaller, disconnected nodes such as the **Department of Neurology** and **Department of Kriya Sharir** suggest minimal collaborative integration across disciplines or traditional-modern medicine interfaces. This lack of robust network density reflects a missed opportunity for synergizing diverse streams such as Ayurveda, neurology, and public health in addressing rural health challenges. The findings indicate a pressing need to foster multi-institutional and cross-disciplinary research frameworks. Strengthening academic-practitioner-public health linkages could significantly enhance both the scope and impact of AYUSH-related interventions in rural India.*

Country-wise Collaboration Network

*The country-level co-authorship network (Fig. 7), derived from Scopus-indexed publications, reveals **India** as the undisputed hub of AYUSH-related rural healthcare research, with the largest node size and the most extensive collaborative links. India exhibits strong bilateral co-authorship ties particularly with the **United States**, **United Kingdom**, and **Australia**, indicating a trend toward global interest in traditional Indian systems of medicine, especially in integrative and public health contexts. Moderate collaborative links are also evident with **Netherlands**, **Switzerland**, and **Canada**, pointing to emerging academic engagement with Europe and North America.*

*In contrast, regional collaborations within South and Southeast Asia, including with **Bangladesh**, **Pakistan**, **Thailand**, and **Malaysia**, appear weaker and less frequent, despite geographic and cultural proximity. The country wise number of documents published and number of citations of them is mentioned in table 1. This suggests a potential underutilization of South-South partnerships in AYUSH research, which could otherwise enrich culturally contextualized health systems science and rural implementation strategies. Overall, while India maintains a leadership position in the global AYUSH research landscape, expanding regional and cross-continental partnerships could further strengthen the knowledge base and translational impact of AYUSH systems in rural healthcare delivery.*

Keyword Co-occurrence Network

*The co-occurrence map of author keywords (Fig. 8) derived from Scopus-indexed literature provides a conceptual overview of research trends in AYUSH-related rural healthcare between 2000 and 2024. The term **"human"** is the most prominent and centrally connected node, indicating a primary focus on clinical or observational studies involving human subjects. Closely linked terms such as **"female," "male," "adult,"** and **"humans"** reflect a recurring demographic profile across studies, often segmented by age and gender. Interestingly, traditional AYUSH modalities such as **"yoga," "ayurveda,"** and **"homeopathy"** emerge as independent yet integrally linked terms, suggesting thematic*

diversity within the literature. Their connections with both demographic terms and geographical terms like ***"India"*** *indicate that these systems are widely studied in Indian populations with varied demographic characteristics. The appearance of* ***"article"*** *as a strongly linked node is indicative of the dataset's origin from peer-reviewed journal literature, consistent with formal publication standards. Overall, this Scopus-based keyword mapping underscores the breadth of AYUSH-related inquiry while also revealing its concentration on human-centered studies. Future research could benefit from a stronger focus on health systems, implementation science, and rural policy evaluation to diversify the thematic depth.*

Table 1: Country-wise Distribution of Documents, Citations, and Collaboration Strength in AYUSH-related Rural Healthcare Research (2000–2024)

Sr. No.	Name of Country	Number of documents	Number of citations	Total link strength
1	India	165	4029	41
2	United States	71	1240	30
3	United Kingdom	23	314	21
4	Australia	25	1053	13
5	Bangladesh	9	222	5
6	Canada	11	225	4
7	Netherlands	5	3	4
8	Malaysia	6	236	2
9	Switzerland	5	120	2
10	Pakistan	12	340	1
11	Thailand	5	34	1

Citation Analysis

Citation analysis revealed the most frequently cited articles and authors, highlighting influential contributions in to the research regarding AYUSH system access in rural healthcare. It also helped identify core journals and emerging focus areas within the field.

[A] Top-cited articles, **Co-citation Anchors Influencing the Field**

To map the intellectual structure of AYUSH-focused rural healthcare literature, a citation analysis was conducted using Scopus-indexed data, visualized through VOSviewer. The figure highlights the most influential references based on citation counts within the selected time frame. Notable among these are *Bandaranayake (2006)* (29), *Muthu (2006)* (30), *Rao (2011)* (31), *Cohen (2014)* (32), and *Sen (2017)* (33), which appear as larger nodes, indicating their centrality and impact on subsequent research. These works predominantly explore themes of traditional medicine integration, evidence-based practice, and healthcare accessibility. The dispersion and clustering of nodes suggest a moderately fragmented citation landscape, reflecting the interdisciplinary nature of AYUSH-related rural health studies and the evolving research focus across decades. This visualization aids in identifying seminal contributions and potential knowledge gaps warranting further exploration in policy and clinical integration of AYUSH systems.

[B] Journal-wise publication trends

A journal co-citation analysis was conducted to identify the leading publication sources contributing to AYUSH-related rural healthcare literature. The VOSviewer visualization reveals a cluster of key journals that frequently appear in citations, indicating their central role in disseminating research findings. Prominent among these are the *Journal of Ayurveda and Integrative Medicine*, *Journal of Ethnopharmacology*, *Annals of Neurosciences*, and *Journal of Ethnobiology and Ethnomedicine*. These journals have served as consistent platforms for scholarly discussions on the integration of traditional medicine with public health initiatives in rural settings. The presence of specialized journals in ethnopharmacology and integrative medicine highlights a multidisciplinary approach, bridging indigenous knowledge systems with modern health policy frameworks. This cluster analysis underscores the importance of these journals in shaping research agendas and guiding evidence-based AYUSH policy implementation.

Temporal trend in publications

The annual publication trend, visualized through a bar diagram using Scopus data, shows a clear upward trajectory in AYUSH-related rural healthcare research between 2000 and 2024. A total of 421 documents were identified across both databases (Scopus = 313; PubMed = 108). Output during the early years (2000–2005) was minimal, averaging fewer than 5 publications per year. From 2006 to 2013, output increased gradually to an average of 12 publications per year, followed by a sharp rise after 2014, coinciding with the launch of the *National AYUSH Mission*. Between 2014 and 2024, the average annual output nearly tripled to 31 publications per year. The peak occurred in 2023 with 25 publications, representing the single most productive year in the dataset. This sustained growth reflects not only increasing scholarly attention but also the integration of AYUSH into national health policy frameworks and the global push for traditional medicine evidence, aligning with the WHO Traditional Medicine Strategy 2014–2023.

Figure 8: Keyword co-occurrence network in AYUSH related rural healthcare research (Scopus, 2000–2024)

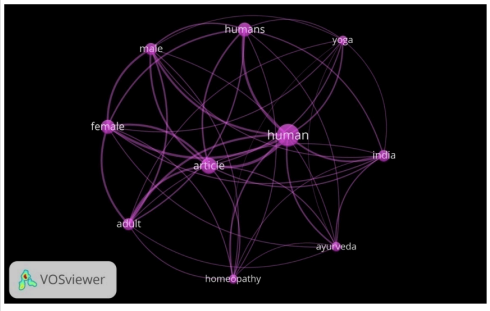


Figure 9: Overlay visualization of journal co-citation network in AYUSH related rural healthcare research (Scopus, 2000–2024)

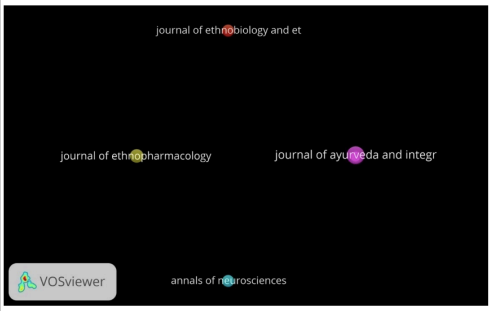
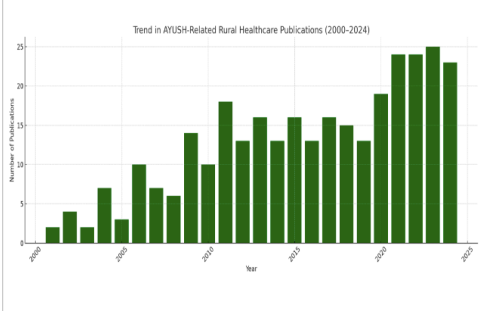


Figure 10: Trend showing the number of AYUSH related rural healthcare research publications per year from Scopus, 2000 to 2024



Results and discussion

The bibliometric analysis of AYUSH-related rural healthcare research from 2000 to 2024 reveals evolving scholarly engagement, institutional patterns, and thematic priorities. Using VOSviewer, key networks were identified in terms of co-authorship, keyword co-occurrence, institutional collaboration, and citation trends. The findings offer critical insights into how AYUSH systems have been studied in the rural health context and highlight both progress and persistent gaps. A total of 421 publications were identified (PubMed = 108; Scopus = 313), which provided the empirical basis for the network and thematic analyses. India accounted for the largest share of publications, while international collaboration though limited was increasingly visible with partners such as the USA, the UK, and Australia. Keyword co-occurrence mapping confirmed that *Ayurveda* and *Yoga* form the largest thematic clusters, whereas *Siddha* and *Unani* appear in smaller, peripheral clusters, indicating uneven research attention across AYUSH systems. Each visualization is discussed to interpret its relevance in shaping future policy and research agendas. Notably, co-authorship networks revealed fragmented clusters with few bridging institutions, suggesting that research efforts are concentrated in isolated institutional silos rather than broad cross-institutional collaborations.

Policy implications

- **Coordinate consortia:** Use India–USA–UK–Australia triads already present in the network to seed multicenter evaluations and replication studies.
- **Balance investments:** Target *Siddha*, *Unani*, and *Sowa Rigpa* to reduce thematic skew and improve representativeness in policy dialogues.
- **Implementation science:** Embed pragmatic trials, program evaluations, and cost-effectiveness analyses into AYUSH programs to create policy-ready evidence.
- **Align with WHO initiatives:** Tie national work to WHO's Traditional Medicine Strategy (2014–2023) and outcomes from the 2023 Global Summit (Gujarat Declaration) to enhance international comparability and uptake (34, 35).
- **Leverage WHO GCTM:** Engage with the WHO Global Centre for Traditional Medicine (Jamnagar) for data standards, research training, and multicountry pilots (36).

Recommended research questions for scholarly study

Despite increasing scholarly output and policy support for AYUSH integration in rural health systems, critical knowledge gaps persist. These include limited evidence on cost-effectiveness, community acceptability, inter-system collaboration, and measurable health outcomes. To guide future research and strengthen the scientific basis for AYUSH integration, it is essential to articulate targeted research questions aligned with public health needs, traditional knowledge systems, and implementation challenges. The table 2 presents proposed research questions categorized under key focus areas relevant to AYUSH and rural healthcare. These questions are intended to direct interdisciplinary inquiries, support policy formulation, and promote the effective translation of AYUSH practices into mainstream rural health delivery. These prioritized research questions align closely with national and international policy frameworks including the National AYUSH Mission and the WHO Traditional Medicine Strategy underscoring their relevance for policy driven research and program evaluation.

Table 2: Proposed research questions for advancing the integration of AYUSH system in rural healthcare research

Sr. No.	Research focus area	Recommended research questions
1	Public Health Impact	What are the health outcomes of AYUSH-based interventions in rural primary care settings?
2	Cost-effectiveness and Affordability	How does the cost of AYUSH-based treatment compare to conventional healthcare in rural areas?
3	Community Awareness and Acceptability	What are rural populations' perceptions and trust in AYUSH systems versus allopathy?
4	Integration Models and Health Policy	What are successful models of AYUSH-allopathy integration in rural healthcare delivery systems?
5	Training and Human Resources	What competencies are required for AYUSH practitioners to serve effectively in rural health setups?
6	Disease-specific Application	Which AYUSH interventions are most effective for managing common rural diseases (e.g., malaria, anemia)?
7	Traditional Knowledge Documentation	How can community-based traditional health practices be scientifically documented and validated?
8	Digital Health and Telemedicine	How can AYUSH services be delivered through telehealth in underserved rural regions?

Investigation of research gap regarding the integration of AYUSH system access in rural healthcare

Despite an expanding body of literature supporting the role of AYUSH systems in addressing healthcare challenges in rural India, several critical research gaps still hinder their full integration into mainstream health delivery frameworks. The current evidence base remains fragmented, with uneven geographical coverage, limited evaluation of implementation outcomes, and inadequate exploration of socio-cultural determinants influencing AYUSH access and utilization. Moreover, policy-to-practice translation, standardization of care, and effectiveness assessment of AYUSH interventions in rural settings are under-researched areas. A key limitation of this bibliometric overview is its reliance on indexed literature, which may under-represent local, non-indexed studies, grey literature, and community-held traditional knowledge that are essential for understanding AYUSH practice in rural settings. Addressing these gaps will require coordinated investments in implementation research, standardized outcome measures, capacity-building for rural AYUSH providers, and routine monitoring to translate policy commitments into measurable improvements in rural health. To systematically outline these deficiencies, Table 3 summarizes the major categories and specific research gaps that demand scholarly attention for advancing the equitable and evidence-based inclusion of AYUSH in rural healthcare.

Table 3: Identified research gaps regarding the integration of AYUSH system access in rural healthcare

Sr. No.	Category	Research gap
1	Policy Implementation	Lack of evaluation studies on how National AYUSH Mission (NAM) is operationalized in rural areas.
2	Service Delivery Infrastructure	Insufficient data on AYUSH facility availability, equipment, and practitioner distribution.

3	Healthcare Workforce	Limited training and skill development for AYUSH practitioners specific to rural health needs.
4	Community Awareness	Low public awareness and health literacy regarding AYUSH therapies among rural populations.
5	Clinical Effectiveness	Inadequate clinical trials or observational studies assessing AYUSH outcomes in rural settings.
6	Integration Models	Absence of well-documented models of integrative AYUSH-allopathic care suited to rural contexts.
7	Health-seeking Behavior	Lack of behavioral studies exploring why rural patients choose or avoid AYUSH care.
8	Funding and Resource Allocation	Limited research on AYUSH budget utilization and resource prioritization in rural health schemes.
9	Digital Health and AYUSH	Scarce studies on use of telemedicine and digital platforms for AYUSH service delivery in villages.
10	Gender and Equity	Gaps in understanding how gender, caste, and socio-economic status affect AYUSH accessibility.

Conclusion

This bibliometric review presents a comprehensive two-decade landscape (2000–2024) of AYUSH-related scholarship in rural healthcare, identifying 421 publications (PubMed = 108; Scopus = 313). The analysis shows a clear upward trajectory in research activity since 2014, dominated by contributions from India, with emerging but still fragmented clusters of authors and institutions. While *Ayurveda* and *Yoga* received the most attention, *Siddha* and *Unani* remained underrepresented, and South–South as well as international collaborations were limited. Thematic gaps persist in implementation science, cost-effectiveness evaluation, digital integration, and gender equity areas critical for evidence-informed policy. Despite initiatives such as the National AYUSH Mission and co-location of services at rural health facilities, few empirical studies rigorously evaluate these interventions. To strengthen the evidence base, future work must prioritize interdisciplinary collaborations, pragmatic trials, and comparative research. Aligning with India's *National Health Policy 2017* and global frameworks such as the *WHO Traditional Medicine Strategy (2014–2023)* and the *Gujarat Declaration (2023)*, AYUSH can play a strategic role in bridging rural health gaps if research is scaled, diversified, and translated effectively into policy action.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest

The authors declare no conflict of interest

Acknowledgments

The authors gratefully acknowledge the technical support provided by the library of the Central Council for Research in Ayurvedic Sciences (CCRAS), Ministry of AYUSH, Government of India, New Delhi, India.

References

1. Shankar D, Patwardhan B. AYUSH for New India: Vision and strategy. J Ayurveda Integr Med. 2017;8(3):137–9. https://linkinghub.elsevier.com/retrieve/pii/S0975947617305442. Accessed on 16 April 2025 at 11:00 IST.
2. Jaiswal YS, Williams LL. A glimpse of Ayurveda – The forgotten history and principles of Indian traditional medicine. J Tradit Complement Med. 2017;7(1):50–3. https://linkinghub.elsevier.com/retrieve/pii/S2225411016000250. Accessed on 22 April 2025 at 08:00 IST.
3. Vaidya AD, Vaidya R. A century of 'The science of yoga' (1921–2021): Revival, renewal and renaissance. J Ayurveda Integr Med. 2023;14(1):100613. https://linkinghub.elsevier.com/retrieve/pii/S0975947622000729. Accessed on 22 April 2025 at 08:00 IST.
4. Steel A, Goldenberg JZ, Hawrelak JA, Foley H, Gerontakos S, Harnett JE, et al. Integrative physiology and traditional naturopathic practice: results of an international observational study. Integr Med Res. 2020;9(4):100424. https://linkinghub.elsevier.com/retrieve/pii/S2213422020300561. Accessed on 22 April 2025 at 08:00 IST.
5. Sheehan HE, Hussain SJ. Unani Tibb: History, Theory, and Contemporary Practice in South Asia. Ann Am Acad Pol Soc Sci. 2002;583(1):122–35. https://journals.sagepub.com/doi/10.1177/000271620258300108. Accessed on 22 April 2025 at 08:30 IST.
6. Ranavagol SK, Patil SS, Kamble LY, Nijaguna. Mapping the Literature of Siddha Medicine from 1972-2024: Scientometrics Analysis. Int J Res Libr Sci. 2024;10(4):8–24. https://www.ijrls.in/wp-content/uploads/2024/10/ijrls-1788.pdf. Accessed on 03 May 2025 at 16:45 IST.
7. Kloos S, Madhavan H, Tidwell T, Blaikie C, Cuomu M. The transnational Sowa Rigpa industry in Asia: New perspectives on an emerging economy. Soc Sci Med. 2020;245:112617. https://linkinghub.elsevier.com/retrieve/pii/S0277953619306124. Accessed on 03 May 2025 at 15:00 IST.
8. Ghosh AK. A short history of the development of homeopathy in India. Homeopathy. 2010;99(2):130–6. http://linkinghub.elsevier.com/retrieve/pii/S147549160900099X. Accessed on 17 May 2025 at 14:00 IST.
9. Ministry of Ayush. Wikipedia. https://en.wikipedia.org/wiki/Ministry_of_Ayush#:~:text. Accessed on 13 June 2025 at 11:00 IST.
10. Yadava R, Arshathjyothi PS. Development and contributions of AYUSH sector - A Review. J Ayurveda Integr Med Sci. 2021;6(3):57–61.
11. Ministry of AYUSH. Government of India. https://ayush.gov.in/#!/. Accessed on 11 June 2025 at 10:00 IST.
12. Srikanth N, Dhiman KS. CCRAS RESEARCH POLICY: A PROFILE. J Res Ayurvedic Sci. 2017;1(1):48–72. https://www.jrasccras.com/doi/10.5005/jp-journals-10064-0007. Accessed on 18 May 2025 at 14:00 IST.
13. Dastagiri P. Good clinical practice guidelines for clinical trials in homoeopathy. Indian J Res Homoeopath. 2023;17(1):46–7. https://www.ijrh.org/journal/vol17/iss1/7. Accessed on 22 April 2025 at 15:20 IST.
14. Ansari AP, Anwar NAK. Current status of Unani medicine in India. J Ayurvedic Herb Med. 2014;10(3):70–2.
15. Govt of India. Ministry of Ayush. Central Council for Research in Siddha. http://siddhacouncil.com/aboutus/#:~:text=. Accessed on 15 June 2025 at 12:10 IST.
16. Govt of India. Ministry of Ayush. Central Council for Research in Yoga & Naturopathy (CCRYN). https://infohub.ayush.gov.in/autonomous/ccryn. Accessed on 10 June 2025 at 09:30 IST.
17. Bhapkar V, Sawant T, Bhalerao S. A critical analysis of CTRI registered AYUSH studies for COVID- 19. J Ayurveda Integr Med. 2022;13(1):100370. https://www.sciencedirect.com/

science/article/pii/S0975947620301030. Accessed on 22 April 2025 at 14:30 IST.
18. House of Commons Science and Technology Committee. UK Parliament. 2010. Evidence Check 2: Homeopathy. https://publications.parliament.uk/pa/cm200910/cmselect/cmsctech/45/4502.htm. Accessed on 10 June 2025 at 11:00 IST.
19. Sundararaman T. National Health Policy 2017: a cautious welcome. Indian J Med Ethics. 2017;2(2):69–71. http://ijme.in/articles/national-health-policy-2017-a-cautious-welcome/?galley=html. Accessed on 22 April 2025 at 10:00 IST.
20. Shrivastava SR, Shrivastava PS, Ramasamy J. Mainstreaming of Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy with the health care delivery system in India. J Tradit Complement Med. 2015;5(2):116–8. http://www.ncbi.nlm.nih.gov/pubmed/26151021. Accessed on 22 April 2025 at 13:00 IST.
21. Samal J. Should the AYUSH doctors be underutilized at subhealth centers under Ayushman Bharat while they prove effective at higher facilities under National Health Mission? Indian J Heal Sci Biomed Res. 2020;13(2):86. https://journals.lww.com/10.4103/kleuhsj.kleuhsj_32_20. Accessed on 10 June 2025 at 14:20 IST.
22. Josyula KL, Sheikh K, Nambiar D, Narayan V V., Sathyanarayana TN, Porter JDH. "Getting the water-carrier to light the lamps" : Discrepant role perceptions of traditional, complementary, and alternative medical practitioners in government health facilities in India. Soc Sci Med. 2016;166:214–22. https://linkinghub.elsevier.com/retrieve/pii/S0277953616304749. Accessed on 10 June 2025 at 14:30 IST.
23. Dhaliya R, Kaushik Sharma BK, Dhakkad GS. One nation one health—Preview through Ayurveda. J Res Ayurvedic Sci. 2023;7(1):65–8. https://journals.lww.com/10.4103/jras.jras_137_22. Accessed on 22 April 2025 at 11:00 IST.
24. Bukar UA, Sayeed MS, Razak SFA, Yogarayan S, Amodu OA, Mahmood RAR. A method for analyzing text using VOSviewer. MethodsX. 2023;11:102339. https://linkinghub.elsevier.com/retrieve/pii/S2215016123003369. Accessed on 22 April 2025 at 11:15 IST.
25. Luo Y, Yang H, Tao G. Systematic review on fingerprinting development to determine adulteration of Chinese herbal medicines. Phytomedicine. 2024;129:155667. https://www.sciencedirect.com/science/article/pii/S094471132400326X. Accessed on 11 June 2025 at 09:00 IST.
26. Jordan JL. PubMed Central: An Essential Resource for Information Professionals and Researchers. Evid Based Libr Inf Pract. 2013;8(2):261–3. https://journals.library.ualberta.ca/eblip/index.php/EBLIP/article/view/18544. Accessed on 11 June 2025 at 09:20 IST.
27. Burnham JF. Scopus database: a review. Biomed Digit Libr. 2006;3(1):1. https://bio-diglib.biomedcentral.com/articles/10.1186/1742-5581-3-1
28. Van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics. 2010;84(2):523–38. http://link.springer.com/10.1007/s11192-009-0146-3. Accessed on 22 April 2025 at 14:00 IST.
29. Bandaranayake WM. Quality Control, Screening, Toxicity, and Regulation of Herbal Drugs. In: Modern Phytomedicine. Wiley; 2006:25–57. https://onlinelibrary.wiley.com/doi/10.1002/9783527609987.ch2. Accessed on 22 April 2025 at 14:20 IST.
30. Muthu C, Ayyanar M, Raja N, Ignacimuthu S. Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. J Ethnobiol Ethnomed. 2006;2(1):43. https://ethnobiomed.biomedcentral.com/articles/10.1186/1746-4269-2-43. Accessed on 22 April 2025 at 14:45 IST.
31. Rao M, Rao KD, Kumar AS, Chatterjee M, Sundararaman T. Human resources for health in India. Lancet. 2011;377(9765):587–98. https://linkinghub.elsevier.com/retrieve/pii/S0140673610618880. Accessed on 10 June 2025 at 14:30 IST.
32. Cohen M. Tulsi - Ocimum sanctum: A herb for all reasons. J Ayurveda Integr Med. 2014;5(4):251. http://www.jaim.in/text.asp?2014/5/4/251/146554. Accessed on 11 June 2025 at 10:30 IST.
33. Sen S, Chakraborty R. Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: Importance, challenges and future. J Tradit Complement Med. 2017;7(2):234–44. https://www.sciencedirect.com/science/article/pii/S222541101630030X. Accessed on 22 April 2025 at 11:40 IST.
34. World Health Organization. WHO Traditional Medicine Strategy: 2014–2023. Geneva. https://www.who.int/publications/i/item/9789241506096. Accessed on 20 April 2025 at 13:20 IST.
35. World Health Organization. WHO Traditional Medicine Global Summit 2023 Meeting Report: Gujarat Declaration, August 17–18, Gandhinagar, India. Geneva; 2023. https://www.pib.gov.in/PressReleasePage.aspx?PRID=1954558&utm. Accessed on 11 June 2025 at 08:45 IST.
36. World Health Organization. Global Centre for Traditional Medicine Overview. Geneva; 2025. https://www.who.int/teams/who-global-traditional-medicine-centre/overview. Accessed on 11 June 2025 at 10:00 IST.

*****