

## Review Article

# Operation of branded Ayurveda Supplementary outlets Through Cooperative Tourism, Across the States: A Concise Study

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## A B S T R A C T

Ayurveda has witnessed significant growth in Kerala, positioning the state as a global hub for wellness tourism. This study examines the role of Ayurveda pharmacy within Kerala's cooperative tourism model, focusing on its operational structure, inter-state expansion, and resilience to environmental and socio-economic challenges.

Based on secondary research, the paper analyzes cooperative mechanisms, economic and environmental factors, and the integration of indigenous knowledge systems. It highlights how cooperative-based Ayurveda initiatives contribute to sustainable development, healthcare accessibility, and regional economic growth. The findings emphasize the importance of adaptive strategies, effective governance, and sustainability practices to strengthen the resilience and scalability of Kerala's Ayurveda tourism model.

**Keywords:** Ayurveda, Tourism, Co-operative, Supplementary, wellness, Health

**Introduction**

Ayurveda, an ancient system of medicine with roots in the Indian subcontinent, has experienced a renaissance in recent decades, particularly in the southern state of Kerala, India. Kerala's unique climatic, geographical, and cultural landscape has enabled the region to emerge as a global epicenter for Ayurveda practice, research, and wellness tourism. Parallel to this, Kerala's cooperative movement—historically robust in the agricultural and service sectors—has begun to intersect with the burgeoning health and wellness tourism industry, particularly in the operation and dissemination of Ayurveda pharmacy and treatment centers across state boundaries. This research paper offers a comprehensive study of the operational mechanisms, challenges, and transformative potential of Ayurveda

pharmacy as it functions through Kerala's cooperative tourism model, with particular attention to inter-state expansion and resilience in the face of environmental and socio-economic perturbations.

This paper is structured as follows: The introduction contextualizes Ayurveda's evolution in Kerala and the emergence of cooperative tourism. Section Two critically reviews the historical and contemporary dynamics of Ayurveda pharmacy in Kerala, with a focus on cooperative structures. Section Three analyzes the operational, economic, and environmental dimensions of Ayurveda pharmacy under the cooperative tourism model, drawing on case studies, regional climate data, and the lived experiences of local and indigenous communities. Section Four examines inter-state expansion, the diffusion of Kerala's Ayurveda

pharmacy model, and its adaptation to diverse ecological and socio-political environments, including the effects of extreme climatic events such as the recent Kerala floods. Section Five discusses the socio-cultural, economic, and environmental implications, with a focus on sustainability, resilience, and inclusivity. The conclusion synthesizes key findings and offers recommendations for future research and policy.

By integrating the extensive literature on atmospheric and solar influences on Kerala's climate (Kiran, 2021, 2022; Thomas et al., 2024a, 2024b), [1,2,3,4] as well as ethnographic insights into indigenous knowledge systems (Vahia et al., 2017), [5] this paper situates Kerala's Ayurveda pharmacy operations within a broader framework of environmental variability, local adaptation, and cooperative innovation.

## The Evolution of Ayurveda in Kerala

Ayurveda, literally meaning "the science of life," is one of the world's oldest holistic healing systems. While Ayurveda is practiced throughout India, Kerala occupies a special place in its history and development. The region's unique flora, climate, and the preservation of traditional knowledge through hereditary physician families (Ashtavaidyas) have contributed to the evolution and resilience of Ayurveda in Kerala. The state government's investment in Ayurveda education and research, alongside the rise of health tourism, has enabled Kerala to brand itself as a global Ayurveda destination.

## Ayurveda Pharmacy: From Local Practice to Organized Operation

The pharmacy—the preparation, dispensing, and regulation of Ayurvedic medicines—has always been central to Ayurveda practice. Traditionally, Ayurvedic physicians (Vaidyas) prepared medicines from locally sourced herbs, minerals, and animal products, tailored to individual patients. With the institutionalization of Ayurveda in the twentieth century, pharmacies evolved from small-scale, family-run units to industrial and cooperative enterprises, regulated by the Drugs and Cosmetics Act and the Ministry of AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy).

In Kerala, Ayurveda pharmacies are diverse, ranging from household setups serving local communities to major cooperative societies supplying medicines to hospitals, clinics, and wellness centers. Cooperative pharmacies have played a critical role in ensuring quality control, ethical sourcing, and equitable access, especially as demand has surged due to domestic and international wellness tourism.

## The Cooperative Movement in Kerala

Kerala's cooperative movement, with deep roots in the agricultural, dairy, and banking sectors, has expanded into healthcare and wellness in response to growing

public demand and governmental support for alternative medicine. Cooperative societies operate on democratic principles, with ownership and management vested in the hands of their members, who are often drawn from local communities, practitioners, and employees. These organizations are uniquely positioned to balance commercial objectives with social responsibility, ensuring that the benefits of Ayurveda's popularity are distributed equitably.

## Cooperative Tourism in Kerala: Conceptual Foundations and Institutional Mechanisms

### Defining Cooperative Tourism

Cooperative tourism refers to a model in which local communities, service providers, and other stakeholders jointly own, operate, and benefit from tourism enterprises. In Kerala, this model has been successfully implemented in the form of homestays, eco-tourism ventures, and, increasingly, Ayurveda wellness centers and pharmacies. Cooperative tourism is characterized by participatory governance, reinvestment of profits in community development, and a commitment to environmental stewardship.

### Integration of Ayurveda Pharmacy into Cooperative Tourism

The integration of Ayurveda pharmacy into cooperative tourism has occurred at multiple levels. Village-based cooperatives operate pharmacies that supply medicines to local clinics and tourist wellness centers. Larger federations manage supply chains, quality assurance, and marketing, enabling small producers to access broader markets. Many Ayurveda resorts and treatment centers owned by cooperatives source medicines from these pharmacies, ensuring traceability and adherence to traditional formulations.

This model has several advantages:

- **Economic empowerment:** Local communities retain a greater share of profits.
- **Quality control:** Cooperatives often adhere to stricter standards, motivated by reputation and long-term relationships.
- **Sustainability:** Medicinal plant cultivation and wild harvesting are managed collectively, reducing overexploitation and fostering conservation.
- **Cultural preservation:** Cooperative ownership incentivizes the retention and transmission of traditional knowledge.

### Institutional Support and Policy Frameworks

The Kerala government, through the Department of Tourism and the Department of AYUSH, has incentivized

the growth of cooperative Ayurveda enterprises. Policies include subsidies for cooperative pharmacies, support for organic cultivation of medicinal plants, training in Good Manufacturing Practices (GMP), and inclusion of cooperative wellness centers in state-sponsored tourism circuits. These initiatives have positioned Kerala as a model for community-driven health and wellness tourism.

## Operational Dynamics of Ayurveda Pharmacy in the Cooperative Tourism Model

### Supply Chain Management and Quality Assurance

The operational success of Ayurveda pharmacies within the cooperative tourism model hinges on robust supply chain management and quality assurance mechanisms. Cooperatives typically establish direct relationships with local farmers and wild-crafters for the procurement of raw materials. This not only reduces costs but also ensures traceability and adherence to traditional harvesting practices.

Medicinal plants are cultivated organically or collected sustainably from forests, often with the involvement of indigenous and tribal communities. The Cholanaikkan tribe, for instance, possesses deep knowledge of local flora and plays a role in the sustainable harvesting of medicinal plants (Vahia et al., 2017). Cooperative pharmacies invest in training, capacity building, and the establishment of nurseries to ensure a consistent supply of high-quality raw materials (Vahia et al., 2017).<sup>5</sup>

Pharmaceutical production within cooperatives adheres to stringent quality standards, with processes such as authentication, drying, pulverization, and formulation monitored by trained personnel. Many cooperatives have adopted GMP certification, and products are subject to regular testing for contaminants and potency. This is particularly important given the international clientele of Kerala's Ayurveda tourism sector, who demand transparency and regulatory compliance.

### Distribution and Marketing

Ayurveda pharmacies operated by cooperatives distribute medicines through multiple channels:

- **Tourist wellness centers and resorts:** These are often the primary retail outlets, catering to both domestic and international visitors.
- **Hospitals and clinics:** Many government and private Ayurveda hospitals source medicines from cooperative pharmacies.
- **Direct sales:** Cooperatives engage in direct-to-consumer sales through on-site pharmacies, online platforms, and exhibitions.
- **Export:** Some larger cooperatives have developed export divisions, supplying Ayurveda medicines to

diaspora communities and international wellness markets.

Marketing strategies emphasize authenticity, sustainability, and community benefit, differentiating cooperative products from those of commercial pharmaceutical companies. The Kerala government's "God's Own Country" branding, which integrates Ayurveda and eco-tourism, has further enhanced the appeal of cooperative Ayurveda products.

### Financial and Human Resource Management

Cooperative pharmacies operate on a not-for-profit or limited-profit basis, with surpluses reinvested in community development, infrastructure, and member welfare. Decision-making is democratic, with annual general meetings and elected boards. Employees, including pharmacists, production workers, and field collectors, are often members of the cooperative, aligning their interests with organizational goals.

Training and skill development are central to the cooperative model. Many cooperatives partner with local colleges, research institutes, and government agencies to provide ongoing education in pharmacognosy, quality control, and entrepreneurial skills. This has contributed to the professionalization of the Ayurveda pharmacy workforce in Kerala.

### Integration with Wellness Tourism Experiences

The success of Ayurveda pharmacy operations is closely tied to the experiential dimension of wellness tourism. Many cooperative-run wellness centers offer immersive experiences, including personalized consultations, Panchakarma detoxification treatments, yoga, meditation, and traditional cuisine. Visitors are often given guided tours of pharmacies, medicinal plant gardens, and demonstration kitchens, fostering trust and cultural appreciation.

This integration enhances the perceived value of Ayurveda treatments, increases demand for cooperative pharmacy products, and generates positive word-of-mouth, both domestically and internationally.

Environmental and Climatic Influences on Ayurveda Pharmacy Operations

### Kerala's Climatic Variability and its Impact on Ayurveda

Kerala's climate is characterized by high humidity, abundant rainfall, and a rich biodiversity of medicinal plants. However, the region is increasingly vulnerable to extreme weather events, most notably the catastrophic floods of 2018 and 2019. Recent research attributes these events to convectively-coupled high-frequency atmospheric waves, equatorially-trapped Mixed Rossby-Gravity (MRG) waves, and the influence of solar activity, which together modulate

monsoonal rainfall and moisture availability over Kerala (Kiran, 2021, 2022; Thomas et al., 2024a, 2024b).

The floods of 2018 and 2019 caused unprecedented damage to agriculture, infrastructure, and the Ayurveda sector, disrupting supply chains, damaging medicinal plant populations, and affecting the livelihoods of collectors and producers (Kiran, 2021, 2022).<sup>1,2</sup> Changes in monsoon patterns, potentially linked to both natural variability and anthropogenic climate change, pose an ongoing threat to the sustainability of Ayurveda pharmacy operations.

- **Adaptive Strategies:** Resilience, Sustainability, and Cooperative Response Cooperative pharmacies have demonstrated resilience in the face of climatic shocks through several adaptive strategies.
- **Diversification of supply chains:** Cooperatives have expanded sourcing to include multiple agro-climatic zones, including partnerships with farmers in less flood-prone regions.
- **Medicinal plant conservation:** Initiatives such as community-based nurseries, seed banks, and in-situ conservation have mitigated losses from floods and droughts.
- **Disaster preparedness:** Cooperatives have invested in infrastructure upgrades, emergency storage, and risk-sharing mechanisms.
- **Research and development:** Collaborations with research institutes have enabled the identification of climate-resilient plant varieties and the development of alternative formulations.

The cooperative model, with its emphasis on local knowledge, participatory governance, and collective action, has enabled rapid mobilization of resources and mutual aid during crises. For instance, after the 2018 floods, cooperatives played a key role in distributing medicines, providing healthcare to affected communities, and supporting the rehabilitation of medicinal plant cultivators (Kiran, 2021, 2022).<sup>1,2</sup>

### Solar Activity, Atmospheric Waves, and Long-Term Planning

Emerging research indicates that solar activity—measured by indices such as sunspot number, F10.7 index, and cosmic ray intensity—correlates with rainfall variability in Kerala, particularly during periods of high or low solar activity (Thomas et al., 2024a, 2024b).<sup>3,4</sup> Extreme rainfall events, including those leading to floods, have been shown to coincide with solar maxima or minima, suggesting a physical link between solar cycles and monsoon behavior.

Understanding these relationships is critical for long-term planning in the Ayurveda pharmacy sector. Seasonal forecasts, based on solar and atmospheric data, could inform the timing of medicinal plant cultivation, harvesting, and production, reducing vulnerability to supply shocks.

Cooperative societies are well positioned to integrate scientific and indigenous knowledge in adaptive management.

### Inter-State Expansion and Adaptation of Kerala's Cooperative Ayurveda Pharmacy Model

#### Drivers of Inter-State Diffusion

Several factors have driven the expansion of Kerala's cooperative Ayurveda pharmacy model across state boundaries:

- **Reputation and demand:** Kerala's Ayurveda products are highly regarded for their quality and authenticity, leading to increased demand from other Indian states.
- **Policy support:** Central government initiatives promoting AYUSH (including Ayurveda) have facilitated the replication of Kerala's cooperative model.
- **Migration and diaspora:** Practitioners and entrepreneurs trained in Kerala have established pharmacies and wellness centers in neighboring states, often in partnership with local cooperatives.
- **Tourism circuits:** The integration of Ayurveda with inter-state tourism routes has created new markets for cooperative products and services.

#### Operational Challenges and Innovations

Adapting the cooperative pharmacy model to other states involves several challenges:

- **Ecological differences:** Variations in climate, soil, and biodiversity affect the availability and quality of medicinal plants. Cooperatives must adapt sourcing strategies and product formulations accordingly.
- **Regulatory environments:** States differ in their implementation of health, pharmacy, and cooperative laws, necessitating legal and institutional adaptation.
- **Socio-cultural context:** Consumer preferences, cultural attitudes toward Ayurveda, and the organization of local communities influence the viability of the cooperative model.

Successful inter-state ventures have addressed these challenges through innovation:

- **Trans-state cooperative federations:** Federations coordinate procurement, production, and marketing across multiple states, leveraging economies of scale while respecting local autonomy.
- **Knowledge exchange:** Training programs and exchange visits facilitate the transfer of best practices in pharmacy operation, quality control, and cooperative governance.
- **Community engagement:** Cooperatives partner with indigenous and local communities to adapt products and services to local needs and preferences.

## Case Studies: Inter-State Operations and Environmental Adaptation

### Kerala-Tamil Nadu Cooperation

In Tamil Nadu, several Ayurveda wellness centers and pharmacies have adopted the Kerala cooperative model, sourcing essential medicines from Kerala while cultivating local medicinal plants suited to the region's drier climate. Cooperative societies have established satellite pharmacies, trained local staff in GMP, and incorporated Tamil Siddha traditions, creating hybrid models responsive to local demand.<sup>5</sup>

### Kerala-Karnataka Collaboration

Karnataka's Western Ghats, sharing ecological similarities with Kerala, have seen the establishment of Ayurveda pharmacies and wellness centers under cooperative ownership, often led by practitioners trained in Kerala. These ventures have contributed to biodiversity conservation, sustainable livelihoods, and the promotion of Ayurveda tourism in the region.

### Resilience to Environmental Extremes

Cooperative pharmacies operating in flood-prone regions have developed contingency plans based on Kerala's experience. These include decentralized storage, alternative sourcing agreements, and the cultivation of flood- and drought-tolerant medicinal plants. Solar activity and climate forecasts, as developed in recent Kerala studies.<sup>6</sup> are increasingly used to inform operational planning.

### Socio-Cultural and Indigenous Dimensions

#### The Role of Indigenous Knowledge and Tribal Communities

Indigenous and tribal communities, such as the Cholanaiikkan of Kerala, possess deep knowledge of local ecosystems, medicinal plants, and traditional healing practices.<sup>7</sup> Their participation in cooperative Ayurveda pharmacy operations is critical for sustainability, cultural preservation, and equity.

Cooperatives have engaged with tribal communities through benefit-sharing agreements, capacity building, and the recognition of intellectual property rights. The integration of indigenous knowledge in pharmacy operations has enhanced product diversity, ecological adaptation, and cultural authenticity.<sup>8</sup>

However, challenges remain. Tribal communities face marginalization, loss of land, and cultural erosion. Cooperative models must ensure genuine participation, respect for autonomy, and equitable distribution of benefits.

### Gender, Social Inclusion, and Empowerment

Ayurveda pharmacy operations within the cooperative tourism model have the potential to empower women

and marginalized groups.<sup>9</sup> Women often play key roles in medicinal plant cultivation, processing, and management. Cooperatives have provided employment, training, and leadership opportunities, contributing to gender equity and social inclusion.

Nevertheless, structural barriers persist, including unequal access to land, credit, and decision-making power. Policy interventions and capacity-building programs are needed to enhance inclusivity and empower marginalized stakeholders.<sup>10</sup>

### Ritual, Cosmology, and Ayurveda Practice

Ayurveda is not merely a medical system but is embedded in the cosmology, ritual, and worldview of Kerala's communities. Seasonal rhythms, lunar and solar cycles, and the observation of local ecological indicators inform the timing of medicinal plant harvesting, preparation, and use.<sup>11</sup> For instance, the Cholanaiikkan determine the time of day by the length of shadows and the seasons by the sounds of crickets and the appearance of butterflies.<sup>5</sup>

Cooperative pharmacy operations that honor these cultural practices foster a sense of belonging, resilience, and cultural continuity.<sup>12</sup> The integration of ritual and cosmology with modern quality control and marketing practices creates a distinctive value proposition for Kerala's Ayurveda tourism sector.

### Economic, Environmental, and Public Health Implications

#### Economic Impact and Sustainability

The cooperative Ayurveda pharmacy sector has generated significant economic benefits for Kerala and partnering states.<sup>13</sup> Revenue from wellness tourism, the export of medicines, and local sales supports rural livelihoods, infrastructure development, and community services. The cooperative model ensures that profits are distributed equitably, reducing income disparities and empowering local stakeholders.

Sustainability is central to the cooperative approach. By investing in organic cultivation, biodiversity conservation, and sustainable harvesting, cooperatives contribute to the long-term viability of medicinal plant populations and the health of local ecosystems.

#### Environmental Stewardship and Climate Adaptation

Ayurveda pharmacy operations are closely linked to environmental health. Overharvesting, habitat loss, and climate change threaten the availability of key medicinal plants. Cooperative pharmacies have pioneered conservation initiatives, including:

- **Medicinal plant sanctuaries:** Protected areas managed by cooperatives for the conservation and sustainable use of medicinal biodiversity.

- **Agro-ecological practices:** Intercropping, organic fertilization, and water conservation techniques adapted to local conditions.
- **Climate adaptation research:** Identification and propagation of climate-resilient species, informed by both traditional knowledge and scientific research.

The integration of solar and atmospheric data into operational planning enhances the sector's capacity to anticipate and respond to environmental variability.

### Public Health Outcomes

Ayurveda pharmacy operations within cooperative tourism have contributed to improved public health outcomes in Kerala and beyond. Increased access to affordable, high-quality Ayurvedic medicines has expanded treatment options, particularly for chronic and lifestyle-related diseases. Cooperative pharmacies often participate in health camps, educational outreach, and the provision of free or subsidized medicines to marginalized populations.

However, the sector faces challenges, including regulatory constraints, competition from commercial enterprises, and the need for rigorous clinical evaluation of Ayurvedic formulations. Ongoing research, quality assurance, and public health monitoring are essential for the sector's credibility and effectiveness.

### Challenges and Future Directions

#### Regulatory and Institutional Barriers

Despite its successes, the cooperative Ayurveda pharmacy sector faces regulatory and institutional barriers, including:

- **Fragmented governance:** Overlapping jurisdictions between health, agriculture, and cooperative departments can create confusion and inefficiency.
- **Quality assurance gaps:** Variability in standards and enforcement across states can undermine consumer confidence.
- **Intellectual property:** The protection and equitable sharing of benefits from traditional knowledge remains contested.

Policy harmonization, capacity building, and the development of national standards for cooperative Ayurveda pharmacy operations are needed to address these challenges.

#### Market Competition and Commercialization

The rising popularity of Ayurveda has attracted commercial pharmaceutical companies, which often prioritize profit over sustainability and equity. Cooperatives must differentiate themselves through authenticity, quality, and community benefit, while adapting to changing consumer preferences and global market dynamics.

Strategic alliances, branding, and innovation in product development and marketing can enhance the competitiveness and resilience of cooperative pharmacies.

### Climate Change and Environmental Uncertainty

Kerala and the broader Western Ghats region are increasingly vulnerable to climate change, including shifts in monsoon patterns, extreme weather events, and biodiversity loss. Cooperative pharmacies must invest in climate adaptation, risk management, and the integration of scientific and indigenous knowledge to ensure long-term sustainability.

### Research, Monitoring, and Evaluation

Further research is needed on the social, economic, and environmental impacts of cooperative Ayurveda pharmacy operations, particularly in relation to inter-state expansion. Participatory monitoring and evaluation, involving local communities, practitioners, and policymakers, can inform adaptive management and continuous improvement.

### Conclusion

Kerala's cooperative Ayurveda pharmacy operations represent a unique convergence of traditional knowledge, community empowerment, and sustainable tourism. The cooperative model has enabled the equitable distribution of economic benefits, the preservation of cultural heritage, and the promotion of environmental stewardship. The sector's resilience in the face of climatic shocks—such as the 2018 and 2019 floods—demonstrates the potential of cooperative action to adapt to environmental variability.

Inter-state expansion of the Kerala model offers opportunities for knowledge transfer, innovation, and the scaling-up of sustainable health and wellness tourism. However, success depends on careful adaptation to local ecological, cultural, and regulatory contexts, as well as the genuine participation of indigenous and marginalized communities.

The integration of atmospheric and solar data into operational planning, as highlighted by recent research, enhances the sector's capacity to anticipate and respond to environmental variability. Ongoing investment in research, capacity building, and policy reform is essential to ensure the long-term viability of cooperative Ayurveda pharmacy operations.

In a world facing accelerating environmental change, rising health challenges, and growing demand for authentic, sustainable tourism experiences, Kerala's cooperative Ayurveda pharmacy model offers a compelling blueprint for inclusive, resilient, and culturally grounded development.

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