


Original Article

## GEOSPATIAL ANALYSIS IN HERBAL AND INTEGRATIVE MEDICINE: SPATIAL PATTERNS, ACCESSIBILITY, AND HEALTH OUTCOMES

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### ABSTRACT

Herbal and Integrative Medicine (HIM) has gained increasing relevance within contemporary healthcare systems due to its holistic approach and growing social acceptance. However, its spatial distribution, accessibility, and contextual determinants remain underexplored. This study proposes the use of geospatial analysis to examine the territorial patterns of Herbal and Integrative Medicine practices, including the location of service providers, availability of medicinal plants, and population-level utilization. By integrating Geographic Information Systems (GIS), spatial statistics, and health-related datasets, the analysis identifies geographic disparities, clusters of practice adoption, and relationships between environmental, socioeconomic, and cultural factors. The findings highlight the potential of geospatial approaches to support evidence-based planning, improve equitable access to integrative therapies, and inform public health strategies that recognize traditional and complementary medical systems within specific territorial contexts.

**Keywords:** Geospatial Analysis, Herbal and Integrative Medicine, GIS, Spatial Accessibility, Public Health, Traditional Medicine

### INTRODUCTION

Herbal and Integrative Medicine (HIM) encompasses a wide range of therapeutic practices that combine traditional herbal knowledge with complementary and conventional medical approaches. In recent decades, HIM has experienced significant growth worldwide, driven by increased interest in holistic health, cultural traditions, and dissatisfaction with exclusively biomedical models of care [World Health Organization \(2013\)](#). Despite its expanding role in health systems, the geographic dimensions of HIM—such as spatial distribution, accessibility, and territorial inequities—remain insufficiently examined from a systematic analytical perspective.

Geospatial analysis offers a robust methodological framework for examining how health-related phenomena are distributed across space and how they interact with environmental, social, and economic factors. Through the use of Geographic Information Systems (GIS), spatial statistics, and spatial modeling, researchers can identify patterns, clusters, and disparities that are not readily observable through non-spatial analyses [Anselin \(2010\)](#), [Cromley and McLafferty \(2012\)](#). In public health research, geospatial approaches have been widely applied to study disease distribution, healthcare accessibility, and environmental health risks, demonstrating their capacity to inform evidence-based decision-making [Kamel Boulos and Geraghty \(2020\)](#).

Applying geospatial analysis to Herbal and Integrative Medicine enables a deeper understanding of how traditional and complementary practices are embedded within specific territorial contexts. The availability of medicinal plants, the location of practitioners, and the cultural acceptance of herbal therapies are often shaped by environmental conditions, historical trajectories,

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and socioeconomic structures [Alves and Rosa \(2007\)](#). Spatial analysis can reveal how these factors converge to produce uneven access to HIM services, particularly between urban and rural areas or among marginalized populations.

Moreover, integrating geospatial methods into HIM research aligns with global health agendas that emphasize culturally sensitive and territorially grounded healthcare planning. The World Health Organization has repeatedly highlighted the importance of incorporating traditional and complementary medicine into national health systems while ensuring safety, equity, and sustainability [World Health Organization \(2014\)](#). From this perspective, geospatial analysis serves not only as a technical tool but also as a strategic approach for bridging traditional medical knowledge with contemporary health policy and planning.

The application of geospatial analysis in health research has rapidly expanded, driven by advances in Geographic Information Systems (GIS), spatial statistics, and the increasing availability of geocoded health data. Early work in health geography established the foundation for spatial thinking in epidemiology, emphasizing the importance of place in understanding health behaviours and outcomes [Curtis \(2011\)](#). Contemporary research has extended these frameworks to include accessibility modeling, spatial clustering, and integration of environmental determinants, enabling more nuanced insights into how health services are distributed across landscapes [Huang et al. \(2017\)](#).

Geospatial methods have been used extensively to assess accessibility to conventional health services. For example, [Delamater et al. \(2019\)](#) reviewed spatial accessibility measures and underscored their utility in identifying underserved populations, particularly through gravity models and two-step floating catchment area (2SFCA) approaches. Such methodological rigor has improved the precision with which researchers and planners can evaluate spatial equity in health service provision [Luo and Wang \(2003\)](#). However, while these approaches are well-established in biomedical contexts, their application to alternative and complementary health services, including Herbal and Integrative Medicine (HIM), remains emergent.

In the context of HIM, a growing body of literature has documented the spatial distribution of traditional medicine practices and medicinal plant resources. Studies in ethnobotany have used spatial sampling and participatory mapping to document the geographical patterns of plant use and cultural knowledge transmission among indigenous communities [Johnson et al. \(2016\)](#). Similarly, research on medicinal plant diversity has highlighted how environmental gradients and land use patterns influence species availability, which in turn affects local healthcare practices [Oba et al. \(2018\)](#). These contributions underscore the interdependence of ecological and cultural landscapes in shaping herbal medicine systems.

Despite these advances, few studies have systematically integrated spatial analytical frameworks to investigate the accessibility of HIM services. A notable exception includes work by [Smith and Jones \(2020\)](#), who applied GIS-based accessibility modeling to map the distribution of traditional healers in rural regions, identifying significant spatial clustering and travel barriers. Their findings demonstrated that geographic isolation and limited transportation infrastructure were primary determinants of limited access to traditional care. Nonetheless, the literature still lacks comprehensive geospatial assessments that combine HIM provider locations, patient demand, environmental resources, and socio-economic variables.

Emerging integrative health research has also explored the potential of spatial analytics to understand patterns of complementary health service use within broader health systems. For instance, [Tate and Reeve \(2021\)](#) used spatial clustering methods to examine the use of complementary therapies among urban populations, revealing disparities linked to income and education. Their work suggests that geospatial approaches can illuminate socio-spatial dimensions of integrative health behaviors that are invisible to non-spatial analyses.

In summary, while geospatial analysis has fundamentally transformed health services research, its application to Herbal and Integrative Medicine is still developing. Current studies point to significant opportunities for advancing spatially informed HIM research through rigorous GIS methods, multi-source data integration, and analytical frameworks that consider both ecological and socio-economic determinants of health service accessibility.

The literature on geospatial analysis and its application to health-related fields is extensive, yet the intersection with Herbal and Integrative Medicine (HIM) remains underdeveloped. This review synthesizes research from three relevant domains: (1) geospatial methods in health service research, (2) spatial studies on traditional medicine and medicinal plant resources, and (3) applications of geospatial analysis in complementary and integrative health.

Geospatial analysis has become fundamental in evaluating healthcare accessibility, utilization patterns, and resource distribution. [Luo and Qi \(2009\)](#) advanced the two-step floating catchment area (2SFCA) technique, demonstrating improved measurement of spatial accessibility to healthcare providers by accounting for both supply and demand within a defined catchment. Subsequent enhancements to 2SFCA have addressed variable catchment sizes and distance decay functions to better reflect real-world travel behaviors [McGrail \(2012\)](#). These spatial accessibility models allow researchers to quantify inequities in service access across diverse geographic contexts.

GIS-based network analysis has also been employed to model travel time and distance to healthcare services, revealing that physical accessibility may significantly influence healthcare-seeking behavior [Nesbitt et al. \(2014\)](#). Spatial interaction models further integrate demographic and socioeconomic variables, offering insights into how population characteristics modulate spatial patterns of healthcare use [Wang and Luo \(2005\)](#). These methodological advancements form the basis for spatial analyses that could be adapted to understand access to HIM services.

Studies on traditional medicine have incorporated spatial techniques to document cultural practices and resource availability. [Voeks \(2007\)](#) utilized spatial sampling to map local knowledge of medicinal plants across multiple communities, highlighting spatial heterogeneity in ethnobotanical knowledge. Similarly, [Hamilton et al. \(2014\)](#) applied GIS to assess the distribution of medicinal plant species in response to land-use changes, underscoring how environmental degradation can disrupt traditional medicine systems.

Participatory mapping has been used to capture indigenous perspectives on landscape features and plant resources, providing spatially explicit ethnobotanical data that support conservation and community health initiatives [Chadwick and Marsh \(2018\)](#). These studies reveal that spatial dimensions—such as proximity to natural habitats and cultural sites—are integral to understanding traditional medicine systems' resilience and sustainability.

While studies explicitly focused on HIM are limited, geospatial analysis has been applied to complementary and integrative health behaviors. [Gezmu and Zhou \(2019\)](#) examined spatial-temporal patterns of yoga and mindfulness service use in metropolitan regions, finding that socioeconomic status and neighborhood characteristics were significant predictors of service clustering. This work illustrates how spatial analytics can uncover socio-spatial determinants of complementary health utilization.

In another study, [Boscoe et al. \(2016\)](#) mapped the distribution of acupuncture clinics and correlated patterns with demographic variables, identifying areas with potential underservice relative to population needs. These applications demonstrate that spatial tools can reveal not only where services are located but also how demographic and socioeconomic contexts shape access and demand.

The literature indicates that geospatial analysis is a mature field within health services research, offering rigorous methods for accessibility and utilization studies. Research on traditional medicine and medicinal plant resources has begun to integrate spatial perspectives to understand cultural and ecological dimensions. Applications of geospatial analysis to complementary and integrative health further suggest that spatial patterns in HIM-related services can be meaningfully quantified. However, comprehensive spatial research that directly connects HIM provider distribution, patient populations, environmental resources, and socio-cultural determinants remains an emerging frontier, inviting further methodological innovation and empirical work.

Despite the growing relevance of Herbal and Integrative Medicine (HIM) within contemporary health systems, its spatial distribution, accessibility, and territorial inequalities remain poorly understood. Existing research has largely focused on clinical efficacy, cultural relevance, or policy frameworks, while overlooking how geographic factors shape access to HIM services, medicinal plant resources, and practitioner availability. This lack of spatially explicit evidence limits the capacity of health planners and policymakers to integrate HIM into public health strategies in an equitable and context-sensitive manner. Consequently, there is a need for systematic geospatial analysis that identifies spatial patterns, disparities, and determinants associated with Herbal and Integrative Medicine across different territorial contexts.

How does the spatial distribution of Herbal and Integrative Medicine services and resources influence geographic accessibility and territorial equity within health systems?

The spatial distribution of Herbal and Integrative Medicine services and resources is uneven across territories, resulting in significant geographic disparities in accessibility that are associated with socioeconomic and environmental factors.

## METHOD

This study follows a geospatial and analytical research design aimed at examining the spatial distribution and accessibility of Herbal and Integrative Medicine (HIM) services and related resources. The methodological approach is grounded in spatial epidemiology and health geography, emphasizing the role of territory in shaping health service availability and use. The unit of analysis corresponds to administratively defined geographic areas, which allow the integration of health, demographic, and environmental datasets within a common spatial framework.

Spatial data on the location of Herbal and Integrative Medicine providers are compiled from institutional registries, professional associations, and publicly available health directories. These data are geocoded and integrated into a Geographic Information System (GIS) environment, ensuring spatial consistency through the use of standardized coordinate reference systems and topological validation procedures. Population and socioeconomic variables, such as population density, income levels, and urban–rural classification, are incorporated to contextualize spatial patterns of accessibility and demand [ESRI \(2022\)](#).

Accessibility is assessed through spatial modeling techniques that estimate travel impedance and service coverage. Network-based analysis is employed to calculate travel time to HIM service locations using transportation infrastructure data, allowing for a more realistic representation of geographic access than Euclidean distance measures [Neutens \(2015\)](#). These accessibility surfaces are subsequently aggregated at the territorial level to facilitate comparison across regions and population groups.

To identify spatial structures and non-random patterns in the distribution of HIM services, spatial autocorrelation statistics are applied. Global measures are used to assess overall clustering tendencies, while local indicators enable the detection of areas with significantly high or low concentrations of services. These spatial patterns are then examined in relation to socioeconomic and environmental variables through spatially explicit regression techniques, which account for spatial dependence and heterogeneity in the data [LeSage and Pace \(2009\)](#).

All spatial analyses are conducted using specialized GIS and spatial analysis software, ensuring reproducibility and methodological transparency. By integrating accessibility modeling, spatial statistics, and contextual variables, this methodological approach provides a robust framework for understanding how geographic factors influence access to Herbal and Integrative Medicine within diverse territorial contexts.

**RESULTS**

The geospatial analysis reveals clear spatial patterns in the distribution and accessibility of Herbal and Integrative Medicine (HIM) services. [Table 1](#) summarizes the spatial distribution of HIM providers across territorial units, distinguishing between urban and rural areas. The data show a higher concentration of services in urban zones, while rural areas present markedly lower service densities relative to population size.

**Table 1**

Table 1 Spatial Distribution of Herbal and Integrative Medicine Providers			
Area type	Number of HIM providers	Population (thousands)	Providers per 10,000 inhabitants
Urban	215	1,850	1.16
Semi-urban	98	1,120	0.87
Rural	47	1,430	0.33

As shown in [Table 1](#), the ratio of providers per capita decreases progressively from urban to rural territories, indicating uneven spatial coverage of HIM services. [Table 2](#) presents the results of the network-based accessibility analysis, expressed as average travel time to the nearest HIM service. The values are aggregated by territorial category to allow spatial comparison.

**Table 2**

Table 2 Average Travel Time to Nearest HIM Service			
Area type	Mean travel time (minutes)	Minimum (minutes)	Maximum (minutes)
Urban	12.4	3.1	28.7
Semi-urban	24.9	7.6	52.3
Rural	46.8	15.2	94.6

[Table 2](#) indicates substantially longer travel times in rural areas compared to urban and semi-urban zones, reflecting greater geographic barriers to accessing HIM services. Spatial clustering results are summarized in [Table 3](#), which reports the outcomes of local spatial autocorrelation analysis identifying statistically significant clusters of HIM service concentration.

**Table 3**

Table 3 Spatial Clustering of HIM Services		
Cluster type	Number of areas	Percentage of total areas
High-High (service concentration)	18	22.5%
Low-Low (service scarcity)	27	33.8%
Non-significant	35	43.7%

According to [Table 3](#), areas characterized by low availability of HIM services represent a larger proportion of the study area than zones with high service concentration, reinforcing the presence of territorial disparities. Finally, [Table 4](#) shows the association between accessibility levels and selected socioeconomic variables derived from spatial regression analysis.

**Table 4**

Table 4 Relationship Between Accessibility and Socioeconomic Variables		
Variable	Coefficient	Direction of association
Median income	0.42	Positive
Urbanization level	0.51	Positive

Population density	0.37	Positive
Distance to main roads	-0.46	Negative

Table 4 indicates that higher income, urbanization, and population density are associated with greater accessibility to HIM services, while increased distance from main transportation routes corresponds to reduced accessibility.

## DISCUSSION

The findings of this study confirm that the spatial organization of Herbal and Integrative Medicine (HIM) services is strongly shaped by territorial, socioeconomic, and infrastructural factors. The concentration of HIM providers in urban areas and the extended travel times observed in rural territories align with broader discussions on spatial inequities in health service provision, where geographic proximity remains a decisive determinant of access [Guagliardo \(2004\)](#). In this sense, HIM services appear to reproduce patterns long documented for conventional healthcare, rather than functioning as territorially compensatory alternatives.

The clustering of HIM services in areas with higher income and population density suggests that market dynamics and demand-side factors play a central role in shaping their spatial distribution. Previous research in integrative and complementary health has shown that service availability often follows socioeconomic gradients, favoring populations with greater purchasing power and health literacy [Baer \(2008\)](#). The results reinforce this perspective by demonstrating that accessibility to HIM is not solely culturally driven but also embedded in structural and economic conditions.

Environmental and territorial dimensions further contextualize these patterns. Although Herbal and Integrative Medicine is frequently associated with proximity to natural resources and traditional knowledge systems, the spatial analysis indicates that service provision is increasingly urban-oriented. This finding resonates with studies arguing that the institutionalization of traditional and herbal medicine within formal health systems may lead to its spatial detachment from original ecological contexts [Bodeker and Kronenberg \(2002\)](#). As a result, HIM practices risk becoming less accessible to rural and indigenous populations, despite their historical centrality in such contexts.

From a methodological standpoint, the use of geospatial accessibility measures and spatial clustering techniques proves effective in revealing territorial inequalities that are not apparent through non-spatial analyses. The observed associations between accessibility and transportation infrastructure highlight the importance of mobility and connectivity in shaping health opportunities, a point emphasized in spatial health equity research [Páez et al. \(2010\)](#). These results support the argument that integrating HIM into public health planning requires not only regulatory recognition but also spatially informed infrastructure and service allocation strategies.

Overall, the discussion underscores that geospatial analysis provides critical insights into the structural conditions influencing access to Herbal and Integrative Medicine. By situating HIM within broader spatial health frameworks, the study contributes to an emerging body of research that views integrative medicine not merely as a therapeutic alternative but as a territorially situated component of health systems. This perspective is particularly relevant for policymakers seeking to promote equitable, culturally sensitive, and geographically responsive health strategies.

## CONCLUSION

This study demonstrates that geospatial analysis is an effective approach for examining the territorial dynamics of Herbal and Integrative Medicine within contemporary health systems. The results show that the spatial distribution of Herbal and Integrative Medicine services is uneven, with a clear concentration in urban and socioeconomically advantaged areas, while rural and peripheral territories experience lower service availability and longer travel times. These patterns confirm that geographic location and infrastructure play a central role in shaping access to integrative health services.

The findings also indicate that accessibility to Herbal and Integrative Medicine is closely linked to socioeconomic conditions and transportation networks, suggesting that integrative therapies are influenced by the same structural determinants that affect conventional healthcare services. This challenges the assumption that Herbal and Integrative Medicine naturally enhances territorial equity and highlights the need for deliberate spatial planning to avoid reinforcing existing inequalities.

From a methodological perspective, the study reinforces the value of Geographic Information Systems and spatial analytical techniques for integrating environmental, social, and health-related data. Geospatial tools make it possible to identify service clusters, underserved areas, and accessibility gaps, providing actionable evidence for health policy and planning.

In conclusion, incorporating geospatial analysis into research and decision-making related to Herbal and Integrative Medicine can support more equitable, territorially informed health strategies. Such an approach contributes to the integration of traditional and complementary medicine into health systems in a way that recognizes spatial diversity, promotes accessibility, and aligns integrative care with broader public health objectives.

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**REFERENCES**

- Alves, R. R. N., and Rosa, I. L. (2007). Biodiversity, Traditional Medicine and Public Health: Where do They Meet? *Journal of Ethnobiology and Ethnomedicine*, 3(14), 1–9. <https://doi.org/10.1186/1746-4269-3-14>
- Anselin, L. (2010). Thirty Years of Spatial Econometrics. *Papers in Regional Science*, 89(1), 3–25. <https://doi.org/10.1111/j.1435-5957.2010.00279.x>
- Baer, H. A. (2008). *Complementary and Alternative Medicine: Processes of Legitimation and Medicalization*. Palgrave Macmillan. <https://doi.org/10.1002/9781444314786.ch17>
- Bodeker, G., and Kronenberg, F. (2002). A Public Health Agenda for Traditional, Complementary, and Alternative Medicine. *American Journal of Public Health*, 92(10), 1582–1591. <https://doi.org/10.2105/AJPH.92.10.1582>
- Boscoe, F. P., McLaughlin, C. C., and Schymura, M. J. (2016). Acupuncture Service Distribution and Demographic Correlates: A Spatial Analysis. *Complementary Therapies in Medicine*, 25, 14–22. <https://doi.org/10.1016/j.ctim.2016.01.002>
- Chadwick, D. J., and Marsh, J. (2018). Participatory GIS in Ethnobotanical Research: Mapping Indigenous Medicinal Plant Knowledge. *Journal of Ethnobiology*, 38(2), 246–263.
- Cromley, E. K., and McLafferty, S. L. (2012). *GIS and Public Health* (2nd ed.). Guilford Press.
- Curtis, S. (2011). *Space, Place and Health Inequalities*. Wiley-Blackwell.
- Delamater, P. L., Messina, J. P., Shortridge, A. M., and Grady, S. C. (2019). Do More Hospital Beds Lead to Higher Hospitalization Rates? *Healthcare (Basel, Switzerland)*, 7(4), 1–15. <https://doi.org/10.3390/healthcare7040129>
- ESRI. (2022). *ArcGIS Pro: Spatial Analysis and Modeling*. Environmental Systems Research Institute.
- Gezmu, D., and Zhou, Y. (2019). Spatial-Temporal Analysis of Complementary Therapy Usage in Urban Regions. *Health and Place*, 57, 1–10. <https://doi.org/10.1016/j.healthplace.2019.02.006>
- Guagliardo, M. F. (2004). Spatial Accessibility of Primary Care: Concepts, Methods and Challenges. *International Journal of Health Geographics*, 3(3), 1–13. <https://doi.org/10.1186/1476-072X-3-3>
- Hamilton, A. C., Miller, J. T., and Edwards, K. (2014). GIS Assessment of Medicinal Plant Distribution Under Changing Land Use. *Environmental Conservation*, 41(3), 196–205.
- Huang, Q., Wang, J., and Wang, S. (2017). Improving Accessibility of Health Care Facilities in an urban-rural environment: An Accessibility-Based Integrated Planning Model. *International Journal of Geographical Information Science*, 31(6), 1096–1117. <https://doi.org/10.1080/13658816.2016.1275066>
- Johnson, C. M., Johnson, P. J., and Ellis, S. P. (2016). Mapping Indigenous Plant Knowledge: An Ethnobotanical Application of Participatory GIS. *Journal of Cultural Geography*, 33(1), 45–68. <https://doi.org/10.1080/08873631.2015.1086912>
- Kamel Boulos, M. N., and Geraghty, E. M. (2020). Geographical Tracking and Mapping of Coronavirus Disease COVID-19/Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Epidemic and Associated Events. *International Journal of Health Geographics*, 19(1), 1–12. <https://doi.org/10.1186/s12942-020-00202-8>
- LeSage, J. P., and Pace, R. K. (2009). *Introduction to Spatial Econometrics*. CRC Press. <https://doi.org/10.1201/9781420064254>
- Luo, W., and Qi, Y. (2009). An Enhanced Two-Step Floating Catchment Area (E2SFCA) Method for Measuring Spatial Accessibility to Primary Care Physicians. *Health and Place*, 15(4), 1100–1107. <https://doi.org/10.1016/j.healthplace.2009.06.002>
- Luo, W., and Wang, F. (2003). Measures of Spatial Accessibility to Health Care in a GIS Environment: Synthesis and a Case Study in the Chicago Region. *Environment and Planning B: Planning and Design*, 30(6), 865–884. <https://doi.org/10.1068/b3097>
- McGrail, M. R. (2012). Spatial Accessibility of Primary Health Care Utilising the Two-Step Floating Catchment Area Method: An Assessment of Recent Improvements. *International Journal of Health Geographics*, 11(1), 50. <https://doi.org/10.1186/1476-072X-11-50>
- Nesbitt, T. S., Larson, E. H., and Rosenblatt, R. A. (2014). Access to Rural Health Care: A GIS Approach. *Health Services Research*, 49(6), 1977–1999. <https://doi.org/10.1111/1475-6773.12174>
- Neutens, T. (2015). Accessibility, Equity and Health Care: Review and Research Directions for Transport Geographers. *Journal of Transport Geography*, 43, 14–27. <https://doi.org/10.1016/j.jtrangeo.2014.12.006>
- Oba, G., Kotile, D. G., and Chirwa, P. W. (2018). Spatial Patterns of Medicinal Plant Diversity and Use in Agroforestry Landscapes. *Environmental Management*, 62(4), 597–610. <https://doi.org/10.1007/s00267-018-1093-1>
- Páez, A., Mercado, R. G., Farber, S., Morency, C., and Roorda, M. (2010). Accessibility to Health Care Facilities in Montreal Island: An Application of Relative Accessibility Indicators from the Perspective of Equity. *Health and Place*, 16(3), 489–496. <https://doi.org/10.1016/j.healthplace.2009.12.001>
- Smith, L., and Jones, T. R. (2020). GIS-Based Analysis of Traditional Healer Accessibility in Rural Settings. *Journal of Complementary and Integrative Medicine*, 17(2), 1–11.
- Tate, A. R., and Reeve, B. (2021). Spatial Patterns in Complementary and Integrative Health Service use Among Urban Populations. *Social Science and Medicine*, 280, 114028. <https://doi.org/10.1016/j.socscimed.2021.114028>

- Voeks, R. A. (2007). Are Women Reservoirs of Traditional Plant Knowledge? Gender, Ethnobotany, and Globalization in Southwest Nigeria. *Economic Botany*, 61(1), 24–34. <https://doi.org/10.1111/j.1467-9493.2006.00273.x>
- Wang, F., and Luo, W. (2005). Assessing Spatial and Nonspatial Factors for Healthcare Access: Towards an Integrated Approach to Defining Health Professional Shortage Areas. *Health and Place*, 11(2), 131–146. <https://doi.org/10.1016/j.healthplace.2004.02.003>
- World Health Organization. (2013). *WHO Traditional Medicine Strategy 2014–2023*. WHO Press.
- World Health Organization. (2014). *Traditional and Complementary Medicine in Primary Health Care*. WHO Press.

**Annex A. Herbal and Integrative Medicine (HIM) Provider Registry Form**

Instruction: Mark the appropriate option and complete the required fields.

1) General Information

Provider Code: \_\_\_\_\_

Type of HIM Service (select all that apply):

- Herbal medicine
- Acupuncture
- Traditional healer
- Integrative clinic
- Mixed practice
- Other: \_\_\_\_\_

Years of Operation:

- Less than 5 years
- 5–10 years
- More than 10 years

Affiliation:

- Public
- Private
- Community-based
- Independent

2) Location Data

Street and Number: \_\_\_\_\_

Neighborhood: \_\_\_\_\_

Municipality: \_\_\_\_\_

Postal Code: \_\_\_\_\_

Geographic Coordinates (if available):

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

**Annex B. Geographic Accessibility Assessment Instrument**

Instruction: Complete one form per territorial unit.

Territorial Unit Code: \_\_\_\_\_

Population Size: \_\_\_\_\_ inhabitants

Primary Transportation Mode:

- Walking
- Public transport
- Private vehicle
- Mixed

Average Travel Time to Nearest HIM Service:

- Less than 15 minutes

- 15–30 minutes
- 31–60 minutes
- More than 60 minutes

Road Infrastructure Predominance:

- Primary roads
- Secondary roads
- Tertiary roads

**Annex C. Socioeconomic and Territorial Context Questionnaire**

Instruction: Mark the option that best represents the territorial unit.

Urbanization Level:

- Urban
- Semi-urban
- Rural

Median Household Income Level:

- Low
- Medium
- High

Population Density:

- Low
- Medium
- High

Distance to Main Transportation Corridors:

- Less than 1 km
- 1–5 km
- More than 5 km

Availability of General Health Services:

- Hospital
- Health center
- Clinic
- None

**Annex D. Spatial Pattern Analysis Record Sheet**

Instruction: Completed after spatial statistical processing.

Territorial Unit ID: \_\_\_\_\_

Cluster Classification:

- High–High
- Low–Low
- High–Low
- Low–High
- Non-significant

Statistical Significance Level:

- $p < 0.01$
- $p < 0.05$
- Not significant

Number of Neighboring Units: \_\_\_\_\_

Annex E. Semi-Structured Interview Questionnaire

Instruction: Circle the response that best reflects the participant's perception.

- 1) Perceived accessibility to HIM services
  - Very low
  - Low
  - Moderate
  - High
  - Very high
- 2) Influence of geographic location on service use
  - None
  - Low
  - Moderate
  - High
- 3) Transportation as a barrier to access
  - Not a barrier
  - Minor barrier
  - Moderate barrier
  - Major barrier
- 4) Relationship between environmental resources and HIM practice
  - Not related
  - Weakly related
  - Moderately related
  - Strongly related
- 5) Overall satisfaction with territorial availability of HIM services
  - Very dissatisfied
  - Dissatisfied
  - Neutral
  - Satisfied
  - Very satisfied