

# The Economic Impact of Medicinal Plants on Health Systems in Developing Countries

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## ABSTRACT

The use of medicinal plants plays a crucial role in the healthcare systems of developing countries, particularly in rural areas where access to conventional medicine is limited. This paper examines the economic impact of medicinal plants on health systems, focusing on their contribution to reducing healthcare costs, generating income, and sustaining biodiversity. It explores the historical and cultural significance of traditional medicine, the biodiversity of medicinal plants, market trends, and their integration into national health policies. The study highlights challenges such as regulatory barriers, intellectual property rights, and sustainability concerns while showcasing successful case studies from countries that have effectively incorporated medicinal plants into their healthcare frameworks. The findings emphasize the need for strategic policies, investment in research, and collaboration between traditional and modern medical systems to maximize the economic and health benefits of medicinal plants in developing nations.

**Keywords:** Medicinal plants, traditional medicine, economic impact, healthcare system, biodiversity, sustainability.

## INTRODUCTION

The use of medicinal plants is an integral part of the health practices of most people in developing countries. Despite the increasing dominance of modern health care practices in recent years, the bio-cultural legacy of traditional health care practices based on medicinal plants continues in these countries. Access to cheap medicinal plants appears to be an essential component in coping with the recent increase in health care costs and also with the wide accessibility to such plants by most households in rural areas. In most developing countries, traditional systems play an important role in providing health care, particularly primary health care (PHC). Traditional medicines satisfy the cultural literacy requirements of most societies in these countries. Moreover, there is a strong social convention and reluctance to easily accept or easily adapt to imported systems of drug management. Because of these factors, the WHO, at its annual assembly in 1977, adopted a resolution that called for a coordinated programme for the integration of traditional medicine into national health care systems [1]. Medicinal plants have been used from time immemorial in all communities to address health problems. In India, ancient Ayurvedic, Unani, and Homeopathic medicine systems are based on plants that are continuing to be used for preventive and healthcare practices. The knowledge and usefulness of plants for medicine have been stated in the Atharva Veda, which is the oldest human treatise on nature. The treatment prescribed in the Vedas was predominantly done through plants. Later texts, particularly the Charaka Samhita and Susruta Samhita, are compilations of systematic Ayurvedic knowledge. At that time, the knowledge system more or less had a monopoly over the cure practices in Asia. With time, the popularity of the Ayurvedic system dwindled because of the lack of a knowledge-bridge with scientific rationality in their cure process. However, the continuing dependency on plants for relief and cure in most parts of the world bears witness to their therapeutic value [2, 3].

### Historical and Cultural Significance of Medicinal Plants

Medicinal plants have been gathered and used in various health systems for thousands of years. They have been used in various cultural and geographic regions, from the Sumerians in ancient Mesopotamia, in the first millennium BC, to the present. Similarly, indigenous people in the interior of Borneo, the Amazon, and Australia have also used medicinal plants for centuries. Throughout history, medicinal plants have played a significant role in health, culture, and economy. They were always tied up with the realization and faith of the existence of a supernatural being. Adoration and fear of nature's power lie in the realization that its power to cure is due to the favor of the supernatural power, i.e., God, goddess, deity, or other supernatural beings who create and maintain the universe. Folk medicine practices also define medicinal plants as gifts from the gods. Therefore, the fear of supernatural retributions in case of mishandling has also been served to preserve, conserve, and forestall the misuse of medicinal plants. Each culture, society, or ethnic group has its medicinal plant preparation and method of treatment. As a result, they protect and develop diverge medicinal plant species in the time being and also pass it over from generation to generation ethno-pharmacological information. The gift of medicinal plants has been associated with rituals, religious beliefs, and otherwise customarily maintained, implying an animist or pantheistic worldview. From the perspective of ethno-botany, the majority of medicinal plants are treated as omnipotent, omnipresent, immaterial substances that have the power to cure ailments that otherwise necessitate material treatment. Ethno-botanical practices often encompass various complex inter-relationships and the involvement of different reverence or sacred acts among ethnic societies. Hence, the protection and conservation of medicinal plants have mainly been kept in the traditional religious domain. In most areas of the world, healers deal with the management and preservation of medicinal plants and their habitat. The spiritual aspect of the fear of supernatural retribution has also played a major role in preserving the medicinal plants since folk medicine practices. It also implicitly shows that the cultural values of medicinal plants are predominant before time immemorial [4, 5].

### Biodiversity And Availability of Medicinal Plants in Developing Countries

Medicinal plants have been used throughout human history for various purposes, including the prevention and treatment of diseases and the improvement of human health. One-fifth of plant species worldwide can cure various human ailments effectively. A diversity of medicinal plants can be found in any part of the world, but developing countries, such as those in Africa, Asia, and South America, are particularly rich in both the number of specifically useful species and the traditional knowledge about their methods of application. The ecological aspect of these raw materials is also noteworthy, as encompassed species are often endemic. More than half of all plant species grow in tropical regions, many of which have not even been identified. This is especially true in rainforests. However, these species are most affected by habitat destruction and climate change. The individual relationship between the availability of medicinal plants and ecosystem destruction is very complex. Due to several diversity-related criteria, it can be seen that the groups of plants endemic to a region have special importance in the biodiversity of the region and often have special importance for the local human population [6, 7]. Hence, the destruction of rainforests can favor the easy accessibility of species previously hidden under the canopy. As a disease or an abnormal state in a human being is characteristically due to the existence of a particular pathogen (often a bacterium or a virus), the search for an appropriate treatment has traditionally been based on finding a toxic agent, a substance capable of killing or paralyzing the pathogen. Drugs were, and still are, produced from plants, animals, minerals, and synthetically. In general, these methods are not acknowledged as safe and effective preventive measures against diseases by the biomedical model. The use of contemporary medicines is often beyond the financial reach of Third World countries. Hence, the role of medicinal plants in the health system of these countries is of great importance. Epidemiological surveys report the high-level use of traditional healers among African, Asian, and Latin American populations (80% of consultants in perceptive studies). However, access to this medical practice is often arduous. There are few practitioners available, and they are usually distant from the majority of the population. Furthermore, a lack of proper infrastructures and training can lead to unhygienic practices that exacerbate the diseases [8, 9].

### Traditional Knowledge and Use of Medicinal Plants

Ethnobotany and Medicinal Plant Use Ethnobotany is the scientific study of traditional knowledge and customs that use plants. The origin of the term is associated with the lack of botanical knowledge in countries that colonized and, consequently, with the perspective of a question and an answer directed by a number. The realization of the importance of this knowledge occurred in the 19th century by a physicist, a mystic, and a botanist working in India independently—who gave new meaning to the study of Indian

knowledge. Therefore, history reports that colonization increases the loss of the natural heritage of humanity. In this sense, it was a measure of colonial politics that prevented original ethnobotanical research from being pursued in the colonies. Currently, the study of ethnobotanical knowledge for medicinal plant therapy—which, in general, deals with diseases that can be treated without medication—has been gaining ground in global scientific research through phytochemical studies. It should be emphasized that the medicinal plants that people in various countries are studying are from the local flora, and as a result, about 85% of traditional medicine comes from plants. The study of ethnobotanical knowledge with medicinal plants aims for a responsible combination of health assets with economic and healing ones [10, 11].

#### **Phytochemicals and Pharmacological Properties of Medicinal Plants**

The therapeutic properties of many plants have been known since ancient times, but the active compound was unknown. In many cases, experience and tradition showed common uses of local plants on certain diseases. The origin of modern science, especially in the Renaissance, improved the techniques to test the therapeutic use of products (up to now, people drank decoctions, applied cataplasms, etc.) and made it possible to isolate the active principles of medical plants. This isolation took place between the 17th and 18th centuries. Since then, these active principles have been obtained synthetically in laboratories to produce new medicines. This fact has enabled the development of medicine in general. Present medicine has its foundation on the industry producing pharmaceutical medicines based on the active principles of plants [12, 13]. Plants produce a variety of chemical compounds known as phytochemicals, which have specific pharmacological properties. Until now, 250 compounds with therapeutic activity have been identified. It is expected that this figure will be greatly increased in the future. The compound responsible for the therapeutic effect of a specific plant is not known in the majority of cases. The most common problem is that several compounds of one plant are responsible for a variety of effects, which makes the study of these effects. Many compounds are neither identified nor synthesized in the laboratories. This fact makes it difficult to analyze their therapeutic use. For instance, it is known that the resin obtained from different plants of the Taxodiaceae family was used in ancient Egypt to cure several diseases. We also know that the active principle is taxol, which produces cytotoxic effects. Thus, this compound was considered for use in several therapeutic applications as a cancer drug. The resin contains other compounds with cytoprotector effects, which avoids the administration in *in vivo* experimental models. Thus, the biotechnological development of the research has been complex [14, 15].

#### **Economic Value and Market Trends of Medicinal Plants**

Urban societies have become more health conscious and are treating and preventing illnesses and diseases more naturally. The trade in medicinal plants has increased all over Africa, especially in developing countries, as the global market demands more organic and natural remedies to promote health and emotional well-being. With the increasing demand for alternative, natural, and traditional medicine worldwide, many countries in Africa have started focusing more on the commercialisation of their traditionally used medicinal plants as a means to increase income and reduce the poverty level of the local population. At the same time, people want to treat diseases without using chemical drugs and to use traditional medicine as a secondary treatment. This is a behavior change from the olden days, since traditional medicine was mostly the first line of treatment. In the Asian region, the trade in and the consumption of traditional medicine is believed to account for a significant market share of the Western style of modern drugs in many national health systems [16]. Medicinal plants have been or are still being used by more than 80% of the world's population as a primary medicine. Medicinal plants can provide economic value, as well as create market opportunities throughout the planet for both people and the environment. For local people in rural and urban areas, these plants can be used to create trades, thus generating income, alleviating poverty, and improving the quality of life. The trade dynamics of the medicinal plant market are complex and vary locally, thus, it may be influenced and determined by local circumstances. One critical issue is trade pricing. While some argue that the price paid to collectors should be increased to enhance the economic benefits at the grass-roots level, others argue that higher income may encourage even more unsustainable harvesting of medicinal plants. In addition, the trade of medicinal plants is characterized by a few traders amassing large quantities from primary collectors at low prices. As a result, the collectors who ultimately bear the risks and invest considerable time in collection activities seldom see adequate returns on their investments. Trade malpractices such as misinformation, price-fixing, and unjust competition occur. Several global organizations, recognizing the importance of the trade in medicinal plants, are promoting and assisting in the development of various symposiums, conventions, laws, and sustainable management practices. Given the right conditions and

circumstances through these forums and other initiatives, there could be increased market opportunities in the international trade of medicinal plants, particularly for small-scale producers, which may contribute to sustainable livelihoods. However, there is also a downside. This will present a new and unforeseen challenge, and there may be local producers in developing ravaged countries who will be unable to maintain their hold and do not have the resources to comply with the stringent regulatory practice and market requirements of industrialized countries. The birth of a lucrative global marketplace from the utilization of medicinal plants may not automatically enhance the general welfare of local populations. On the contrary, it could bring forth an era of their increased exploitation and the permanent loss of biodiversity many cherish, until its disappearance or banalization [17, 18].

### **Challenges and Opportunities in Integrating Medicinal Plants into Health Systems**

Rising healthcare costs and the side effects of synthetic drugs have generated greater interest in herbal medicines in developing and developed countries. However, the integration of medicinal plants into formal health systems in developing countries faces challenges due to skepticism about traditional medicine. Given the limited health budget, health authorities may hesitate to spend scarce funds on medicinal plants or the associated research until compelling evidence is available on their cost-effectiveness. Yet, donors and non-government organizations (NGOs) are unlikely to fund research on seeds or plants until there is substantive evidence that could be used for therapeutic purposes. Furthermore, most developing countries, including India, do not have regulatory and monitoring frameworks in place to ensure the safety, efficacy, and quality of medicinal plants. Significant resources will be required to set up and standardize facilities to enable objective evaluation of traditional medicine, Western drugs, and various procedures. In response to this skepticism, there are calls for a lower profile and focused research on the safety, efficacy, rational use, and cost-effectiveness of therapeutic plants. Considerable opportunities exist for creating synergies between the indigenous/traditional health systems and the national health delivery programs, both for reaching the sizable segment of the population who currently use only traditional health care and for generating new resources for a generally impoverished health system. Many developing countries have a rich repository of medicinal plants, which can be used for diversifying their health care and generating income. In many countries, medicinal plants can be found growing in the wild, and many species can be cultivated. There are several ways in which national health authorities and donors can promote medicinal plants. Policy makers should recognize the potential value of traditional medicine, including medicinal plants. A wide variety of organizations and institutions involved in the training and education of health workers and community groups should be encouraged to enlist the expertise of the elderly traditional healers and other folk medicine practitioners and to include in their curricula information about the nature and use of common local medicinal plants. There are already several initiatives demonstrating the potential benefits of collaboration between traditional and modern health systems. However, it is essential that an appropriate blend is achieved and that the process of integration is balanced. Health workers, through their diagnostic and therapeutic practices, are central to the integration process. In many countries, for example, healers and midwives have already been successfully integrated through training courses. A public health approach may help develop a partnership between the different health systems for a positive impact on health. Further, it suggests research priorities to generate data for the formulation of a comprehensive policy to harmonize the diverse health practices in India [19, 20].

### **Regulatory Frameworks and Intellectual Property Rights**

Medicinal plants have gained increasing recognition in recent years for their potential contribution to health systems in developing countries. There is, however, ongoing public controversy about the commercial exploitation of medicinal plant knowledge and resources. While bioprospecting offers the possibility of greater market integration for developing countries, the sustained exploitation of traditional knowledge holds potentially adverse social, economic, and environmental consequences, especially for indigenous communities. There are profound ethical implications to be addressed in the commercialization of medicinal plants. Sustainable use can only be achieved within the framework of clear guidelines and regulations [21].

### **Currents Regulations**

The potential commercial value of medicinal plants has spurred several initiatives to regulate their use and commercial exploitation. There is worldwide concern about the increasing pressure on plant resources, and proposals have been made to develop the collection, trade, and use of medicinal plants under a sound management system to ensure the sustainable use of plant resources and to benefit the improvement of health care. Many countries in Asia, Africa, and Latin America have enacted regulations

that address the exploration and protection of medicinal plant resources. Moreover, countries that are parties to the Convention on Biological Diversity (CBD) are obliged to develop national measures to regulate access to genetic resources and their commercialization, based on the principle of prior informed consent (PIC) and the equitable sharing of benefits. At the international level, the World Trade Organization (WTO) provides a general framework regulating the trade of goods, including plant species; however, there is at present no specific WTO agreement on the protection of plant resources. Crisis resulting from biopiracy—the unauthorized exploitation of knowledge and resources—have raised the need for additional protection and the development of a regulatory framework that will govern the collection, research, and commercialization of medicinal plants. However, there are difficulties in reconciling the economic interests of commercial companies, the conservation of biodiversity, and the need for equitable sharing of the benefits derived from medicinal plants. In addition, it is equally complicated to harmonize the national legal system with agreements reached at the international level [22, 23].

### Case Studies of Successful Implementation

Success stories from countries like Bangladesh, Brazil, India, Indonesia, Malaysia, and the Philippines highlight how traditional knowledge of medicinal plants has been validated and integrated into health systems. These case studies reveal lessons learned, factors contributing to success, and implementation hurdles, emphasizing the role of medicinal plants in primary healthcare in developing nations. They provide examples of successful initiatives that enhance community health and local economies through the abundant availability of medicinal plants. Initiatives involve small-scale plantations, community gardens, conservation, and sustainable resource management, leading to improved healthcare and economic benefits. The reviewed cases shed light on effective implementation strategies and underline the positive potential of drug-plant-based health systems supported by local communities. A community-oriented approach promotes the sustainable use of national medicinal resources, contributing to basic health facilities. In Bangladesh, a tested laboratory model has shown promising results over a decade [24, 25, 26, 27].

### Future Research Directions and Recommendations

This paper identified that research on the pharmacological potential of species evaluated is critical to guarantee their sustainable harvest and to ensure safe and effective use are necessary. Forgotten or little-known edible, aromatic, and medicinal but less-sheltered plant species in developing countries may contain undiscovered bioactive compounds. Globalisation processes have accelerated and rendered the shift of products through global value chains (GVCs) much easier. This offers opportunities for poor countries to enhance labour markets and increase foreign investment. Due to multiple factors, such as the lack of local technology change, the so-called latecomers' curse may prevent the insertion of these economies. However, through the domestic enhancement of linkage strategies, developing countries may enter and progress through GVCs. Consequently, the active support by patients, managers of health systems, governments, and the pharmaceutical industries is essential to apply well-defined rules for plant material used in the community pharmacopoeia. In parallel, in-depth interdisciplinary studies involving ethnobotany, pharmacology, and economics should be made to confirm the economic impact of traditional practices. Eventually, once the information is corroborated, strong efforts can be adjudicated upon to evidence-based economic participate for setting up sustainable arrangements for traditional pharmacopoeia concerns users, prescribers, and managers. Analysis of price trends for more than 100 species traded in India over 15 years indicates that, overall, profit margins for collectors, wholesalers, and women brokers have decreased. Sustainable collection was found to be associated with a strong dependence on forests, and prices for wildcrafted goods have remained highly variable. A national review of forest policies, which could increase the value of forest-based trade in MAPs, found that in many cases, existing policies were incompatible with income generation. Particular problems include mechanisms designed to manage forest trading unjustly, restrictions on female participation in MAPs trade, and the use of bureaucratic procedures to obstruct trade [28, 29, 30].

### CONCLUSION

Medicinal plants continue to be a vital component of healthcare systems in developing countries, providing cost-effective and accessible treatment options for many populations. Their economic impact extends beyond healthcare cost reduction to include job creation, income generation, and conservation efforts. However, challenges such as overexploitation, lack of regulatory frameworks, and market inequalities hinder their full potential. Sustainable integration into national healthcare policies, backed by scientific research and fair trade practices, can enhance the economic and health benefits of medicinal

plants. Strengthening collaboration between traditional and modern medicine, promoting responsible commercialization, and ensuring equitable benefit-sharing are essential for harnessing the full potential of medicinal plants in developing economies.

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