



# Menopausal Women: A Survey to Create a Geographic Information System of Medicinal Plants Used in Folk Remedies in Chanthaburi Province

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## Abstract

**Introduction:** Traditional Thai medicine and local health wisdom play a vital role in Thai society, particularly in caring for menopausal women experiencing hormonal changes. This treatment focuses on the use of local herbs, reflecting knowledge and experiences passed down through generations to alleviate related symptoms such as hot flashes and mood swings. Currently, support for the use of herbs in healthcare is growing, leading to a continuous increase in the herbal product market. This research aims to study treatment methods for menopausal patients using traditional Thai medicine, explore herbs used by local healers in Chanthaburi Province, and create a Geographic Information System (GIS) of these herbal plants. The use of GIS aids in collecting spatial data regarding the herbs used to treat menopausal patients, allowing for the analysis of the distribution of herbal plants and the geographical factors affecting their growth. **Methodology:** A mixed research method was employed, involving the study of treatment methods and the use of herbs through interviews and observations, as well as the creation of GIS to identify the locations of herbs used in treatment. Data quality was verified using triangulation to ensure reliable information, which is effective in promoting local wisdom regarding traditional Thai medicine within communities. **Results:** It was found that local healers utilize various herbs with properties that nourish the blood and balance the body's elements, such as red sandalwood, long pepper, black pepper, cardamom, and turmeric. Treating menopausal symptoms requires careful communication and follow-up on treatment outcomes to help patients understand the duration and importance of ongoing care. Furthermore, preserving local wisdom related to herbs is crucial for promoting health and improving the quality of life for menopausal women. The use of GIS in analyzing herbal plant data helps create effective distribution maps, including assessing the impacts of climate change. **Conclusion:** This allows for the sustainable conservation and utilization of herbal resources. Integrating GIS data with local wisdom will enhance the effectiveness of treating menopausal women. In the future, this will lead to the development of health policies that sustainably and appropriately respond to community needs.

**Keywords:** Menopause, herbs, traditional medicine, Geographic Information System (GIS).

## Introduction

Traditional Thai medicine and local health wisdom play a crucial role in Thai society, utilizing natural resources and herbs to treat various ailments, including menopausal symptoms in women. These practices are closely related to the lifestyle and culture of Thai communities. Treatments often arise from accumulated knowledge and experiences passed down through generations, using methods aligned with local beliefs and traditions (Aphichat, J., 2020). For example, the use of locally available herbs to promote health and alleviate symptoms such as hot flashes, mood swings, and other physical issues associated with hormonal changes during menopause (Boonchom, S., & Suwan, C., 2022). Currently, support for the use of herbs in the healthcare system is growing, leading to a continuous upward trend in the herbal product market in the coming years (Kanchanapoom, T., & Saengsang, A., 2020). This is particularly relevant as society emphasizes holistic health and natural

rehabilitation, increasing demand for herbal products as people seek natural alternatives for health care.

In treating menopausal women, traditional Thai medicine focuses on balancing the body's elements (Mongkol, P., 2021), considering both internal and external factors affecting health. The use of herbs, known for their healing properties, is a recognized method within Thai communities. For instance, using herbs to relieve hot flashes and mood swings caused by hormonal changes, combined with avoiding foods that trigger these symptoms, is an effective strategy for symptom relief (Pichai, R., & Thongnopnua, P., 2021). Moreover, the application of Geographic Information Systems (GIS) in managing data related to herbs used for treating menopausal women enhances the analysis and tracking of herbal use effectively. GIS facilitates the spatial representation of the distribution of available herbs, making access to and utilization of these herbs more efficient and convenient. Integrating technology with local wisdom in this way promotes the sustainable conservation

and use of herbal resources (Sirisak, S., & Choochote, W., 2022). The decision to conduct this research stems from the significance of herbs in treating menopausal women, particularly how local healers in Chanthaburi Province utilize them in their remedies. However, local herbs are becoming increasingly rare due to the use of land for monoculture farming. Therefore, there is an urgent need to explore and develop a Geographic Information System (GIS) to identify the locations of remaining herbs. Doing so not only facilitates easier access to herbs but also allows for their propagation and promotes the sustainable conservation of the wisdom of local healers and communities for the future.

### Objectives

1. To study the treatment methods for menopausal syndrome patients using traditional Thai medicine by local healers in Chanthaburi Province.
2. To investigate the herbal formulations used by local healers in Chanthaburi Province for treating menopausal syndrome patients with traditional Thai medicine.
3. To develop a Geographic Information System (GIS) for the medicinal plants used in the treatment of menopausal syndrome by local healers in Chanthaburi Province.

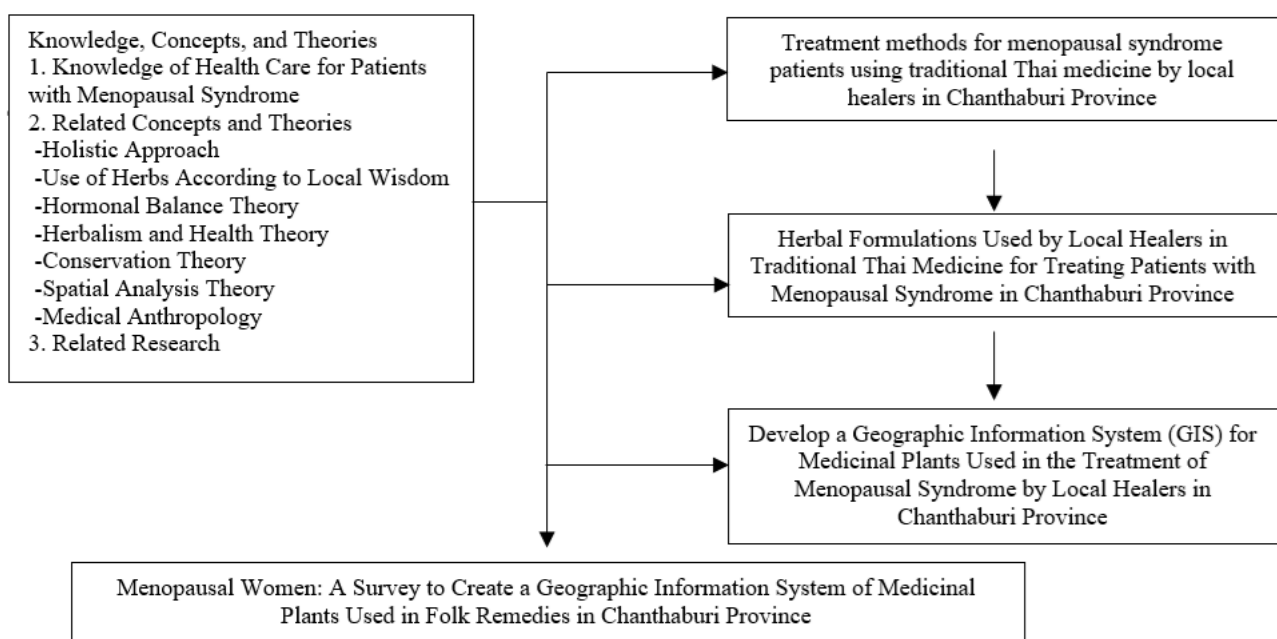
### Research Questions

1. What are the treatment methods for menopausal syndrome patients using traditional Thai medicine by local healers in Chanthaburi Province?
2. What are the herbal formulations used by local healers in Chanthaburi Province for treating menopausal syndrome patients with traditional Thai medicine?
3. How can a Geographic Information System (GIS) be developed for the medicinal plants used in the treatment of menopausal syndrome by local healers in Chanthaburi Province?

### Literature Review

1. **Knowledge about Health Care for Patients with Menopausal Syndrome:** Research in this area covers the physical changes women experience during menopause and health care methods, particularly the use of traditional Thai medicine and herbs to alleviate symptoms. This includes using herbs that help nourish the body's elements, balance hormones, and promote mental and neurological health.
2. **Traditional Thai Medicine in Caring for Menopausal Women:** The use of herbs and Thai massage to restore health and treat menopausal symptoms is widely accepted. Research in this area discusses herbal plants used to treat symptoms, such as Dong Quai (*Angelica sinensis*), ginger, and other herbs that can help balance hormones and nourish the blood.
3. **Modern Medicine in Caring for Menopausal Women:** Treatments through modern medicine focus on hormone replacement therapy (HRT) and other medications to relieve menopausal symptoms. Additionally, lifestyle modifications, such as exercise and dietary control, are emphasized to mitigate the effects of declining hormone levels.
4. **Health Management for Menopausal Women in Clinical Practice:** Various symptoms of menopause, such as hot flashes, mood swings, and osteoporosis, are assessed and managed. The use of hormone replacement therapy and exercise is an essential part of effective health management.
5. **Developing a Geographic Information System for Herbal Management:** This research focuses on the use of Geographic Information Systems (GIS) to collect and analyze the locations of medicinal plants in Chanthaburi Province, which is beneficial for tracking and managing herbal resources used in the treatment of menopausal women according to local wisdom

### Conceptual Framework



## Methodology

The research on developing a Geographic Information System (GIS) for medicinal plants used in the treatment of menopausal syndrome patients in Chanthaburi Province is conducted in a mixed research format, utilizing applied research in conjunction with qualitative research. The target population includes local healers, traditional Thai medicine practitioners, and individuals who have received treatment for menopausal syndrome.

**The research instruments are divided into two phases:** the first phase involves studying treatment methods and the use of herbs through in-depth interviews, both participatory and non-participatory observations, as well as focus group discussions to gather data on herbal usage in the study area. The second phase focuses on developing a Geographic Information System for medicinal plants, utilizing GPS tools and GIS software to identify the locations of herbs used for treatment.

Data collection begins with a review of relevant research and documentation on the treatment of menopausal syndrome patients, followed by interviews and focus group discussions to obtain flexible data that can validate the understanding between the interviewer and interviewees. Additionally, data obtained from interviews and document studies are analyzed and categorized according to the research themes.

Data quality verification will employ triangulation to ensure the reliability of the information gathered, checking data from various aspects, including data sources, researchers, and data collection methods. The resulting data will be presented in a descriptive analysis format to explain the research objectives and present the information along with relevant illustrations.

This study aims to promote the conservation of local wisdom in traditional Thai medicine and enhance community understanding of the importance of herbs in health care, particularly for menopausal women facing various challenges during this period.

## Research Results

### Part 1: Traditional Thai Medicine Treatments for Menopausal Syndrome by Local Healers in Chanthaburi Province

The results show that traditional Thai medicine is deeply integrated into the Thai way of life, focusing on restoring the body's balance rather than merely targeting pathogens, which is a unique feature of Thai healing methods. For the treatment of menopausal syndrome, local healers use pulse diagnosis, medical history-taking, and observation of physical symptoms before prescribing herbal remedies in various forms, such as decoctions and capsules. The treatment also incorporates spiritual rituals and care related to religious beliefs.

Menopausal women often experience imbalances in the "tridosha," which can result in symptoms such as irregular menstruation, hot flashes, and mood swings. The use of herbs combined with the avoidance of certain foods is an effective method for treating these symptoms. The duration and consistency of herbal intake greatly influence the treatment outcomes, requiring local healers to educate and help patients understand the necessity of long-term and disciplined health care.

Follow-up care is another important factor, as some patients experience severe symptoms and cannot wait for long-term results. Thus, good communication between healers and patients is essential to clarify the time required for treatment and the importance of continuous care.

### Part 2: Herbal Formulations Used by Local Healers for the Treatment of Menopausal Syndrome in Chanthaburi Province

The treatment of menopausal syndrome by local healers in Chanthaburi reflects local wisdom, with herbal remedies playing a key role. From the study, it was found that four local healers commonly use five types of herbs: sappan wood, long pepper, black pepper, cardamom, and plai.

**Caesalpinia sappan** helps nourish the blood, reduce pain, and promote healthy blood circulation, particularly in menopausal women who often suffer from circulatory issues. It is also effective in alleviating hot flashes.

**Piper longum** has properties that help expel gas and relieve bloating, symptoms commonly caused by hormonal changes in menopausal women.

**Piper nigrum** stimulates blood circulation and reduces inflammation, which helps balance the body's elements.

**Elettaria cardamomum** aids digestion and relieves fatigue by stimulating the digestive system.

**Zingiber zerumbet** reduces swelling and inflammation, which is suitable for symptoms caused by hormonal changes.

Most of these herbs are classified as hot-tasting, which helps balance the body's elements in menopausal women. Improved blood circulation enables the body to better cope with symptoms. Moreover, this study underscores the importance of preserving local wisdom, raising awareness of, and valuing the traditional knowledge of health care that has been passed down for generations.

### Part 3: Development of a Geographic Information System (GIS) for Medicinal Plants Used in Traditional Remedies by Local Healers in Chanthaburi Province

The development of a Geographic Information System (GIS) for medicinal plants in Chanthaburi Province focuses on collecting and analyzing data on herbs used to treat menopausal women, which is vital to traditional Thai medicine. Chanthaburi Province's diverse geography, including mountains, highlands, and river plains, along with its suitable temperatures and rainfall, makes it rich in medicinal plants. The survey identified over 50 important species of medicinal plants used by local healers for treating menopausal symptoms. The location data of these plants are recorded as geographical coordinates to promote effective treatment and preserve local wisdom for future generations.

In creating the GIS, the locations of medicinal plants used for menopausal treatments and the residences of local healers were identified, including: 1) Healer Pensri Sa-nguanthap 2) Healer Thanu Poonthavee 3) Healer Kruang Kamsuk 4) Healer Prasert Kaewngam

The analysis of medicinal plants used by Healer Pensri Sa-nguanthap provides insights into the roles and properties of each herb, considering their relationship with the geographical environment. For example, long pepper, used to treat respiratory issues, is often grown in humid areas; sweet flag, which relieves pain, is found in waterlogged areas; and nutmeg, which strengthens the heart, grows in tropical climates.

Additionally, coriander seeds and sappan wood help alleviate various symptoms. GIS analysis helps identify the most effective sources of medicinal plants and design efficient conservation of natural resources in the area.





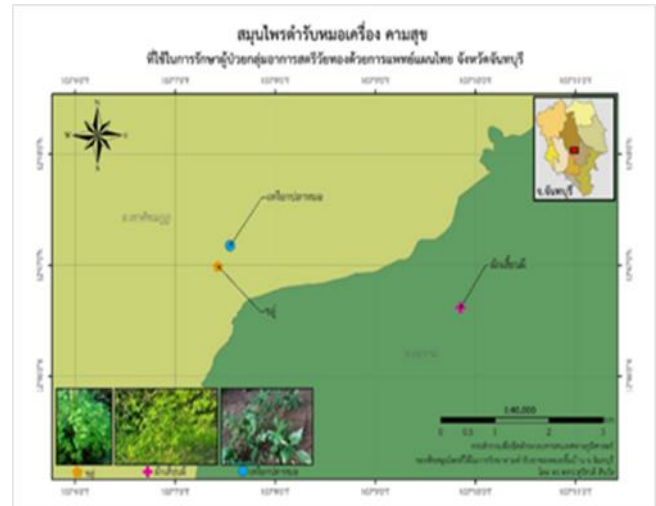
**Figure 1: Key Medicinal Plants Used by Healer Pensri Sanguanthap in the Treatment of Menopausal Symptoms**

Thanu Poonthavee is an expert in the use of Thai herbal medicine, such as tamarind, Indian gooseberry, sea almond, Shorea (Payom), black pepper, cardamom, and plai, which have important properties for treating diseases and promoting health. Tamarind aids digestion and detoxification, while Indian gooseberry boosts the immune system. Sea almond helps relieve pain, Shorea reduces inflammation, and black pepper stimulates digestion. The use of Geographic Information Systems (GIS) helps analyze the distribution of these herbs and their relationship with environmental factors, as well as the community's needs for treatment. This enables sustainable and effective conservation and promotion of herbal use in the community



**Figure 2: Key Medicinal Plants Used by Healer Thanu Poonthavee in Treating Menopausal Syndrome**

Healer Kruang Kamsuk is an expert in using herbs to alleviate menopausal symptoms, particularly herbs like *Cleome viscosa* (Wild Spider Flower), *Acanthus ebracteatus* (Sea Holly), and *Pluchea indica* (Indian Marsh Fleabane), which are highly effective in reducing hot flashes, anxiety, and depression. These herbs are commonly found in tropical and fertile soil regions. Utilizing GIS technology to analyze these herbs can help create distribution maps and study the relationship between geographic factors and herb growth. This analysis will enhance the understanding of the impact of herbal use on menopausal symptoms and contribute to the development of effective future health policies.



**Figure 3: Key Medicinal Plants Used by Healer Kruang Kamsuk for Treating Menopausal Syndrome**

Healer Prasert Kaewngam uses various herbs to treat menopausal symptoms caused by hormonal changes, including ginger, galangal, neem, ma-kha, and soursop. These herbs have properties that help stimulate blood circulation, balance hormones, and alleviate symptoms experienced during menopause. The use of these medicinal plants is rooted in local wisdom accumulated over centuries and is connected to the community's culture. Geographic studies help understand the distribution of medicinal plants in different areas, which can be used to create a database for developing more effective and safer treatments.



**Figure 4: Important herbs used by Healer Prasert Kaewngam to treat menopausal symptoms.**

The researcher conducted a survey of medicinal plants in Chanthaburi Province in collaboration with a team of GIS experts and local healers to gather information about the herbs used to treat menopausal patients. The collected data was systematically organized and geocoded in GIS, enabling effective analysis and management of the information. This is particularly true for medicinal plants in the group of warm and balanced herbs that play a role in harmonizing the body's elements. Important data, such as scientific names, parts used, and properties, were meticulously recorded. This data collection will promote the use of medicinal herbs in the community and enhance the understanding of traditional Thai medicine.



**Figure 5: Important herbs used by local healers as primary medicines for treatment.**

In summary, the use of Geographic Information Systems (GIS) in studying medicinal plants for treating menopausal symptoms is an essential tool for creating databases and analyzing data effectively. It assists in collecting information about medicinal plants used for treatment, such as plant names and growth characteristics. GIS also helps analyze the distribution of medicinal plants and the factors affecting their growth, including the study of biodiversity and assessing the impacts of climate change. Furthermore, GIS can support the planning of conservation and sustainable management of medicinal plant resources to develop effective and environmentally friendly treatments in the future.

## Discussion of Results

### Section 1: Treatment Methods for Patients with Menopausal Symptoms Using Thai Traditional Medicine by Folk Healers in Chanthaburi Province

Thai traditional medicine is deeply connected to the way of life of Thai people, as it emphasizes treating bodily imbalances rather than merely focusing on pathogens. This is considered a unique characteristic of Thai treatment, particularly in managing menopausal symptoms, where folk healers employ a holistic diagnostic approach.

#### 1.1 Research Findings on Diagnosis and Treatment Approaches:

Folk healers use methods such as pulse diagnosis and patient history-taking, along with observing physical symptoms, to assess bodily imbalances, such as the imbalances in the three elements that occur during menopause, which affect menstrual systems and emotional changes. Patients receive herbal medicines in various forms, such as decoctions and capsules, alongside psychological rituals related to religion, which help build confidence and restore health.

This aligns with the findings of Phichaya Petchkla (2022) regarding the survey of medicinal plants used to treat menopausal symptoms in Chanthaburi communities, which emphasizes the importance of medicinal plants in folk medicine wisdom for alleviating various symptoms during menopause, particularly hot flashes, mood swings, and sleep issues.

Moreover, follow-up care is another critical factor, as some patients may experience severe symptoms that prevent them from waiting for treatment outcomes. Therefore, effective communication between the healer and the patient is necessary to ensure understanding of the treatment duration and the importance of continuous care. Research by Nuanjan Sukchit (2019) also underscores the need for utilizing Geographic Information Systems (GIS) to analyze health data and medicinal plants, which can assist in managing health care more effectively and sustainably.

**1.2 Research Findings on the Importance of Using Herbs:** The use of herbs alongside the avoidance of inappropriate foods is an effective method for treating menopausal symptoms, such as hot flashes, mood swings, and insomnia. This treatment approach tends to receive a better response when patients understand the duration and continuity required in the treatment process.

Thai traditional medicine is deeply connected to the lifestyle of Thai people, especially in treating bodily imbalances, which differs from modern medicine that often focuses solely on addressing pathogens. In treating patients with menopausal symptoms, folk healers utilize various diagnostic methods, such as pulse diagnosis and history-taking, to obtain accurate information about the patient's condition. Treatment includes administering herbal medicines in various forms, such as decoctions and capsules, reflecting the use of local wisdom in healing.

Menopausal symptoms often arise from imbalances in the three elements, including pitta and vata, leading to several symptoms such as irregular menstruation, hot flashes, and mood swings. The combined use of herbs and avoidance of inappropriate foods is recognized as an effective treatment method. Patients who understand the duration and continuity of the treatment tend to achieve better outcomes. Therefore, it is essential for folk healers to educate patients about this understanding.

Additionally, follow-up care is crucial, especially for patients with severe symptoms who may not be able to wait for treatment results. In this regard, good communication between the healer and the patient can help patients comprehend the importance of continuous treatment, as well as the time required for healing. This aligns with the findings of Apichat Chantak (2020), which revealed that using herbs to treat menopausal symptoms can reduce reliance on chemical medications, consistent with the treatment approaches that emphasize the use of herbs in local wisdom. Research by Kritaya Jittasiri (2021) also highlights the effective use of herbs in alleviating menopausal symptoms, particularly when utilizing Geographic Information Systems (GIS) for comprehensive and accurate data.

#### 1.3 Research Findings on Follow-Up and Communication:

Follow-up care is essential, and folk healers must maintain good communication to ensure that patients understand the duration of treatment and the importance of ongoing care. Clear communication can help patients develop patience and understanding in their treatment, positively impacting long-term treatment outcomes.

Follow-up care is particularly vital in treating patients with menopausal symptoms, especially concerning communication between folk healers and patients. This ensures that patients comprehend the duration required for treatment and the importance of ongoing care. This information is consistent with the concepts proposed in the research by Siriporn Pakdeewarakul (2021), which emphasizes the necessity of educating patients about the use of herbal medicine and the time required for treatment to achieve optimal outcomes. The importance of follow-up care is also highlighted in the research by Apichat Chantak (2020), which states that good communication between the healer and the patient helps patients remain patient and motivated during treatment, positively influencing long-term treatment outcomes. Ongoing monitoring allows the healer to adjust treatments to suit each patient and respond promptly to any issues or changes in symptoms.

## Chapter 2: Herbal Remedies Used by Folk Healers for Treating Menopausal Symptoms with Thai Traditional Medicine in Chanthaburi Province

**2.1 Research Findings on the Use of Herbs for Treating Menopausal Symptoms:** The treatment of menopausal symptoms



by folk healers in Chanthaburi Province involves the use of herbs known for their blood-nourishing properties and their ability to alleviate various symptoms caused by hormonal changes. This aligns with the principles of Thai traditional medicine, which focuses on restoring bodily balance. The herbs commonly used include Fang (red sandalwood), Dipli, Pepper, Cardamom, and Plai (Zingiber zerumbet), all of which play a crucial role in balancing the elements within menopausal women's bodies. These herbs not only help alleviate hot flashes and improve circulation but also promote digestion and reduce fatigue, which is often experienced by these patients. The use of warming herbs is therefore an effective option for treatment and positively impacts the overall health of women in the community.

The continuity of treatment, including the duration and consistency of herbal intake, significantly affects treatment outcomes. It is essential for folk healers to educate and help patients understand that treatment requires time and discipline in health management. Furthermore, follow-up care is another important factor, necessitating good communication between the healer and the patient to ensure an understanding of the treatment duration and the importance of ongoing care. This is consistent with the studies by Apichat Chantak (2020) and Siriporn Pakdeewarakul (2021), which emphasize the critical role of herbal medicine in promoting the overall health of women in Chanthaburi Province. Moreover, the combined use of herbs with the avoidance of inappropriate foods represents an effective strategy for alleviating menopausal symptoms.

**2.2 Research Findings on the Importance of Preserving Indigenous Medical Knowledge:** The treatment of menopausal symptoms with herbs that have been passed down from indigenous wisdom not only alleviates physical symptoms but also fosters awareness and appreciation among women in the community regarding the health knowledge that has existed since ancient times. The use of herbs also helps preserve local lifestyles and cultures associated with Thai traditional medicine. In this regard, folk healers are not only providers of care but also custodians of health knowledge and wisdom, which can lead to the development of effective and appropriate natural treatment methods that align with the community's lifestyle in the future.

Follow-up care is another crucial factor, as some patients may experience severe symptoms that prevent them from waiting for treatment results. Thus, good communication between the healer and the patient is necessary to ensure an understanding of the treatment duration and the importance of ongoing care. These studies align with the research of Amphon Rangsit (2020), which highlights the significance of preserving indigenous medical knowledge as an effective form of treatment, rich in historical and cultural value intertwined with the lives of Thai people.

Additionally, research by Sujin Sutthasuwana (2019) emphasizes the importance of maintaining cultural diversity, as folk medicine reflects the lifestyles and health understandings of people in various regions. Particularly in the context of treating menopausal symptoms, the relationship with local herbal wisdom illustrates the importance of passing down knowledge and wisdom in health care from generation to generation.

### **Chapter 3: Development of a Geographic Information System (GIS) for Medicinal Plants Used in Folk Remedies in Chanthaburi Province**

**3.1 Research Findings on the Importance of Geography and Climate in Developing Herbal Resources:** Chanthaburi Province features diverse topography, including mountains, plateaus, and lowlands, contributing to a rich biodiversity that promotes the

growth of medicinal plants. Notably, the region's climate, characterized by abundant rainfall, supports moisture levels conducive to the growth of various medicinal plants. The integration of geographic data with traditional healing practices can aid in creating distribution maps for medicinal plants that are beneficial for treating menopausal patients.

This is consistent with the research of Apichat Chantak (2020) titled "Developing GIS for Managing Herbal Resources in Chanthaburi Province," which emphasizes the use of GIS to analyze the distribution of herbs across diverse terrains, allowing for effective tracking and conservation of important medicinal plants and the impact of climate.

Additionally, research by Mwangi and Obara (2022) highlights the application of GIS in creating maps for traditional remedies for menopausal symptoms in Kenya, demonstrating the significance of climatic conditions affecting the use of herbs for treatment, particularly regarding data related to seasons and soil moisture affecting herb growth.

Research by Karam and Torabi (2023) illustrates the use of GIS in assessing health issues and developing healthcare services in rural areas, utilizing GIS technology to create maps and spatial analyses that facilitate effective resource planning for medicinal plants in line with local wisdom.

The findings indicate that the significance of geography and climate in Chanthaburi Province plays a crucial role in developing herbal resources, promoting sustainable conservation and use of herbs, and effectively improving the quality of life for women during menopause.

**3.2 Research Findings on the Use of GIS in Surveying and Analyzing Medicinal Plants:** The use of Geographic Information Systems (GIS) for surveying and analyzing data regarding herbal resources in Chanthaburi Province enables efficient collection and spatial analysis of medicinal plant data. The identified coordinates facilitate easy access to information, allowing for analysis of the relationship between herbal plants and the symptoms experienced by menopausal patients, such as hot flashes and mood swings. The application of GIS in developing this information will contribute to creating suitable treatment approaches that align with local wisdom.

The use of GIS in gathering and analyzing spatial data about medicinal plants allows for evaluating the relationships between these plants and menopausal symptoms, such as hot flashes and mood swings. This aligns with the research of Mwangi and Obara (2022), which examined the use of GIS to create maps of traditional remedies for menopausal symptoms in Kenya, focusing on integrating traditional medical knowledge with modern technology to develop treatment strategies. GIS aids in developing appropriate treatment approaches consistent with local wisdom, aligning with the ideas in the study by Asgarpanah and Khoshkam (2012), which examined herbs and the benefits of herbal plants for disease treatment, emphasizing the importance of holistic care and the use of herbs in line with local culture.

The findings reveal that the data compiled in the GIS not only aids in treating menopausal symptoms but also promotes the conservation of local wisdom concerning medicinal plants. This is vital for maintaining environmental balance and sustainable resource use, similar to the study by Nwokolo and Smith (2023), which explored the use of GIS in tracking herbal usage and treatments in local communities, focusing on preserving local wisdom in the use of plants for medicinal purposes.

The application of GIS in keying information about medicinal plants in Chanthaburi Province not only supports the health care of menopausal women but also aids in the conservation

and sustainable promotion of natural resources, as well as the development of effective policies and holistic medicine in the future.

### **3.3 Research Findings on the Conservation of Herbal Resources and Enhancement of Quality of Life for Menopausal Women:**

The development of a GIS for medicinal plants used in treating menopausal patients integrates knowledge from Thai traditional medicine with modern technology while promoting sustainable conservation and use of herbal resources. Emphasizing local wisdom will enhance the quality of life for women in menopause by supporting the use of herbs in the community for effective and sustainable health care.

This is consistent with the research of Apichat Chantak (2020), which emphasized using GIS to manage herbal resources in Chanthaburi Province, allowing for the tracking and conservation of essential herbs in traditional medicine. This study underscores the creation of distribution maps for medicinal plants to promote sustainable resource use, enhancing health and quality of life.

Similarly, research by Mwangi and Obara (2022) found that using GIS to create maps for traditional remedies for menopausal symptoms can lead to a better understanding of health management approaches for women. Supporting the use of herbs in the community improves the quality of life for menopausal women.

Research by Wallap Tree Rat (2019) also found that using GIS to analyze the distribution of medicinal plants is crucial for treating menopausal symptoms, providing information that can be used to develop effective and sustainable resource management policies and plans in the future.

The study and use of Geographic Information Systems (GIS) serve as essential tools for supporting conservation and sustainable development in communities, aligning with both domestic and international research that advocates for effective health management and resource use.

## **Recommendations**

### **1. Recommendations for Utilizing Research Findings**

**1.1 Development of GIS for Medicinal Plants:** A geographic information system (GIS) should be established to collect data on medicinal plants used in the treatment of menopausal patients. This system should provide easily searchable spatial information to aid in the effective planning and management of herbal resources in Chanthaburi Province.

**1.2 Creating Knowledge and Education about Herbs in the Community:** Training sessions or seminars should be organized in communities regarding the use of herbs for treating menopausal symptoms, particularly to support the use of local wisdom, so that menopausal women can better understand their health care.

**1.3 Promoting Ongoing Research on Medicinal Plants:** Continuous research into medicinal plants used to treat menopausal patients should be supported, including studies on the mechanisms of action and safety of these herbs, to provide quality information useful for treatment.

**1.4 Building Networks between Traditional Healers and Patients:** A network should be promoted between traditional healers and patients to ensure continuous care and treatment, providing clear information about symptoms and treatments and building trust in the healing system.

**1.5 Conservation and Development of Natural Resources:** Conservation and development of natural resources in the area should be implemented, especially regarding medicinal plants.

Collaboration with local agencies to promote the cultivation and use of herbs in communities is essential to preserve biodiversity and ensure the sustainability of local resources.

### **2. Suggestions for Future Research**

**2.1 Expanding the Scope of Study:** The scope of the study should be extended to cover other areas with biodiversity and cultural diversity in Thailand to compare the use of medicinal plants in treating menopausal patients in different regions.

**2.2 In-Depth Study of Medicinal Plants:** Research should focus on the pharmacological properties of herbs used in treating menopausal patients to develop more effective and safer treatment methods.

**2.3 Studying Psychological Impacts:** Investigating the psychological impacts and quality of life of menopausal women using herbs for treatment should be conducted to understand the relationship between treatment and the mental health of patients.

**2.4 Application of New Technologies:** Consideration should be given to utilizing new technologies such as mobile applications or online platforms to provide information about the use of herbs and to create GIS maps, making it easier for patients and communities to access information.

**2.5 Developing a Comprehensive GIS Database:** A GIS database should be developed containing information about medicinal plants, their distribution locations, and patient information to facilitate effective analysis and planning.

**2.6 Gathering Knowledge from Traditional Healers:** Research and documentation of knowledge from traditional healers regarding the use of herbs to treat menopausal symptoms should be conducted to preserve local wisdom and promote the use of herbs in communities.

## **Further Research Recommendations**

1. Research should focus on identifying the active compounds of medicinal herbs used to treat cancer, with over 20 species yet to be studied, to utilize them in pharmacology for producing quality medicines for treatment.
2. Practical research on the conservation and restoration of medicinal herbs should involve community cooperation between Cambodia and Thailand to reduce the spread of diseases, ensuring the longevity of these herbs.
3. Research should identify the locations of various medicinal plants within government-protected forest areas to establish a geographic information system (GIS), especially in large forests of the country.

## **Declarations**

### **Ethics approval and consent to participate**

This article received ethical approval for human research from the Research Ethics Committee of Sirindhorn College of Public Health, Chon Buri, in 2021. The research was conducted under an expedited review process and did not involve any human tissue or animal experimentation.

### **List of abbreviations**

GIS: Geographic Information Systems

## Conflicts of Interest

The authors declare that there are no conflicts of interest that could influence the decision-making or outcomes of this study. The research and its findings have been conducted independently, free from financial or personal interests that could affect the accuracy and credibility of the results.

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