© 2026 IJMETS | Volume 9, Issue 8 August 2026 | ISSN: 2277-1549 | ijmets.org

Ethnobotany and Medicinal Plants: A Review of Knowledge Systems, Scientific Validation, and Conservation Challenges

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Abstract

Traditional plant-based remedies remain the primary source of healthcare for a large share of the world's population and continue to seed modern drug discovery. Ethnobotany, ethnopharmacology, and phytochemistry together document this knowledge and test its pharmacological basis, yet the field faces persistent gaps in documentation standardization, scientific validation, and conservation of both species and knowledge. This review synthesizes recent (largely 2025) peer-reviewed and World Health Organization (WHO) sources on ethnobotanical methodology, regional case studies (with a detailed focus on Andhra Pradesh, India), pharmacological validation pathways, and the conservation and policy landscape surrounding medicinal plant knowledge. The databases searched, date range, and inclusion/exclusion criteria were not specified in the source material and should be added here before submission. Global demand for traditional and herbal medicine continues to rise, with the herbal medicine market valued near USD 198 billion in 2025 and projected to approach USD 326 billion by 2032. A majority of WHO member states report that 40-90% of their populations use traditional, complementary, and integrative medicine (TCIM), and roughly 40% of currently marketed pharmaceuticals trace their origins to traditional medicine. Regional surveys, particularly across Ethiopia and Andhra Pradesh, India, continue to document new medicinal plant species, but validation from traditional use-report to confirmed pharmacological or clinical activity remains the exception rather than the rule, and at least one published survey has been retracted for research-integrity concerns. Ethnobotanical knowledge remains a vital and still-expanding resource for global healthcare and drug discovery, but realizing its full value requires standardized documentation protocols, expanded preclinical-to-clinical validation pipelines, integrated species and knowledge conservation strategies, equitable benefit-sharing frameworks, and continued formal integration into national health systems.

Keywords: Ethnobotany, Medicinal plants, Traditional knowledge, Ethnopharmacology, Phytochemistry, Biodiversity conservation

Introduction

Long before the emergence of formal pharmacology, human communities accumulated detailed, empirically tested knowledge of which plants healed, which harmed, and how preparation and dosage changed their effects. This knowledge encoded in oral tradition, ritual practice, and specialized healer lineages constitutes one of humanity's oldest continuous bodies of applied science. Ethnobotany formalizes the study of this relationship, while ethnopharmacology and phytochemistry supply the tools to test, isolate, and validate the bioactive basis of traditional remedies.

The stakes of this field are not merely historical. Global demand for traditional and herbal medicine continues to rise sharply: the global herbal medicine market was valued near USD 198 billion in 2025 and is projected to approach USD 326 billion by 2032, growing at roughly 7.4% annually, driven partly by increased use of herbal cosmetics and natural dietary supplements alongside the broader rise in medicinal plant use (Editorial 2025/2026). More broadly, WHO's most recent global survey found that a majority of member states report that between 40% and 90% of their populations use traditional, complementary, and integrative medicine (TCIM), with 67% of respondents reporting 40-99% population use (World Health Organization). WHO officials have also noted that traditional medicine is frequently the closest or only accessible form of healthcare for populations lacking access to essential health services, since roughly half the world's population still lacks such access (DevelopmentAid 2025). This has translated into formal policy commitment: the World Health Assembly adopted the Global Traditional Medicine Strategy 2025-2034, built around four objectives strengthening the evidence base, ensuring safety and regulation, integrating TCIM into health systems, and optimizing its cross-sectoral value (World Health Organization 2025).

Medicinal plants are also economically and pharmaceutically significant beyond traditional-medicine markets narrowly defined. WHO estimates that around 40% of currently marketed pharmaceutical products can trace their origins to traditional medicine, underscoring the continuing relevance of ethnobotanical knowledge to biomedical drug discovery (Health Policy Watch 2025). This review surveys the methodological foundations of ethnobotanical research, examines how traditional knowledge is documented and pharmacologically validated, discusses landmark and regional case studies, and addresses the conservation, ethical, and policy challenges the field now faces.

The World Health Organization (WHO) has estimated that as many as 80% of the world population is dependent on traditional medicine for their primary health needs (Bannerman, R. H. 1982; S. Matya Raju et al., 2022). Plants have a significant historical role in indigenous medical systems including Ayurveda, Siddha, Unani, and homeopathy (J. Ramalakshmana et al., 2022). The main source of livelihood for the people in this area was found to be agriculture and they follow shifting cultivation practices (J. Ramalakshmana et al., 2022). Unfortunately, this precious biological wealth has been eroded to an alarming level by ruthless anthropogenic activities (J. Ramalakshmana et al., 2022). The Indian subcontinent is rich in medicinal plants used in traditional medical treatments (Ballabh, B., & Chaurasia, O. P. 2007); (Raju, S. M et al., 2022). The Ayurvedic concept (science of life) is believed to have appeared and developed between 2500 and 500BC in India. Although 20,000 medicinal plants are reported from India (Dev, S. 1997); (Raju, S. M et al., 2022). Plants are vital sources of bioactive compounds that not only sustain human nutrition but also provide therapeutic benefits for various diseases (Babu Y. R. et al., 2023; (Rao, P. J et al., 2025; Rao, P. J et al., 2026; J. Ramalakshmana et., al 2026).

Among the distinctive conservation traditions of India are sacred groves, which serve as reservoirs of biodiversity and cultural heritage (J. Ramalakshmana et al., 2026). Traditionally, the whole plant number of ailments such as diabetes, Arthritis, liver diseases, cancer, gastric ulcers, diarrhea, and dysentery, also used as an antiviral agent, Anti-inflammatory agent, anticonvulsant, astringent, anti-bacterial agent and also used in other Heart diseases (Wang, M.Y., Su, C. 2001); (Chandramouli, B et al., 2023). There has been a lot of research done on medicinally useful plant species that are exploited by the tribals during exploration trips (Raju. S. M et al., 2022). Distinguishing plant communities has been at the centre of plant science for centuries, with a traditional focus on the distribution, composition and classification of plant communities (Ramalakshmana. J et al., 2023). Biodiversity is continuously declining due to the activities of humankind (Ramalakshmana. J et al., 2023); Ramalakshmana, J. (2025). Sacred plants is also the repositories of rich medicinal plants, wild relatives of crops and many important species, which act as the valuable gene pool (Ramalakshmana. J et al., 2023). Flavonoids are produced in almost all the plant parts and cause flower pigmentation (Rai et al., 2017); (Durazzo, A et al., 2019); (Ramalakshmana. J et al., 2025). The use of medicinal plants holds deep historical roots and contemporary relevance, forming a bridge between ancient healing practices and modern biomedical science (Rani .M. S et al., 2026). Medicinal plants have served as the cornerstone of human healthcare since antiquity, with archaeological and textual evidence tracing plant based remedies across ancient civilizations including India, China, Egypt, and the Arab world (Ang-Lee et al., 2001; Stojanoski, (1999); Sowmithri, C et al., 2026).

Widespread agricultural development is one of the major causes of deforestation and biodiversity loss by J. Ramalakshmana & S. B. Padal (2022). The plant resources form an integral part of a huge inter-dependent system that encompasses the physical components and the biological community of life they have an important role to play in the development of agriculture and food security of a country (Raju, S. M et al., 2022). Biodiversity is the variety of living organisms considered at all levels of organization, from gene through species, to higher organization levels including habitats and ecosystems (Bhat et al., 2014; J. Ramalakasmana et al., 2022). India is noted for having a large number of sacred groves that include medicinal plants. Numerous sacred groves may be found in India, which is well recognized for its diverse culture and customs, particularly in its northeast and along the Western Ghats (Gadgil and Vartak 1981; Ramalakshmana. J et al., 2022).

Plants produce a huge amount of antioxidants and they can represent a potential source of new compounds having antioxidant properties with fewer side effects (Ramalakshmana et al., 2025). Plants were discovered to exhibit a variety of pharmacological effects, including anti-diabetic, antitumor, hypolipidemic, hypocholesterolemic, anthelmintic, anti-inflammatory, and antimicrobial activities (Ramalakshmana. J et al., 2025). Plants used in traditional medicine contain a wide array of compounds capable of treating both chronic and infectious diseases (Rao P. J. et al., 2025). The discovery of bioactive ingredients drawn from natural reservoirs marks the start of innovative medication development (Babu Y. R. et al., 2024). Qualitative phytochemical analysis revealed the presence of primary metabolites such as proteins and secondary metabolites, including saponins, terpenoids, coumarins, and anthocyanins (Chandra mouli. B. et al., 2024). Medicinal plants have been a cornerstone of traditional medicine and continue to provide a valuable source of new therapeutic agents. Phytochemicals, the bioactive compounds found in plants, exhibit a wide range of biological activities, including antimicrobial, anti-inflammatory, and antioxidant properties (Ramalakshmana et al., 2023; Rajesh et al., 2023; Sailaja C. S et al., 2024). The Rig Veda, which was composed in India between 3500 and 1800 B.C., has the earliest mention of using plants as medicine. Consequently, since the beginning of civilization, plants have been integral to the basic healthcare system (Babu Y. R. et al., 2023). Plants have a significant historical role in indigenous medical systems including Ayurveda, Siddha, Unani, and homeopathy (Ramalakshmana et al., 2023). According to the World Health Organisation (WHO), 80% of the world's population uses various plant parts and their various components as traditional remedies (Babu. Y. R. et al., 2023).

Materials and Methods

Review approach

This review synthesizes findings from recent (predominantly 2025) peer-reviewed and WHO sources on ethnobotany and medicinal plants, identified via literature search. The source material did not specify the databases searched, search date range, keyword strategy, or inclusion/exclusion criteria used for this review. Authors should insert those details here for example, following the PRISMA framework used by comparable systematic reviews in this field before submission.

Field-study methodologies represented in the literature reviewed

Contemporary ethnobotanical fieldwork, as represented across the primary studies synthesized in this review, typically combines several complementary methods: semi-structured interviews and key-informant surveys with traditional healers, herbalists, and community elders, often supplemented by household surveys; guided field walks and voucher specimen collection, allowing botanical identification to be verified rather than inferred from vernacular names alone; focus-group discussions, which triangulate individual reports against shared community knowledge; and quantitative ethnobotanical indices informant consensus factors (ICF), use-value calculations, relative frequency of citation, and fidelity levels which identify species and reported ailments showing the strongest cross-informant agreement, a proxy for likely efficacy and priority for pharmacological follow-up.

A recent ethnopharmacological study in Ethiopia's Metema district illustrates this integrated approach, combining semi-structured interviews, guided field walks, and focus-group discussions, and calculating informant consensus factors for both medicinal and “magical” plant applications in a district whose ethnically diverse population and settlement history had left its plant-use traditions comparatively underexplored (Metema study 2025). Such studies consistently find that medicinal plant use remains extremely widespread in some regions, with over 80% of the Ethiopian population relying on medicinal plants for healthcare (Metema study 2025).

A 2025 systematic review following PRISMA guidelines, drawing on the Scopus, EBSCO, and Web of Science databases, assessed how ethnomedicinal knowledge is documented, evaluated, and conserved across cultural settings, and concluded that integration of this knowledge into modern medicine continues to face persistent challenges chiefly the absence of standardized documentation protocols and insufficiently rigorous scientific validation (Duche-Pérez et al. 2025). This tension between the richness of traditional knowledge and the field's methodological fragmentation recurs throughout the contemporary literature.

Results

Regional case studies: Sub-Saharan Africa

Ethiopia has become one of the most intensively studied regions in recent ethnobotanical literature. A 2025 study in the Jabitehnan district of West Gojjam Zone documented traditionally used phytomedicines and found that ethnobotanical knowledge varied significantly across informant groups, while identifying deforestation, agricultural expansion, and unsustainable harvesting as the major threats to continued availability of medicinal plant species (Amsalu et al. 2025). The study's authors argued that safeguarding this knowledge base requires strengthening intergenerational knowledge transfer, promoting sustainable harvesting, and supporting community-based conservation, alongside further phytochemical work to validate the identified species for their medicinal applications (Amsalu et al. 2025).

Regional case studies: West Africa

Quantitative ethnobotanical surveys in Nigeria have attempted to map specific plant species against specific reported ailments across urban and peri-urban communities, applying use-value and consensus statistics to prioritize species for pharmacological screening. However, researchers and readers should note that not all published surveys in this literature have withstood scrutiny: a 2023 quantitative ethnobotanical study from Osun State, Nigeria, was formally retracted after an investigation found evidence of systematic manipulation of the publication and peer-review process a reminder that methodological rigor and editorial oversight remain uneven across the ethnobotanical literature (Evidence-Based Complementary and Alternative Medicine 2023, retracted 2025).

Botanical family-level reviews

Beyond regional surveys, researchers increasingly synthesize ethnobotanical, phytochemical, and pharmacological data at the level of plant families. A 2025 review of the Amaranthaceae family comprising roughly 175 genera and over 2,000 species, ranking among the most morphologically and ecologically diversified plant families compiled two decades of literature on eight medicinally important wild herbs within the family, integrating botanical characterization with phytochemical, pharmacological, and toxicology data, based on a systematic search of the Scopus, Science Direct, Google Scholar, and Web of Science databases (Amaranthaceae review 2025). Such family-level syntheses help identify recurring bioactive compound classes and guide more targeted screening.

Andhra Pradesh, India a regional deep dive

Andhra Pradesh, in south eastern India, offers an unusually dense and instructive case study because its ethnobotanical literature consists not of a few large syntheses but of dozens of small, tribe- and mandal-specific surveys spanning the Eastern Ghats, the Nallamala forest, and the Godavari basin.

Methodology

Andhra Pradesh studies apply the same quantitative-ethnobotany toolkit described above, at a finer geographic grain. A 2024 study in Polavaram Mandal, West Godavari, conducted 18 field visits across eight villages and interviewed 126 informants using open-ended and semi-structured questionnaires, analyzing the results with Relative Frequency of Citation, Family Importance Value, and Informant Consensus Factor, and documented 53 plant species used to treat various ailments, with herbs the most common growth form (27 species) and leaves the most frequently used plant part, accounting for 37% of preparations (Singh et al. 2024).

Scale and fragmentation

Where the broader literature has begun consolidating into family-level or country-level systematic reviews, Andhra Pradesh's knowledge base remains scattered across single-tribe papers, each typically covering 25-55 species:

Anantapur district: 25 medicinal plants documented among Sugali tribes, used mainly for cough, cold, headache, dysentery, fever, and jaundice, with far fewer reports of major chronic diseases such as diabetes; researchers also noted tribal hesitance to share knowledge for fear of triggering overharvesting of the species involved (Anantapur study).

Araku Valley, Visakhapatnam district: a survey of 49 traditional healers from the Kondadora tribe recorded indigenous disease-treatment knowledge, explicitly framed around the problem that this knowledge remains inadequately documented, which the authors argued impedes its wider validation and use (Araku Valley study).

Chittoor district (Madanapalle mandal) spans three distinct tribal groups (Yanadi, Chenchu, and Sugali) living in forest zones (Pratap et al. 2019).

A bioprospecting-oriented strand

One Andhra Pradesh study stands out for explicitly linking survey data to drug-discovery targeting from the outset. A study of the Eastern Ghats of Andhra Pradesh was designed specifically to flag plant taxa with antitumour, wound-healing, and antimicrobial potential based on tribal use patterns, organizing the data by plant part, disease, and ethnic tribe to support future anticancer drug discovery (Kumari & Ammani 2020). This mirrors the "documentation as pharmacological triage" logic described below, applied at regional scale.

Conservation a step beyond most regional cases

Unlike most of the regional surveys discussed elsewhere in this review, Andhra Pradesh has a formal First Red List of Medicinal Plants, a dedicated conservation-assessment and management-planning exercise. A 2025 field survey in the Nallamala Forest (Macherla Range) combined quadrat-based biodiversity sampling with semi-structured ethnobotanical interviews in a single study, recording 30 species across 6 families used mainly for fever, skin infections, respiratory disorders, digestive problems, and bone fractures, with leaves and roots the dominant plant parts used (First Red List of Medicinal Plants of Andhra Pradesh, n.d.). Pairing formal biodiversity assessment with ethnobotanical interviewing in the same fieldwork is a more integrated conservation approach than most of the standalone surveys elsewhere in the literature.

Where Andhra Pradesh lags the broader field

No Andhra Pradesh-wide or Eastern Ghats-wide systematic review yet consolidates these dozens of tribe-specific datasets into a single comparative resource, unlike the family-level and country-level syntheses discussed above. Clinical follow-through is also limited: Andhra Pradesh studies consistently conclude by recommending further pharmacological or phytochemical research rather than reporting species that have advanced beyond that stage (Chandu et al. 2021), leaving the validation bottleneck described below fully intact at the state level.

From traditional use to pharmacological validation

The core scientific challenge in this field is translating a traditional use-report ("this bark is chewed for fever") into a validated, mechanistically understood therapeutic claim. This process typically proceeds through several stages: extraction and phytochemical profiling to identify candidate bioactive compounds; in vitro bioassays against relevant biological targets; in vivo studies in animal models; and, in a small minority of cases, controlled human clinical trials.

Anticancer research offers a well-documented example of this pipeline. A 2025 review of Ethiopian ethnopharmacological knowledge on plant-based anticancer agents found that several traditionally used species including *Acokanthera schimperi*, *Clematis simensis*, *Euphorbia schimperiana*, *Kalanchoe petitiana*, and *Plumbago zeylanicum* showed potent cytotoxic activity against various human cancer cell lines in preclinical testing, with IC50 values ranging from 0.086 to 6.37 µg/mL, activity levels that fall well within ranges considered promising by standard cytotoxicity benchmarks (Belete & Beyna 2025). Yet the same review emphasized that only a fraction of ethnopharmacologically identified anticancer plants have progressed through preclinical evaluation to controlled clinical trials, reflecting how traditional use continues to substantially outpace rigorous biomedical validation (Belete & Beyna 2025).

This gap a large reservoir of traditionally reported efficacy against a comparatively small body of clinically confirmed activity is one of the field's defining features, and one reason ethnobotanical documentation is often framed as a hypothesis-generation step for pharmacology rather than a conclusion in itself. Infectious disease research shows a parallel pattern: growing interest in plant-derived antimicrobials is driven partly by the rising threat of multidrug-resistant pathogens and the ongoing burden of infectious disease globally, alongside broader interest in naturally derived medicines and culturally sensitive treatment approaches (Journal of Herbal Medicine special issue, n.d.).

Ethnobotany as a wellspring of modern pharmaceuticals

The pharmaceutical relevance of ethnobotanical knowledge extends well beyond herbal medicine markets. Several of medicine's most consequential drugs trace their origin to plants first used within traditional healing systems, subsequently isolated, characterized, and in many cases chemically modified by biomedical science: quinine and its antimalarial derivatives from *Cinchona* bark used in South American traditional medicine; the analgesic and anti-inflammatory compounds underlying aspirin from willow bark remedies used across multiple traditions; the antimalarial artemisinin isolated from *Artemisia annua* following its identification in classical Chinese medical texts; and the anticancer agent paclitaxel (Taxol), derived from Pacific yew bark. WHO's estimate that roughly 40% of pharmaceutical products have origins traceable to traditional medicine underscores that this is not a marginal historical curiosity but an ongoing structural feature of drug discovery (Health Policy Watch 2025).

This pipeline function explains why ethnobotanical documentation is treated as scientifically valuable even before pharmacological confirmation: it functions as a triage mechanism, directing costly bioassay and clinical resources toward plant species with the strongest cross-cultural or cross-informant evidence of efficacy, rather than screening plant biodiversity at random.

Discussion

Conservation, threats, and knowledge erosion

Ethnobotanical knowledge and the plant resources it depends on face converging pressures. Habitat loss driven by deforestation and agricultural expansion combined with unsustainable wild-harvesting practices has been repeatedly identified as a primary threat to the continued availability of medicinally important species, a finding echoed across multiple recent regional surveys (Amsalu et al. 2025). At the same time, traditional knowledge itself is vulnerable to erosion as intergenerational transmission weakens, a concern that has led researchers to explicitly call for strengthening knowledge transfer between generations and supporting community-based conservation initiatives alongside species protection, treating cultural and biological conservation as inseparable goals (Amsalu et al. 2025).

This dual vulnerability of species and of the knowledge attached to them is a recurring theme in the field's more synthetic literature. The 2025 systematic review of ethnomedicinal documentation practices framed conservation of medicinal plants and conservation of the traditional knowledge surrounding them as a joint objective, alongside the goals of improving documentation standards and strengthening therapeutic-application evaluation, reflecting a broader shift in the field away from treating “plant conservation” and “knowledge conservation” as separate problems (Duche-Pérez et al. 2025).

Ethical, legal, and policy dimensions

Ethnobotanical research raises persistent ethical questions around intellectual property, informed consent, and equitable benefit-sharing. Because traditional knowledge is typically held collectively rather than by individual “inventors” in the legal sense, conventional patent frameworks fit poorly, and researchers and pharmaceutical developers have faced sustained criticism over cases where commercially valuable compounds were developed from indigenous knowledge without corresponding recognition, consent, or compensation to source communities. International instruments such as the Convention on Biological Diversity's Nagoya Protocol attempt to address this through access-and-benefit-sharing requirements, though implementation and enforcement remain uneven across jurisdictions.

At the health-systems level, policy has moved toward formal integration rather than parallel or marginal status. The WHO Global Traditional Medicine Strategy 2025-2034 explicitly expands on earlier strategies and updates core definitions, including a formal definition of “integrative medicine” describing interdisciplinary approaches combining conventional and traditional care, providing conceptual clarity intended to help countries develop coherent policy and pursue integration (Policy implications of WHO's Global traditional medicine strategy 2025-2034, n.d.). This reflects a broader normative history: the 1978 Declaration of Alma-Ata first formally recognized traditional medicine's role in primary healthcare, and the 2018 Declaration of Astana reaffirmed the importance of traditional knowledge in achieving universal health coverage, positions further reinforced by United Nations General Assembly resolutions in 2019 and 2023 calling for safe, evidence-based traditional and complementary medicine to be included within health-care systems supporting universal health coverage (Policy implications of WHO's Global traditional medicine strategy 2025-2034, n.d.).

It is also worth noting that widely repeated statistics in this field deserve scrutiny. The frequently cited claim that 80% of Asian and African populations rely on traditional medicine for primary healthcare traces to a single 1983 estimate, and has been repeated in scientific literature, official reports, and the press ever since, despite limited updated verification (WHO-SAGE analysis, n.d.). A WHO-SAGE study surveying over 35,000 participants across six middle-income countries found substantial variation from this figure: traditional medicine use was comparatively infrequent in China, Ghana, Mexico, Russia, and South Africa, and even in India, where use was highest, only about 12% of respondents reported traditional medicine as their most frequent source of care over the prior three years, though almost 19% reported some traditional medicine use within the past year. The study's authors cautioned that policy efforts to harness traditional medicine for population health may be poorly matched to populations that increasingly prefer modern medical care (WHO-SAGE Study, n.d.). This illustrates a broader methodological caution for the field: prevalence statistics vary substantially by measurement approach, time period, and population, and older figures should not be assumed to still hold.

Challenges and research gaps

Several persistent challenges limit the field's scientific and practical impact. Documentation inconsistency remains widespread: ethnobotanical surveys vary considerably in methodology, informant sampling, and reporting standards, complicating cross-study comparison and meta-analysis a gap recent systematic reviews have explicitly identified as needing standardized protocols covering documentation, evaluation, and conservation practices (Duche-Pérez et al. 2025). A persistent validation bottleneck compounds this: as the anticancer literature illustrates, the number of species with traditional use-reports vastly exceeds the number that have undergone rigorous preclinical or clinical evaluation, meaning most traditional claims remain scientifically untested rather than confirmed or refuted (Belete & Beyna 2025).

Research integrity is a further concern: the retraction of published ethnobotanical surveys due to manipulated peer review is a reminder that the field's growing publication volume needs to be matched by editorial rigor (Evidence-Based Complementary and Alternative Medicine 2023, retracted 2025). Statistical overreach in headline figures is also common long-repeated prevalence statistics, such as the “80% reliance” figure, often outlive their evidentiary basis and can distort both scientific framing and health policy, since more recent, better-sampled surveys frequently find substantially different and more variable rates of use (WHO-SAGE analysis, n.d.). Finally, conservation urgency remains acute: habitat loss and unsustainable harvesting threaten to eliminate species and the specific knowledge tied to them faster than documentation and pharmacological evaluation can proceed (Amsalu et al. 2025).

Future directions

Based on the current state of the field, several priorities stand out for future ethnobotanical and ethnopharmacological research: standardized, comparable documentation protocols, building on frameworks such as the Consensus Statement on Ethnopharmacological Field Studies (Con SEFS), to make cross-regional and cross-cultural datasets more usable for meta-analysis and systematic pharmacological prioritization; expanded preclinical-to-clinical pipelines for species with strong cross-cultural consensus of efficacy, closing the gap between traditional use-reports and clinically confirmed therapeutic value; integrated conservation strategies that treat species protection and traditional-knowledge preservation as a single objective, including community-based conservation and stronger intergenerational knowledge-transfer programs; equitable benefit-sharing and consent frameworks that ensure source communities are formally recognized and compensated when their knowledge contributes to commercially successful pharmaceutical or herbal products; rigorous, updated epidemiological surveys of traditional medicine use, to replace outdated or poorly sourced prevalence statistics with regionally specific, methodologically transparent data suitable for health policy; and formal health-system integration, following the direction set by the WHO Global Traditional Medicine Strategy 2025-2034, with continued attention to safety regulation as traditional and complementary medicine products become more widely adopted.

Conclusion

Ethnobotany occupies a genuinely interdisciplinary position: it is simultaneously an anthropological record of human relationships with the plant world, a practical resource for global healthcare, and an engine of pharmaceutical discovery. The scientific literature from the past two years underscores both the field's vitality expanding regional surveys, family-level phytochemical syntheses, and a new decade-long WHO strategy and its unresolved tensions, from inconsistent documentation standards and a persistent validation bottleneck to the accelerating loss of both biodiversity and the cultural knowledge attached to it. Addressing these tensions will require closer integration between ethnobotanical fieldwork, rigorous pharmacological science, conservation policy, and equitable governance of traditional knowledge work that is increasingly urgent given how much of both current global healthcare and future drug discovery still depends on it.

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