ASSESSMENT OF THE KNOWLEDGE AND CHALLENGES TOWARD THE USE OF HERBAL MEDICINES IN ADULTS

BY

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A DISSERTATION SUBM,ITTED IN PARTIAL FULFILLMENT OF THE PHARMD PROGRAMME. DEPARTMENT OF CLINICAL PHARMACY AND PHARMACYY PRACTICE, FACULTY OF PHARMACY
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FEBUARY, 2025.

CERTIFICATION

This is to certify that this project is carried out by AIGBEDION AYEVOSA FAVOUR with matriculation number PHA1808332 in the Department of Clinical Pharmacy and Pharmacy Practice,Faculty of Pharmacy, University of Benin, Benin City, Edo State.

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DEDICATION

This work is wholly dedicated to the Lord God Almighty mystrength and shield for His grace and cndless uidatice thronugtrour the cuurse of his prujecetand my entire school journey: to my beloved parents, whose unwavering suppor, sacrifies and encouragement have my pillars and to my cousins and friends for their prayers and support.

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ABSTRACT

Background: Herbal medicine has long been a cornerstone of healthcare, offering a range of therapeutic effects derived from natural sources. Despite advancements in conventional treatments, herbal therapies remain popular, especially among adults.

Objectives: The broad objectives of the study are usage, challenges, attitudes, knowledge, and willingness toward the use of herbal medicine among adults in Uhunmwonde Local Government Area of Edo State, Nigeria.

Methods: This cross-sectional study was conducted in Uhunmwonde Local Government Area (LGA) of Edo State, Nigeria. The study population comprised adults aged 18 years and above who have used, are currently using, or have any relevant knowledge of herbal medicine. Data was collected using a questionnaire that was designed based on the requirement and literature review. The questionnaire was divided into sections covering socio-socio-demographics, gathering information on participants' age, gender, education, occupation, religion, and ethnicity to provide a detailed profile. Statistical analysis was performed using the Statistical Package for Social Science (SPSS) version 21.0 software.

Results: Overall, 280 participants were enrolled. Most of the respondents (54, 19.3%) were aged 60-69 years, with a nearly balanced gender distribution (42.2% male, 57.9% female). Herbal medicine use was prevalent among respondents, with 76.1% having used it and 47.5% currently using it. However, 26.1% faced challenges in finding reliable information, and 17.5% struggled with determining the correct dosage. Traditional healers were the most common source (103/280), followed by healthcare professionals (46/280) and books/magazines (41/280). Males used self-prepared remedies more than females ($p=0.009$), while females preferred herbal vendors. Higher education levels were associated with increased use of pharmacies, while those with no formal education relied on traditional healers ($p=0.000$).

Conclusion: The study highlights the usage, challenges, attitudes, knowledge, and willingness toward herbal medicine among adult patients. Findings indicate that while many older adults in Uhunmwonde Local Government Area use herbal medicines, barriers such as accessibility, safety concerns, and lack of proper guidance hinder their optimal use.

Keywords: Herbal medicines, Adults, Challenges and barriers, Attitudes, Knowledge.

CHAPTER ONE

1.1 Introduction and Background of the Study

Herbal medicine has long been a cornerstone of healthcare, offering a range of therapeutic effects derived from natural sources. Despite advancements in conventional treatments, herbal therapies remain popular, especially among adults. Many individuals use herbal medicine to manage chronic illnesses, enhance overall well-being, and treat age-related conditions (Lindquist *et al*., 2012). The use of herbal medicine dates back thousands of years, with documented practices in ancient civilizations such as China, Egypt, and India. Traditional systems like Ayurveda, Traditional Chinese Medicine (TCM), and Native American herbalism have significantly influenced modern herbal medicine (Barnes *et al*., 2013). In today's world, the World Health Organization (WHO) estimates that 80% of the global population relies on herbal medicines for some aspect of primary healthcare (WHO, 2013). In developed countries, a resurgence in interest in natural and holistic health practices has further boosted the use of herbal remedies among adults.

Several factors influence the use of herbal medicine by adults. Cultural ideas and traditions play a significant role, especially in regions where herbal therapy has a long-standing history (Kennedy *et al*., 2015). Additionally, the perception of herbal medicine as a safer alternative to synthetic medications, which often have numerous side effects, enhances its popularity. Economic considerations are also important, as herbal treatments are generally less expensive and more accessible than prescription medications. Adults often have a positive attitude towards herbal medicines, viewing them as natural and safer solutions for treating health issues (Fouladbakhsh and Stommel, 2013). Herbal medicine's holistic

approach, which typically encompasses physical, mental, and spiritual health, aligns well with adults' comprehensive care needs. Furthermore, the increasing integration of herbal therapy into conventional healthcare practices has bolstered trust in its efficacy and safety. Despite this positive attitude, there is considerable variation in the knowledge and awareness levels of adults regarding herbal medicine. Some have extensive knowledge, often passed down through generations, while others rely on information from healthcare providers, media, or peers. The quality and accuracy of this information can vary, leading to potential risks such as incorrect dosages, interactions with prescription medications, and the use of non-standardized herbal products (Yoon *et al*., 2013). Therefore, this study explores the attitude and knowledge of adults towards herbal medicine, focusing on the factors influencing their usage, challenges, willingness to use, and the potential implications for healthcare practices.

Herbal Medicines: Definition and Terminologies

The World Health Organization (WHO) provides both general and specific definitions of traditional herbal medicines across multiple documents, classifying them into four main categories (WHO, 2000, as cited by RH, 2015):

Herbs: These are unprocessed plant materials such as leaves, flowers, fruits, seeds, stems, wood, bark, roots, rhizomes, or other parts of plants, which may be whole, broken, or ground into powder.

Herbal Materials: This category includes herbs as well as fresh plant juices, gums, fixed oils, essential oils, resins, and dried herbal powders. In some regions, these materials may undergo traditional processing methods, such as steaming, roasting, or stir-baking with honey, alcoholic beverages, or other substances.

Herbal Preparations: These form the foundation for finished herbal products and may consist of crushed or powdered herbs, extracts, tinctures, and fatty oils derived from herbal materials. The pro-duction process involves techniques such as extraction, purification, concentration, or other physical or biological methods. Preparations may also be created by steeping or heating herbal materials with honey, alcohol, or other substances.

Finished Herbal Products: These are made from one or more herbs, and if multiple herbs are included, the term "mixture herbal product" applies. Finished and mixture herbal products may contain excipients alongside the active ingredients. However, products that include chemically defined active substances, such as synthetic compounds or isolated plant constituents, are not classified as herbal medicines.

The WHO further refines its definition of herbal medicines for guideline purposes: "Herbal medicines refer to finished, labeled medicinal products that use aerial or underground parts of plants, plant material, or combinations thereof as their active ingredients, whether in their raw form or as plant preparations. Plant materials include juices, gums, fatty oils, essential oils, and similar substances. Herbal medicines may include excipients alongside active ingredients but exclude medicines combining plant materials with chemically-defined active substances, such as isolated plant constituents" (WHO, 2019). The roots of many African plant species, particularly their root barks, are highly regarded for their medicinal properties. Underground plant structures like bulbs, including garlic and onions, consist of fleshy scales and offer therapeutic benefits. Rhizomes, such as ginger, spear grass, and turmeric, are horizontal underground stems known for treating respiratory issues, enhancing male potency, and addressing chronic diseases like cancer. Tubers, including yams and potatoes, are swollen underground

structures often used in managing ailments such as diabetes and cancer. Tree bark, rich in phytochemicals, is particularly valued for its medicinal potential. Other plant parts, including leaves, stems, flowers, fruits, and seeds, are also extensively used for their health benefits. Furthermore, plant-produced substances like gums, exudates, and nectars, which serve as natural defenses against pests and aid in wound healing, play a vital role in pharmaceutical manufacturing (Ozioma and Chinwe, 2019).

The World Health Organization (WHO) has established specific criteria for assessing the safety, potency, and quality of herbal remedies. It is estimated that approximately 80% of the global population relies on herbal formulations as a primary healthcare option, a trend that continues to grow due to the toxicity and adverse reactions associated with modern allopathic drugs. This increasing preference has also led to a significant rise in herbal drug manufacturers (Sen *et al*., 2011). Herbal products have gained widespread acceptance for their therapeutic properties, including antimicrobial, antifertility, antidiabetic, antiarthritic, antiaging, antidepressant, sedative, antispasmodic, antianxiety, anti-inflammatory, analgesic, vasodilatory, anti-HIV, hepatoprotective effects, as well as their applications in treating conditions such as cirrhosis, acne, asthma, menopause, impotence, gallstones, migraines, Alzheimer's disease, chronic fatigue, and memory enhancement (Saggar *et al*., 2022).

Historically, natural herbs have been extensively used for the treatment and prevention of various ailments. The evolving understanding of their benefits and limitations has spurred the development of new herbal remedies that promote health with minimal or no side effects. Over time, the wealth of knowledge surrounding natural products has evolved into various medicinal systems, including traditional Indian medicine, European medicine,

Japanese Kampo, traditional Chinese medicine, traditional Arabic and Islamic medicine, and folk medicine. These systems not only involve herbal treatments but also incorporate pharmaceuticals derived from minerals (e.g., mercury, purified sulfur oxide, gold, silver) and animal products (e.g., ivory, deer antlers, animal horns) as well as physical therapeutic procedures like Panchakarma (Elachouri, 2018; Saggar *et al*., 2022).

1.1.1 History and Development of Herbal Medicines

The use of herbal medicines dates back to the Neanderthal era, as evidenced by archaeological discoveries. Pollen from medicinal plants like yarrow, chamomile, and ephedra was found at Neanderthal sites such as the Shanidar caves in Iraq (65,000 years ago) and El Sidron in Spain (50,000 years ago). These findings suggest early ritualistic or medicinal use of herbs, a practice still relevant today for numerous ailments (Hardey *et al*., 2012). Evidence from the Neolithic period includes the discovery of the Ice Man, Otzi, whose 5,300-year-old remains were found with birch polypore fungus also known for its medicinal properties. This suggests that early humans had some understanding of using plants for treating illnesses, though these interpretations remain speculative (Capasso, 1998).

Herbal medicine also has ancient roots in global traditions such as Ayurveda from India (Rig-Veda texts), Chinese Herbal Medicine (dating back to 1000-500 B.C.), and Ancient Egyptian Practices (such as Eber's Papyrus, 1500 B.C.). These systems laid the groundwork for contemporary herbal medicine, showcasing diverse plant-based remedies for ailments like ulcers, burns, and heart issues (Saboo *et al*., 2014; Pan *et al*., 2014). During the Middle Ages in Europe, knowledge of herbal medicine stagnated but was preserved in monasteries through medicinal gardens and texts like *Dioscorides' Materia*

Medica (65 A.D.), which listed over 600 herbal medicines. Asia however, saw continued advancements with the Chinese *Compendium of Materia Medica* (1368–1644) documenting 12,000 herbal remedies. Ayurveda also thrived during this time, with foundational texts like the *Charaka Samhita* cataloging the uses of over 100,000 plants (Manojkumar, 2013).

Herbal medicine gained popularity in the 19th-century America and Europe, influenced by movements like Thomsonianism. It is noteworthy that non-human animals such as chimpanzees and birds also use plants for medicinal purposes, demonstrating an instinctive understanding of herbal medicines' therapeutic potential (Sendker and Sheridan, 2017).

Figure 1: Some of the earliest medicinal plants (Sendker and Sheridan, 2017).

1.1.2 Differences Between Herbal Medicine and Conventional Drugs

While herbal medicine and conventional pharmacotherapy may appear similar, they have three significant distinctions (Wanjari and Wanjari, 2019):

Use of Whole Plants: Herbal medicine typically utilizes unprocessed plant extracts containing multiple active compounds, which are believed to work synergistically. This synergy is thought to enhance the herb's overall effect compared to the sum of its individual components, while also reducing toxicity through a “buffering” effect. Although variations in the composition of herbal extracts exist, practitioners claim these differences rarely lead to clinical issues. Experimental evidence supports the concepts of synergy and buffering in some cases, but their general applicability to all herbal products remains unclear.

Herb Combining: Herbal practitioners often combine several plants in a single preparation. This approach, based on the principles of synergy and buffering, is said to enhance therapeutic efficacy and minimize side effects. In contrast, conventional medicine generally avoids polypharmacy to reduce the risk of adverse drug interactions.

Diagnosis: Herbal medicine employs diagnostic methods distinct from conventional practices. For instance, in treating arthritis, herbalists might interpret symptoms as a result of “under-functioning elimination” and attribute the condition to an accumulation of metabolic waste. Based on this assessment, they might prescribe a combination of diuretic, cholerectic, or laxative herbs along with anti-inflammatory remedies.

1.1.3 Advantages and Limitations of Herbal Medicines

Advantages of Herbal Medicines

Complex Composition: Herbal medicines often consist of a mixture of compounds (Phyto-complexes), which may have a combined therapeutic effect superior to isolated compounds. This synergy, enhanced bioavailability and cumulative effects can provide greater overall activity than single-component therapies (Schmidt *et al*., 2008; Williamson, 2001).

Multi-Targeted Approach: Herbal extracts can act on multiple therapeutic targets simultaneously, making them suitable for multifactorial diseases like hypertension, diabetes, cancer and infections caused by multi-resistant bacteria. This "herbal shotgun" approach contrasts with the single-target mechanism of modern synthetic drugs (Carmona and Pereira, 2013).

Natural Synergism: Phytochemicals in plants evolved to function as multi-targeted, pleiotropic molecules that complement each other. This makes herbal extracts potentially more effective and resistant to developing resistance compared to synthetic single-target drugs (Koehn and Carter, 2005).

Economic and Practical Benefits: Using whole plant extracts may be less expensive and easier to prepare than isolating and purifying individual components. Additionally, herbal medicines may provide cost-effective options for managing chronic and resistant conditions (Raskin and Ripoll, 2004).

Reduced Resistance: Natural products like plant-derived antibiotics have been shown to enhance the efficacy of conventional drugs by reducing microbial resistance. For example, phenolic compounds from plants combined with antibiotics have demonstrated synergistic

effects against resistant bacterial strains (Purushotham *et al*., 2010; Carmona and Pereira, 2013).

Limitations of Herbal Medicines

Lack of Standardization: Variations in active ingredient concentrations and nomenclature inconsistencies can lead to inconsistent therapeutic effects. The complexity of herbal extracts also makes standardization and quality control challenging (Houghton, 1998).

Complex Modes of Action: The interactions among the numerous compounds in herbal extracts complicate the study of pharmacokinetics, pharmacodynamics, and mechanisms of action. This complexity poses challenges for clinical trials and regulatory approval (Raskin and Ripoll, 2004).

Regulatory Issues: Regulatory frameworks for herbal medicines vary widely across countries. While some countries, like the U.S. and Brazil, have developed specific regulations, many others lack robust guidelines, affecting the acceptance and use of phytomedicines (Carmona and Pereira, 2013).

Challenges in Drug Discovery: Modern drug discovery methods, like high-throughput screening (HTS), are not easily adaptable to natural product extracts due to their complex mixtures and difficulty in isolation and resupply of active compounds. This limits the integration of herbal medicines into mainstream pharmacology (Schmidt *et al*., 2008).

Perceived Lack of Efficacy: Skeptics often dismiss herbal medicines as placebos due to the low concentrations of active constituents. However, evidence from poison control reports and clinical studies indicates significant biological effects from herbal compounds (Williamson, 2001; Krenzelok and Mrvos, 2011).

Instability of Active Constituents: Some active compounds in plants may be unstable or degrade during extraction and processing, further complicating the development of herbal medicines as standardized treatments (Carmona and Pereira, 2013).

Globalization of Herbal Medicines

The traditional healthcare system is gaining increasing global recognition due to growing public interest in herbal medicines and their notable acceptance for addressing various health challenges, often with minimal or no side effects. Currently, 60% of the global population relies on herbal or traditional remedies as primary treatments, particularly for managing fever associated with malaria. Herbal and alternative medicines are the preferred choice for treating various ailments among 80% of Africans, 30-50% of Chinese, 48% of Australians, 70% of Canadians, 80% of Germans, 42% of Americans, 39% of Belgians, and 76% of French populations (Sen and Chakraborty, 2017). In cities such as San Francisco, London, and regions of South Africa, approximately 75% of individuals with HIV/AIDS use herbal therapies (Saggar *et al*., 2022).

The growing reliance on herbal products is also evident among healthcare professionals and in cost-effective medical practices. For instance, Malaysia now allocates more resources to traditional medicines than to allopathic drugs (Oritsatoki and Oguntibeju, 2010). In developing countries, traditional remedies remain the primary source of healthcare, with herbal treatments deeply rooted in cultural practices (Coulter and Willis, 2004). Similarly, herbal medicine has gained substantial traction in industrialized countries, including the European Union, Australia, North America, and the United Kingdom (Ekor, 2014).

In Nigeria, the herbal medicine market is still in its early stages, characterized by a developing structure. The market comprises two main supplier groups: local producers and distributors of imported products. Local producers primarily offer herbal remedies targeting conditions commonly treated with over-the-counter (OTC) drugs, while distributors focus on imported herbal products marketed as dietary supplements. These suppliers are predominantly located in Nigeria's Southwest and Southeast regions. Despite its current limitations, Nigeria's abundant natural resources for herbal medicine present significant growth potential, promising expanded marketing opportunities and increased revenue generation for individuals and the nation. The Nigeria Natural Medicine Development Agency (NNMDA) plays a crucial role in fostering the development and promotion of herbal medicine within the country (Mafimisebi *et al*., 2013).

Attitudes Towards Herbal Medicines and Factors Influencing the Acceptance of Its Usage

Since the advent of the scientific era, traditional medicine (TM) has faced persistent prejudice, often fueled by Western religious and educational influences, urbanization, and globalization in Africa. This has led to skepticism among some Western-educated African elites, who question the quality, efficacy, and safety of African medicinal products, despite traditional medicine's significant role in healthcare delivery and its long history of minimal adverse effects. Critics with limited knowledge of herbal medicines frequently focus on reported toxicities, often misrepresenting the practice, while sensationalized media coverage exacerbates negative perceptions without addressing underlying causes. Nevertheless, numerous scientific studies have validated the efficacy and, in some cases,

the safety of medicinal plants and herbal remedies, particularly through animal research, underscoring their therapeutic potential and value (Mensah *et al*., 2019).

The renewed public interest in herbal preparations has been attributed to various factors, including:

The proven efficacy of plant-based medicines.

Growing consumer interest in alternative medicines and natural therapies.

A misplaced belief in the superiority of herbal remedies over synthetic pharmaceuticals.

Dissatisfaction with the outcomes of conventional medicines and reliance on the perceived effectiveness of herbal products.

The high cost and adverse side effects of many pharmaceutical drugs.

Improvements in the safety and quality of herbal medicines through the incorporation of modern scientific technologies.

Patients viewing herbal medicines as an alternative when they believe their physician has failed to accurately diagnose their condition.

The rise in self-medication practices (Kumar *et al*., 2016).

Additionally, strategic advertising by producers and their legislative representatives has significantly brought these products into the spotlight. Public awareness of herbal products has been effectively increased through mass media campaigns, including radio and television broadcasts (Amine and Chao, 2005). Herbal products are recommended for people of all ages to support normal growth and development. For instance, children consume up to 108 herbs for their essential dietary benefits. Young and older adults use herbal products to manage stress and slow the aging process due to their anti-aging and

revitalizing properties. Women often opt for herbal products for their slimming and beautifying effects (Sofowora *et al*., 2013).

Safety of Herbal Medicines

In many countries, herbal medicines are introduced to the market without mandatory safety or toxicological evaluations, and regulations on manufacturing and quality standards are often inadequate. These products are frequently available without prescription, and potential hazards, particularly in substandard products, are rarely identified. The global use of herbal medicines has grown significantly, accounting for 40% of healthcare services in China and with substantial usage reported in countries like Australia (48%), Canada (70%), the USA (42%), Belgium (38%), and France (75%) (Ekor, 2014).

The increasing use of herbal medicines has been accompanied by a rise in reports of toxicity and adverse events. These reactions can result from predictable side effects, overdose, prolonged use, dependence, hypersensitivity, allergic or idiosyncratic responses, and long-term toxic effects, such as liver, kidney, heart or neurological damage, as well as genotoxicity and teratogenicity. Many herbal products lack thorough pharmacological and toxicological evaluation, highlighting the critical role of pharmacovigilance in identifying adverse reactions. Quality issues, including poor raw materials, misidentification of herbs, improper processing, and contamination or adulteration, further contribute to unexpected toxicities. While improved regulation and adherence to Good Manufacturing Practices (GMP) could mitigate some of these concerns, disparities in manufacturing standards across countries make substandard products a persistent issue. Serious adverse effects, such as hepatotoxicity, renal failure, and allergic reactions, have drawn the attention of regulatory authorities. In response, the World Health Organization (WHO) has developed

guidelines for integrating herbal medicine safety into existing pharmacovigilance systems to address these challenges effectively (Shaw *et al*., 2013).

This surge in popularity of herbal medicines is driven by patient dissatisfaction with conventional medicines and a perception of herbal remedies as safer alternatives. However, this belief is often misleading, as herbs can cause severe adverse effects, including life-threatening conditions and death. Numerous poisoning cases have been documented in the literature. A case study in Nigeria highlighted the potential risks of herbal remedies, such as the polyherbal formula *Yoyo "Cleanser" Bitters*®, which caused liver enzyme elevation and hypokalemia in rats during a 30-day toxicity study. Hypokalemia, which can lead to dangerous arrhythmias, was identified as a significant risk. This product, widely advertised and popular in southwestern Nigeria, reflects the broader issue of inadequate regulation and oversight in herbal medicine use. Previous studies on other Nigerian herbal tonics, such as *Super B blood purifier* and *Super B seven keys to power*, revealed chronic toxicity risks, including splenic enlargement and lung tumors in experimental models. Globally, cases of liver fibrosis and poisoning have been associated with herbal medicine use. Toxic compounds in some herbal products have been shown to react with cellular macromolecules like DNA, causing cellular toxicity and genotoxicity. These findings emphasize the need for stricter regulation and thorough safety evaluations for herbal medicine (Ekor, 2014).

1.4 Empirical Review

El-Dahiyat *et al*. (2020) conducted a cross-sectional study in Jordan to investigate the prevalence and factors predicting the use of herbal medicine among older adults. Using a validated questionnaire tested for content and face validity by a panel of experts, data were

collected from 378 randomly selected participants across two regions in Jordan. From a total of 500 invited participants, 378 completed the survey. The study found a high prevalence (80.2%) of herbal medicine use, with age ($p < 0.05$) and the patient's disease state, particularly hypertension ($p < 0.05$), being the only significant predictors. Among nonusers, the primary reasons for avoiding herbal medicines included disbelief in their efficacy (52.2%), feeling healthy with no need for them (31.3%), and insufficient information about herbal products (29.7%). Side effects were reported by 9.3% of users, with nausea and vomiting being the most common, followed by skin rash (2.1%). The study recommended the development of effective herbal medicine policies and health education programs to enhance awareness of the benefits and risks of herbal medicines and optimize therapeutic outcomes.

In 2017, Osuchukwu *et al* carried out a cross-sectional descriptive study in the Calabar metropolis, Cross River State, Nigeria, between June and August 2016, to examine herbal medicine use among adult residents. Data were gathered from 208 participants using a 20-item semi-structured questionnaire and a multi-stage random sampling technique, with analysis performed using SPSS version 22.0. The findings revealed that 64% of respondents had used herbal medicine within the previous year, with self-made preparations (35.5%) and herbal vendors (25%) serving as the primary sources. The main reasons for herbal medicine use included disease treatment, use as food supplements, and skin care, with affordability, effectiveness, and availability being the key factors for preference over conventional medications. Among users, 12% reported side effects, with dizziness, watery stool, abdominal pain, and vomiting being the most commonly

experienced. The study recommended establishing a pharmaceutical regulatory authority to oversee herbal medicine practices, ensuring their safety, standardization, and quality.

In order to examine the use of herbal products and dietary supplements among Americans aged 60 years and above, as well as their attitudes and knowledge regarding these substances, Marinac *et al*. (2007) conducted a descriptive study. The research involved administering a 35-item face-to-face survey to 267 men and women in the Kansas City, Missouri metropolitan area. The study documented patterns of usage, attitudes, and knowledge related to herbal products and dietary supplements. Results showed that 21% of participants were actively using at least one herbal product or dietary supplement, with 19% being at potential risk for adverse drug reactions. Glucosamine, garlic, Echinacea, and Gingko biloba were the most commonly used substances, with white women who had some college education being the most frequent users. Preservation of health emerged as the primary motivator for using these products. Despite notable misconceptions, most participants expressed interest in receiving more information, emphasizing the need for improved patient education and opportunities to enhance care.

Al Akeel *et al*. (2018) conducted a multiregional cross-sectional survey in Saudi Arabia to assess the knowledge, attitudes, and practices of adults regarding traditional medicine. Using a random sample of 809 participants, data were gathered through direct observations, interviews, and structured questionnaires between May 1st and July 2014. Public venues such as markets and schools served as the primary settings for data collection. The questionnaire covered sociodemographic information like age and gender and included optional and predefined-answer questions. The study revealed that 85% of respondents were female, and 70% demonstrated high knowledge about herbal medicine. A significant

majority (88.4%) reported using herbal medicine, with 84.3% expressing interest in traditional recipes, primarily for therapeutic purposes (88.7%), achieving a 61.2% success rate in effectiveness. The study also found that 48.2% of participants obtained information from friends, while 76% distrusted commercial sources. Statistical analysis highlighted a link between demographic factors and perceptions, showing an increased use of herbal medicines. Given the growing reliance on herbal medicine in Saudi Arabia, the study emphasized the need for standardization, stability, and quality control to ensure safe practices.

Another cross-sectional study was conducted by Nguyen *et al*. (2021) to investigate the prevalence, indications, factors associated with the use of herbal medicine, and Vietnamese people's attitudes toward herbal medicine. The survey was distributed among Vietnamese adults aged 18 years and older, equally across the Northern, Central, and Southern regions of Vietnam, between September and October 2020. Descriptive statistics, chi-square tests, and univariate and multivariate logistic regression analyses were used to analyze the data. The study found that nearly half of the respondents used herbal medicine for common illnesses during the COVID-19 pandemic, with use being significantly associated with marital status, urbanicity, monthly income, and health status perception. The most commonly used herbal medicines were ginger (Zingiber officinale), honey (Mel), garlic (Allium sativum), and perilla (Perilla frutescens), mainly for treating sore throat, cough, nasal congestion, and fever. Approximately 70% of participants believed herbal medicines to be safe, effective for minor health conditions, and associated with fewer side effects than conventional medicines. The study concluded that the use of herbal medicine during the COVID-19 pandemic was widespread in Vietnam, offering insights for future medical

research, policy-making, and the pharmaceutical industry in terms of regulation and product development.

Lastly, Alsubaie *et al*. (2017) conducted a descriptive cross-sectional survey to determine the awareness, patterns of use, and beliefs regarding the safety of herbal medicines among Saudi women. The study was carried out among women aged 20 years and above who were attending outpatient clinics at King Khalid University Hospital (KKUH) in Riyadh. A structured questionnaire was used to collect data, and statistical analysis was performed using SPSS version 15.0 software. The study included 404 women, with a mean age of 33 years (ranging from 20 to 70 years). It was found that 71% of the participants reported using herbal medicines, with usage more common among older and less educated women ($P<0.001$). Among the pregnant women, 30.7% used herbal medicines during pregnancy. Notably, 87.4% of women did not consult a doctor before using herbal products, and 14.4% experienced complications. Nearly 47% of the women believed that herbal medicines had no side effects. The most common reasons for using herbal products were weight reduction (31.4%) and cosmetics (28.7%). Additionally, 77.5% of the women were influenced by the recommendations and experiences of friends or relatives in their herbal medicine use. The study concluded that the prevalence of herbal medicine use among Saudi women is high, even during pregnancy, and highlighted the need for effective education to improve awareness and ensure the safe use of herbal medicines.

1.5 Statement of Problem

The increasing use of herbal medicine among adults poses opportunities and challenges due to concerns about safety, efficacy, and regulation. Some adults, often managing multiple chronic conditions with various prescription medications, are particularly

susceptible to adverse drug interactions and side effects from improper use of herbal remedies (Barnes *et al*., 2013). Despite their popularity, there is a lack of comprehensive knowledge among adults about the benefits and risks of herbal medicines, leading to potential misuse (Fouladbakhsh and Stommel, 2013). Regulatory inconsistencies exacerbate risks, as herbal products often lack the rigorous testing required for conventional drugs (Posadzki *et al*., 2013). Additionally, healthcare providers frequently lack the training to guide patients on herbal medicine use, resulting in poor communication and increased risks of adverse interactions with prescribed medications (Hsiao *et al*., 2014). This necessitates the need for better education and regulation to ensure the safe use of herbal remedies among adults while understanding their knowledge, attitudes, and willingness to use these medicines.

1.6 Justification of Study

This study addresses knowledge gaps and raises safety concerns about herbal medication use among adult patients. As the global population continues to age, chronic illnesses and the demand for alternative therapies increase, making it critical to understand adults' attitudes toward herbal medicine for safe use (WHO, 2013). Adults, managing multiple health issues and medications, are more prone to side effects and drug interactions. The study aims to identify educational needs to prevent negative outcomes by understanding their knowledge, attitudes, and willingness to use these medicines. By identifying knowledge gaps among healthcare professionals, this study has the potential to enhance comprehensive herbal medicine education in medical curricula, enabling better guidance for adult patients and fostering an integrated healthcare strategy.

1.7 Objectives of the Study

The broad objective of the study are usage, challenges, attitudes, knowledge, and willingness toward the use of herbal medicine among adult patients. Specific objectives include

- To determine the use of herbal medicines among adults in Uhunmwonde Local Government Area (LGA) of Edo State, Nigeria.
- To identify the challenges and barriers faced in accessing and using herbal medicines.

CHAPTER TWO

METHODS

2.1. Study design

A cross-sectional study.

2.2. Study setting

The study was conducted in Uhunmwonde Local Government Area (LGA) of Edo State, Nigeria. Its administrative headquarters is in Ehor, and the LGA covers 2,033 square kilometers with a population of 1,789,900 (Nigeria Population Projection, 2022). The area is predominantly rural, with agriculture as the main occupation. Villages include Obadan, Iguevbiahiamwen, Ogheghe, Igieduma, Ugiamwen, and Igueuwangue. At the study center, healthcare services are limited, with few primary health centers, and access to education is sparse. These factors contribute to the socio-economic challenges faced by residents and provide an important context for studies focusing on public health, education, and social development.

2.3. Study population

Residents of Uhunmwonde Local Government Area (LGA), Edo state.

2.3.1. Inclusion Criteria

Adults aged 18 years and above.

Individuals who have previously used or are currently using herbal medicines.

Individuals with relevant knowledge of herbal medicines.

Participants who provide informed consent to take part in the study.

2.3.2. Exclusion Criteria

Individuals who decline to provide informed consent for the study.

Participants with conditions that hinder their ability to provide accurate responses (e.g., cognitive impairments).

2.4. Sample size determination

The sample size was determined using the Cochrane formula for estimating proportions from a known population size (Cochran, 1977):

$$\textbf{Sample size(n)} = \frac{z^2 \times p(1-p) \div e^2}{1 + \frac{\{z^2 \times P\,(1-P)\}}{e^2 N}}$$

Where:

N = Population Size = Population of Benin City estimated to be 1,789,900 (Nigeria Population Projection, 2022)

Z = *Z* is the Z-score corresponding to the desired level of confidence (e.g., 1.96 for a 95% confidence level), which will be 1.96 for this study.

p = Standard of deviation = 0.5

e = the desired margin of error = 0.05

n (students) = 383 participants + 38.3 (10% attrition rate) = 421.3 approx. 421 participants

2.3. Sampling technique

Convenience sampling.

2.6. Data collection

2.6.1. Method of Data collection

2.6.2. Questionnairre Design

Data was collected using a questionnaire that was designed based on the requirement and literature review. The questionnaire was divided into sections covering socio-demographics, gathering information on participants' age, gender, education, occupation, religion, and ethnicity to provide a detailed profile. The second section focused on the use of herbal medicine, exploring participants' experiences, such as whether they have used or are currently using herbal medicine, its frequency of use compared with conventional medicine, and for what conditions it is used. Sources of information and where herbal medicine was obtained were also sought. Questions in this section included yes/no and nominal responses. The third section obtained information pertaining to challenges and barriers, including access difficulties, side effects, cost, dosage determination, and social or cultural barriers. Responses in this section were also structured as yes/no or nominal. Participants who were unable to read and write were aided.

2.7. Data analysis

Usable data collected were coded and entered into the statistical package for social science (SPSS) version 21.0 software (SPSS Inc. Chicago IL USA). Descriptive statistics were expressed in frequency and percentages. Furthermore, Graph pad Instat was used for inferential statistics to explore a possible association between demographic data and the use or challenges to the use of herbal medicines. A P-value < 0.05 shall be considered statistically significant.

2.8. Ethical considerations

Ethical approval was sought from the ethics committee of the Faculty of Pharmacy, University of Benin, Benin City (Ref No:).

CHAPTER THREE

3.1. Socio-demographics of Participants

Table 1 presents the socio-demographic characteristics of the participants, highlighting their diverse backgrounds. The majority of respondents (24.3%) were aged 60-69 years, with a nearly balanced gender distribution (35.0% male, 65.0% female). Educational qualification varied, with 30.0% having secondary education and 38.2% holding tertiary qualifications. A significant portion (43.45%) were unemployed, while 22.86% were employed. Christianity was the predominant religion (66.43%), followed by traditional worshippers (15.0%) and Islam (12.86%). Ethnic distribution showed Edo as the majority (65.71%), with Yoruba (8.93%), Igbo (10.7%), and Hausa (6.79%) represented.

Table 1. Socio-demographics of Students, n=280

Variables		Frequency	Percentage (%)
Age (years)	18-19	18	6.3
	20-29	14	5.0
	30-39	8	2.86
	40-49	62	22.14
	50-59	66	23.57
	60-69	68	24.29
	70+	44	15.71
Gender	Male	98	35.0
	Female	182	65.0
Educational level	No Formal Education	42	15.00
	Primary Education	47	16.79
	Secondary Education	84	30.0
	Tertiary Education	107	38.21
Occupation	Employed	64	22.86
	Unemployed	122	43.57
	Self Employed	53	18.93
	Retired	41	14.64
Religion	Christian	186	66.43
	Muslim	36	12.86
	Traditional worshiper	42	15.00
	Atheist	16	5.71
Ethnicity	Edo	184	65.71
	Yoruba	25	8.93
	Igbo	30	10.71
	Hausa	19	6.79
	Others	41	14.64

3.2. Sources and Use of Herbal Medicines

3.2.1. Use of Herbal Medicines by Participants

The findings indicate that herbal medicine use is prevalent among respondents, with 76.1% having used it and 47.5% currently using it. Herbal and conventional medicine use were equally common (50.0% each). Additionally, 58.9% reported using herbal medicine for specific conditions, while 50.4% used it as a preventive measure.

Table 2. Use of Herbal Medicine, n=280

Variables		Frequency	Percentage (%)
Have you used an herbal medicine?	Yes	213	76.1
	No	67	23.9
Are you currently using herbal medicine?	Yes	133	47.5
	No	147	52.5
Do you use herbal medicine more frequently than conventional medicine?	Yes	140	50.0
	No	140	50.0
Do you use herbal medicine for specific conditions?	Yes	165	58.9
	No	115	41.1
Do you use herbal medicine as a preventive measure?	Yes	141	50.4
	No	139	49.6

3.2.2. Sources of Information and Use of Herbal Medicines by Participants

Figures 1 and 2 illustrate participants' sources of information and acquisition of herbal medicines. Most respondents learned about herbal medicine from traditional healers (45%) and herbal medicine vendors (23%), whereas fewer relied on healthcare professionals (14%). Herbal medicines were primarily obtained from herbal vendors (39.3%), and traditional healers (36.8%), reflecting that they conventionally obtained their herbal medications from local sources.

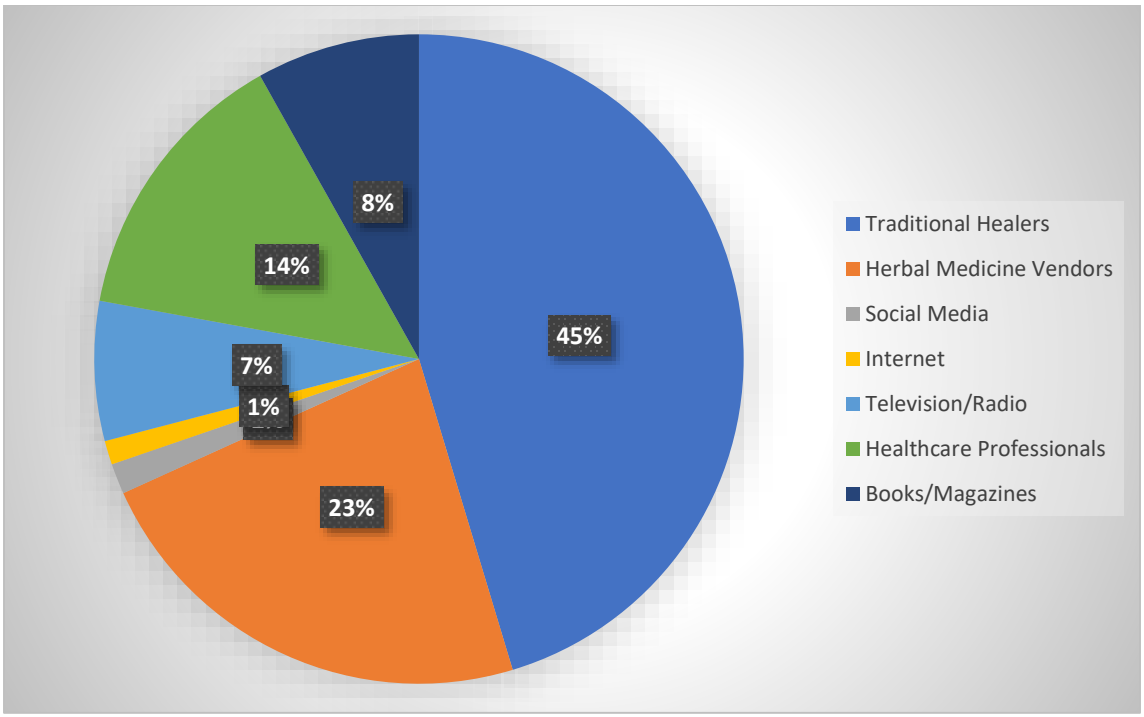

Fig 1. Participant's sources of information on herbal medicines

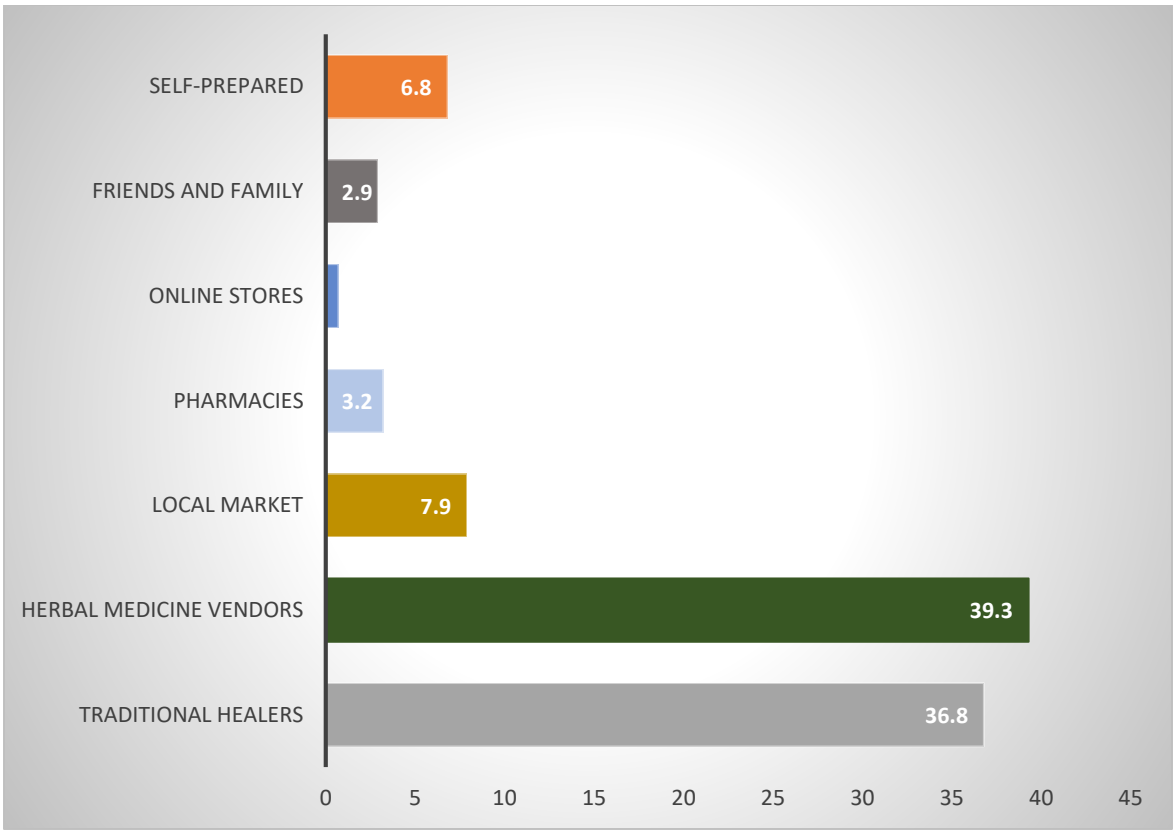

Fig 2. Participant's sources of herbal medicines

3.3. Challenges and Barriers in Accessing and Using Herbal Medicines

Table 3 reveals that most respondents (81.4%) did not find it difficult to access herbal medicines, while 15.4% reported experiencing side effects. Cost was not a significant barrier for 85.4% of participants. However, 26.1% faced challenges in finding reliable information, and 17.5% struggled with determining the correct dosage.

Table 3. Challenges and Barriers to Accessing and Using Herbal Medicines, n=280

Variables		Frequency	Percentage (%)
Do you find it difficult to assess herbal medicine?	Yes	52	18.6
	No	228	81.4
Have you experienced disturbing side effects from using herbal medicines?	Yes	43	15.4
	No	237	84.6
Is the cost of herbal medicine a barrier to you?	Yes	41	14.6
	No	239	85.4
Do you face challenges in finding reliable information about herbal medicines?	Yes	73	26.1
	No	207	73.9
Dou you find it difficult to determine the correct dosage of herbal medicine?	Yes	49	17.5
	No	231	82.5

3.4. Association Between Demographics and Herbal Medicine Use

Table 4 presents the association between demographic variables and herbal medicine use among 280 respondents. Age, gender, and educational level showed significant associations with herbal medicine use ($p<0.05$). Herbal medicine use was highest among individuals aged 60-69 years (56/280) and lowest among those aged 18-19 years (2/280). More females (104/280) than males (79/280) reported usage ($p=0.000$). The educational level also influenced usage, with secondary education having the highest proportion (63/280, $p=0.005$). However, occupation, religion, and ethnicity did not show statistically significant associations ($p>0.05$), suggesting these factors may not strongly influence herbal medicine use in the study population.

Table 4. Association Between Demographics and Herbal Medicine Use, n=280

Variables		Yes	Total	P-value
Age (years)	18-19	2	18	
	20-29	3	14	
	30-39	7	8	
	40-49	38	62	0.000
	50-59	46	66	
	60-69	56	68	
	70+	31	44	
Total		183	280	
Gender	Male	79	98	
	Female	104	182	0.000
Total		183	280	
Educational level	No Formal Education	29	42	
	Primary Education	33	47	
	Secondary Education	63	84	0.005
	Tertiary Education	58	107	
Total		183	280	
Occupation	Employed	44	64	
	Unemployed	71	122	
	Self Employed	40	53	0.227
	Retired	28	41	
Total		183	280	
Religion	Christian	122	186	
	Muslim	26	36	0.640
	Traditional worshiper	27	42	
	Atheist	8	16	
Total		183	280	
Ethnicity	Edo	111	184	
	Yoruba	15	25	
	Igbo	24	30	0.169
	Hausa	10	19	
	Others	23	41	
Total		183	280	

3.5. Association Between Demographics and Sources of Information on Herbal Medicine

Table 5 examines the association between demographics and sources of information on herbal medicines among 280 respondents. Age, gender, educational level, occupation, religion, and ethnicity showed significant associations with sources of information ($p<0.05$). Traditional healers were the most common source (103/280), followed by healthcare professionals (46/280) and books/magazines (41/280). Younger respondents (18-39 years) relied more on traditional healers and herbal vendors, while older individuals (50-69 years) obtained information from healthcare professionals and books. Females relied more on healthcare professionals and books than males ($p=0.001$). Those with tertiary education primarily consulted books (36/280), while those with lower education depended on traditional healers. Unemployed respondents mostly used books and healthcare professionals ($p=0.000$). Christians relied more on healthcare professionals and books ($p=0.000$), while ethnic differences influenced sources. Overall, traditional healers were the dominant source across demographic groups, but education and occupation influenced alternative sources.

Table 5. Association Between Demographics and Sources of Information on Herbal Medicines, n=280

Variables		F/F	Trad	Herb	Social	Intern	TV	Health	Books	Total	P-value
Age (years)	18-19	0	14	10	1	0	0	0	18	18	
	20-29	0	30	12	0	0	0	8	0	14	
	30-39	0	31	7	1	2	0	1	0	8	
	40-49	5	20	9	2	1	4	8	20	62	0.000
	50-59	9	0	0	0	0	2	13	0	66	
	60-69	10	4	1	1	0	3	11	3	68	
	70+	3	4	3	0	0	4	5	0	44	
Total		27	103	42	5	3	13	46	41	280	
Gender	Male	11	47	19	4	2	3	12	0	98	
	Female	16	56	23	1	1	10	34	41	182	0.001
Total		27	103	42	5	3	13	46	41	280	
Educational level	No Formal Education	2	25	8	3	0	0	4	0	42	
	Primary Education	5	24	9	0	0	5	1	3	47	
	Secondary Education	7	28	15	1	2	2	27	2	84	0.000
	Tertiary Education	13	26	10	1	1	6	14	36	107	
Total		27	103	42	5	3	13	46	41	280	
Occupation	Employed	9	35	7	1	0	3	7	2	58	
	Unemployed	5	34	17	2	2	2	21	39	122	0.000
	Self Employed	8	25	6	1	0	6	7	0	53	
	Retired	5	9	12	1	1	2	11	0	41	
Total		27	103	42	5	3	13	46	41	280	
Religion	Christian	19	63	15	2	2	9	38	38	186	
	Muslim	6	19	7	1	1	1	0	1	36	0.000
	Traditional worshiper	2	17	14	2	0	3	4	0	42	
	Atheist	0	4	6	0	0	0	4	2	16	
Total		27	103	42	5	3	13	46	41	280	
Ethnicity	Edo	17	44	19	3	0	5	37	40	165	
	Yoruba	3	14	5	1	1	0	1	0	25	
	Igbo	4	13	7	0	0	5	0	1	30	0.000
	Hausa	3	12	3	1	0	0	0	0	19	
	Others	0	20	8	0	2	3	8	0	41	
Total		27	103	42	5	3	13	46	41	280	

KEY: F/F, Family and friends; Trad, Traditional healers; Herb, Herbal medicines vendors; Social, social media; Intern, Internet; TV, Television; Health, Healthcare professionals; Book, Books and magazines

3.6. Association Between Demographics and Sources of Herbal Medicines

Table 6 explores the association between demographics and sources of herbal medicines among 280 respondents. Age, gender, education, occupation, religion, and ethnicity significantly influenced source selection ($p<0.05$). Traditional healers (113/280) and herbal medicine vendors (110/280) were the most common sources. Older individuals (50-69 years) relied more on traditional healers, while younger respondents (18-39 years) preferred herbal vendors. Males used self-prepared remedies more than females ($p=0.009$), while females preferred herbal vendors. Higher education levels were associated with increased use of pharmacies, while those with no formal education relied on traditional healers ($p=0.000$). Unemployed individuals mostly sourced herbal medicines from vendors (79/122), while employed individuals used traditional healers (44/64). Christians predominantly used traditional healers (89/186), while traditional worshippers had a more diverse distribution ($p=0.000$). Ethnicity also influenced sources, with Edo respondents favoring herbal vendors (82/165).

Table 6. Association Between Demographics and Sources of Herbal Medicines, n=280

Variables		Trad	Herb	Locm	Pharm	Online	F/F	Self	Total	P-value
Age (years)	18-19	0	18	0	0	0	0	0	18	
	20-29	0	9	2	0	0	0	2	14	
	30-39	0	2	0	2	0	0	0	8	
	40-49	16	34	4	2	0	1	5	62	0.000
	50-59	44	17	3	1	0	1	0	66	
	60-69	32	17	5	2	0	2	10	68	
	70+	16	13	7	0	1	2	5	44	
Total		113	110	21	7	1	6	22	280	
Gender	Male	45	26	8	3	1	2	13	98	0.009
	Female	68	84	13	4	0	4	9	182	
Total		113	110	21	7	1	6	22	280	
Educational level	No Formal Education	20	9	6	0	1	3	3	42	
	Primary Education	14	17	2	3	0	2	9	47	0.000
	Secondary Education	31	33	10	3	0	1	6	84	
	Tertiary Education	48	51	3	1	0	0	4	107	
Total		113	110	21	7	1	6	22	280	
Occupation	Employed	44	9	4	1	0	0	4	64	
	Unemployed	24	79	7	2	0	2	8	122	
	Self Employed	27	13	5	2	1	3	2	53	
	Retired	16	9	5	2	0	1	8	41	
Total		113	110	21	7	1	6	22	280	
Religion	Christian	89	78	7	0	0	0	8	186	
	Muslim	9	10	3	1	1	3	9	36	
	Traditional worshiper	12	13	8	4	0	2	3	42	0.000
	Atheist	3	5	3	2	0	1	2	16	
Total		133	110	21	7	1	6	22	280	
Ethnicity	Edo	70	82	7	1	0	1	4	165	
	Yoruba	13	5	5	0	1	0	1	25	
	Igbo	9	14	1	1	0	2	3	30	
	Hausa	6	4	0	2	0	1	6	19	
	Others	15	5	8	3	0	2	8	41	
Total		113	110	21	7	1	6	22	280	

KEY: Trad, Traditional healers; Herb, Herbal medicine vendors; Locm, Local market; Pharm, Pharmacies; Online, Online stores; F/F, Family and friends; Self, Self-prepared.

CHAPTER FOUR

DISCUSSION

4.1. Socio-demographics of Students

The acceptance and attitude toward herbal medicine use are influenced by various socio-demographic factors, in Uhunmwode Local Government Area of Edo State, Nigeria. Age plays a crucial role in shaping health-seeking behavior, particularly in relation to herbal medicine use. The study revealed that the largest proportion of respondents falls within the 60–69-year age group, followed by those aged 50–59 years and 40–49 years. This age distribution suggests that older individuals, who are more susceptible to chronic illnesses and age-related health conditions, may have a greater tendency to rely on herbal remedies. Previous studies have shown that older adults often turn to traditional medicine owing to long-standing cultural beliefs, personal experiences with herbal remedies, and financial constraints that limit access to modern healthcare services (Ozioma and Chinwe, 2019). Gender differences are also evident in this study, with a higher proportion of female respondents compared with males. This aligns with findings from previous research suggesting that women are more proactive in seeking healthcare and are more likely to use herbal medicine for self-care and family health management (Awodele *et al*., 2018).

Furthermore, educational background significantly influences knowledge, perception, and usage of herbal medicine. The study shows that more respondents have secondary education than those with tertiary education. However, a considerable percentage had only primary or no formal education, suggesting a variation in awareness and critical evaluation of herbal medicine. Individuals with tertiary education may be more familiar with scientific research on herbal medicine, leading to a more evidence-based approach to its use. Conversely, those with lower educational attainment may rely more on indigenous knowledge and cultural beliefs, which often

promote the use of herbal remedies despite limited scientific validation (Ekor, 2014). This supports the idea that education plays a crucial role in influencing attitudes toward traditional medicine, with higher educational attainment potentially leading to a more cautious or selective approach to using herbal treatments. Economic factors also contribute to the acceptance and utilization of herbal medicine, as indicated by the respondents' occupational status. A significant proportion of participants were unemployed, while some were employed or self-employed, and those retired were less. The high unemployment rate suggests that financial limitations may drive individuals toward herbal medicine, which is often perceived as a more affordable alternative to conventional healthcare (Tilburt and Kaptchuk, 2008).

Religious beliefs significantly influence attitudes toward herbal medicine use. The study reveals that Christianity is the predominant religion, followed by traditional worship and Islam. Religious perspectives often shape health beliefs, with traditional worshipers being more inclined to use herbal medicine due to cultural and spiritual connections with indigenous healing practices (Osemene *et al*., 2011). Ethnic background further plays a vital role in shaping attitudes toward herbal medicine. The study population is predominantly Edo, followed by Igbo, Yoruba, and Hausa, among others. Traditional medicine practices vary significantly among ethnic groups in Nigeria, with each group having distinct indigenous medical systems (Adisa *et al*., 2020). The Edo people, who comprise the majority of this study, may have strong traditional healing practices that support herbal medicine use. Similarly, the Yoruba and Igbo ethnic groups are known for their rich history of herbal medicine, with extensive documentation of plant-based therapies used for treating various ailments. The relatively lower representation of the Hausa ethnic group in this study may reflect regional differences in reliance on herbal medicine, as northern Nigeria has a mix of traditional medicine, Islamic healing practices, and modern healthcare influences.

4.2. Sources and Use of Herbal Medicines

The findings of this study reveal that herbal medicine use is highly prevalent among respondents. This trend reflects a sustained reliance on traditional medicine, which has deep cultural and historical roots in many societies, particularly in Africa, where traditional medicine is an integral part of healthcare (Ekor, 2014). The widespread use of herbal medicine underscores its perceived effectiveness, affordability, and accessibility, especially in regions where conventional healthcare services may be limited or expensive. The fact that herbal and conventional medicine use was reported in equal proportions suggests that many individuals adopt an integrative approach, combining both systems in their healthcare choices. This finding aligns with studies indicating that people often resort to herbal treatments either as standalone therapies or as complementary treatments alongside modern medicine (Adisa *et al*., 2020). Notably, considerable herbal medicine use was reported among respondents in the treatment of specific health conditions. The perception that herbal remedies provide long-term relief with fewer side effects compared with synthetic drugs contributes to their widespread acceptance. Additionally, many respondents reported using herbal medicine as a preventive measure, reflecting the traditional belief that herbal therapies help strengthen the immune system and prevent illnesses. In many African communities, herbal medicine is commonly used for disease prevention, detoxification, and overall well-being, a practice supported by ethnopharmacological research highlighting the immunomodulatory effects of certain medicinal plants (Tilburt and Kaptchuk, 2008).

The study also highlights the major sources of information on herbal medicine, with traditional healers (45%) and herbal medicine vendors (23%) being the most cited. This finding suggests that indigenous knowledge systems were crucial in shaping public perceptions and usage of herbal medicine. Traditional healers have long been regarded as custodians of herbal medicine

knowledge, passing down therapeutic practices through generations (Ozioma and Chinwe, 2019). Their influence extends beyond medicine, as they often provide spiritual and psychological support, making them highly trusted sources of health information. Similarly, herbal medicine vendors, who frequently operate in open markets and community settings, serve as key distributors and educators on the use of herbal products. The reliance on these informal sources of information underscores the need for proper regulation and standardization of herbal medicine to ensure safety and efficacy. However, only a few respondents reported obtaining information about herbal medicine from healthcare professionals, highlighting a gap between formal medical practice and traditional medicine use. This finding is consistent with previous studies showing that conventional healthcare practitioners often have limited involvement in herbal medicine discussions with patients (Ekor, 2014). Many medical professionals' express concerns over the lack of scientific validation and potential drug-herb interactions, leading to hesitancy in recommending herbal treatments. However, given the significant use of herbal medicine among the population, there is a growing call for healthcare professionals to be more engaged in herbal medicine education and integration into primary healthcare. This would help bridge the communication gap between patients and clinicians, promoting the safe and informed use of herbal therapies (Osemene *et al*., 2011).

Regarding sources of herbal medicines, it was found that most respondents obtained their herbal products from herbal vendors (39.3%) and traditional healers (36.8%). This finding is in line with previous research indicating that the majority of herbal medicine consumers acquire their treatments from local markets, street vendors, and traditional practitioners rather than formalized herbal medicine clinics or pharmacies (Adisa *et al*., 2020). The popularity of herbal vendors suggests that accessibility and affordability are major factors influencing purchasing behavior.

These vendors often sell unregulated products with varying levels of quality control, raising concerns about safety and standardization. Meanwhile, traditional healers, who provide both herbal remedies and cultural healing practices, remain a significant source of herbal medicine, particularly in rural areas where conventional medical facilities are scarce. Overall, the findings reveal that herbal medicine remains an integral part of healthcare, with high levels of usage for both treatment and prevention. The heavy reliance on traditional healers and herbal vendors as primary sources of herbal medicine underscores the importance of cultural beliefs and accessibility in shaping health-seeking behaviors. However, the limited involvement of healthcare professionals in herbal medicine discussions highlights the need for greater integration of traditional and modern healthcare systems. To ensure the safe and effective use of herbal medicine, there is a need for regulatory frameworks that promote quality control, standardization, and patient education. Future research should explore strategies for incorporating herbal medicine into formal healthcare while ensuring scientific validation and safety for users.

4.3. Challenges and Barriers to Accessing and Using Herbal Medicines

Herbal medicine remains an essential component of healthcare for many individuals, offering a perceived natural and cost-effective alternative to conventional treatments. The findings from this study indicate that accessibility is not a significant challenge, which aligns with previous studies suggesting that herbal products are widely available through traditional markets, herbal vendors, and even pharmacies in some regions (Ekor, 2014). The widespread availability is largely due to the longstanding cultural acceptance of traditional medicine and the presence of numerous herbal practitioners who provide these remedies. Additionally, many medicinal plants grow naturally in various environments, allowing people to cultivate or harvest them for personal use, further reducing accessibility barriers (Ozioma and Chinwe, 2019). Cost also does not appear to be a major

obstacle; many participants indicated that affordability was not a limiting factor. This is consistent with previous research demonstrating that herbal medicines are often more economically accessible than conventional pharmaceutical drugs, particularly in low- and middle-income countries (Tilburt and Kaptchuk, 2008). Many individuals turn to herbal treatments due to the lower financial burden than those encountered from expensive hospital visits and prescription medications (Awodele *et al*., 2018).

Notably, despite the high accessibility and affordability of herbal medicines, certain barriers remain. One of the key challenges identified in the study is the difficulty in obtaining reliable information. This finding is particularly concerning, as misinformation about herbal medicine can lead to inappropriate use, delayed treatment of serious conditions, and potential health risks (Adisa *et al*., 2020). Unlike conventional medicine, which is regulated by scientific guidelines and clinical trials, many herbal remedies are passed down through oral tradition or anecdotal evidence, making it difficult to verify their safety and efficacy (Osemene *et al*., 2011). Additionally, advertising and promotional claims made by herbal vendors may not always be evidence-based, further complicating the ability of consumers to make informed decisions. The lack of standardized educational resources on herbal medicine highlights the need for greater public awareness and the inclusion of scientifically backed herbal medicine education in healthcare systems. Another major concern is the difficulty in determining the correct dosage. This issue is prevalent in herbal medicine because of the absence of standardized dosing guidelines. Unlike conventional medications, which undergo rigorous evaluation to establish safe and effective dosages, herbal remedies often lack precise dosage recommendations, leading to variability in treatment outcomes (Ekor, 2014). Many users rely on traditional healers or vendors for dosage instructions, which may not always be accurate or evidence-based. Overdosing herbal medicines can result in toxicity and

adverse effects while underdosing may render the treatment ineffective (Ozioma and Chinwe, 2019). Moreover, the bioavailability of active compounds in herbal medicines can be influenced by factors such as preparation methods, plant part used, and individual metabolism, further complicating dosage accuracy (Tilburt and Kaptchuk, 2008).

Concerns about side effects were also noted. Although herbal medicines are often perceived as natural and safe, they are not without risks. Some medicinal plants contain potent bioactive compounds that can cause allergic reactions, gastrointestinal disturbances, liver toxicity, or other harmful effects (Awodele *et al*., 2018). The risk of contamination with heavy metals, pesticides, or microbial agents is another concern, especially for herbal products that are not subject to strict quality control regulations (Ekor, 2014). Furthermore, the concurrent use of herbal and conventional medicines can lead to herb-drug interactions, potentially reducing the effectiveness of prescribed medications or causing harmful side effects (Adisa *et al*., 2020). These findings highlight the importance of pharmacovigilance and the need for healthcare professionals to be more actively involved in educating patients about the potential risks associated with herbal medicine use.

To address these challenges, several strategies can be implemented. First, improved regulation of herbal medicines is necessary to ensure product quality, safety, and efficacy. Regulatory bodies should establish standardized guidelines for herbal medicine production, labeling, and dosage recommendations to enhance consumer confidence and safety (Osemene *et al*., 2011). Second, public education campaigns should be launched to raise awareness about the proper use of herbal medicines, potential side effects, and the importance of consulting healthcare professionals before using herbal treatments. Healthcare providers should also receive training in herbal medicine to facilitate informed discussions with patients and promote integrative healthcare approaches (Ekor,

2014). Lastly, further research is needed to scientifically validate the efficacy of commonly used herbal remedies, paving the way for evidence-based herbal medicine integration into mainstream healthcare systems.

4.4. Association Between Demographics and Herbal Medicine Use

The findings indicate that age, gender, and educational level significantly influenced the use of herbal medicine, while occupation, religion, and ethnicity did not show significant associations. These results highlight the key demographic determinants of herbal medicine use among the study population.

Age-related trends revealed that herbal medicine use was most prevalent among respondents aged 60-69 years and lowest among those aged 18-19 years. This pattern is consistent with findings from similar studies in Nigeria, where older adults tend to rely more on herbal remedies due to chronic health conditions, cultural beliefs, and affordability compared to modern pharmaceuticals (Ekor, 2014; Fakeye *et al*., 2009). Older individuals may also have more experience with traditional medicine and trust herbal remedies, as they are often deeply rooted in indigenous healthcare practices. Conversely, younger individuals, particularly those in the 18-19 and 20-29 age groups, showed lower herbal medicine usage, which may be attributed to increased exposure to conventional medicine, better health awareness, and greater access to biomedical healthcare facilities.

Gender was another significant factor influencing herbal medicine use. More females reported using herbal medicine compared to males. This aligns with findings from previous studies in Nigeria, which indicate that women are more likely to use herbal medicines due to their role as caregivers and decision-makers in family health matters (Oreagba *et al*., 2011). Women are also more likely to seek herbal remedies for reproductive health issues, pregnancy-related symptoms,

and general well-being. The higher usage among females could also be linked to cultural norms where women play an active role in passing down traditional healing practices within families and communities (Akinyemi *et al*., 2018).

Educational level also had a statistically significant association with herbal medicine use. The highest proportion of users was among individuals with secondary education, while those with tertiary education had a lower usage rate. This suggests that individuals with moderate levels of education may be more receptive to herbal medicine, possibly due to a balanced awareness of both traditional and modern healthcare options. Studies have shown that highly educated individuals are more likely to prefer conventional medicine due to scientific evidence and regulatory oversight (Fakeye *et al*., 2009). Interestingly, occupation, religion, and ethnicity did not show statistically significant associations, indicating that herbal medicine use is widespread across different socioeconomic and cultural groups in Nigeria. This suggests that herbal medicine is accepted across various backgrounds, reinforcing its role in Nigerian healthcare (Akinyemi *et al*., 2018).

4.5. Association Between Demographics and Sources of Herbal Medicines

The results indicate that age, gender, educational level, occupation, religion, and ethnicity significantly influenced where individuals obtained information about herbal remedies. The most commonly reported source was traditional healers, followed by healthcare professionals and books/magazines. These findings highlight the ongoing reliance on indigenous knowledge and the role of modern educational resources in shaping perceptions of herbal medicine in Nigeria.

Age-related differences were observed in the sources of information used. Younger respondents were more likely to rely on traditional healers and herbal vendors, while older individuals obtained information from healthcare professionals and books. This pattern suggests that younger individuals, possibly influenced by cultural traditions, family knowledge, and accessibility, trust

informal sources like traditional healers. In contrast, older adults, who may be managing chronic conditions, appear to seek more structured and evidence-based information from healthcare providers (Oreagba *et al*., 2011). This aligns with findings from previous studies in Nigeria, which indicate that older individuals tend to integrate conventional and traditional medicine to manage age-related illnesses (Akinyemi *et al*., 2018). Gender also played a significant role in determining sources of information on herbal medicine. Females were more likely than males to rely on healthcare professionals and books for information. This could be attributed to the fact that women often play a primary role in healthcare decision-making within households, leading them to seek professional guidance to ensure safe usage of herbal remedies (Fakeye *et al*., 2009). Furthermore, women may have more frequent interactions with healthcare professionals due to maternal and reproductive health needs, increasing their exposure to formal medical advice (Akinyemi *et al*., 2018).

Educational level significantly influenced the sources of information. Respondents with tertiary education were more likely to consult books and magazines (36/107), while those with lower levels of education depended primarily on traditional healers. This finding aligns with previous research, which indicates that individuals with higher education are more likely to seek scientifically validated information, while those with lower education tend to trust oral traditions and ancestral knowledge (Ekor, 2014). Occupation also impacted information sources, with unemployed respondents showing a preference for books and healthcare professionals. This might be due to their relatively higher availability of time to research and consult professionals. Similarly, religious affiliation played a role, as Christians were more likely to seek information from healthcare professionals and books. These findings suggest that education and socio-religious factors significantly influence how people access and validate herbal medicine information. Ethnicity

further influenced the choice of information sources, reflecting Nigeria's diverse cultural landscape. While traditional healers remained the dominant source of information across all groups, the variations in alternative sources suggest that cultural backgrounds play a role in determining healthcare-seeking behavior.

4.6. Association Between Demographics and Sources of Herbal Medicines

The results show that age, gender, education, occupation, religion, and ethnicity significantly influenced the choice of herbal medicine sources. The most frequently reported sources were traditional healers and herbal medicine vendors, suggesting that these providers remain central to the accessibility and utilization of herbal medicines in Nigeria. These findings are consistent with previous research that highlights the widespread use of traditional medicine in Africa, where herbal practitioners and vendors serve as primary health resources (Oreagba *et al*., 2011).

Age played a significant role in determining where individuals obtained herbal medicines. Older respondents relied more on traditional healers, while younger respondents preferred herbal vendors. This may be due to the perception that older individuals require more specialized knowledge in herbal medicine, which traditional healers are believed to possess. On the other hand, younger individuals may have easier access to herbal vendors in urban markets, where herbal products are readily available. Previous studies in Nigeria have also found that older individuals prefer personalized treatment plans from traditional healers, while younger people often experiment with over-the-counter herbal remedies (Fakeye *et al*., 2009). Gender differences were also observed, with males using self-prepared remedies more frequently than females, while females showed a higher preference for herbal vendors. The higher use of self-prepared remedies among males could be attributed to their willingness to experiment with traditional formulations, whereas females might prioritize convenience and opt for readily available herbal preparations

sold by vendors. Additionally, cultural norms in Nigeria often place household healthcare responsibilities on women, which may influence their preference for accessible and affordable herbal medicine sources (Akinyemi *et al*., 2018).

Educational level also influenced the choice of herbal medicine sources. Respondents with higher education levels were more likely to obtain herbal medicines from pharmacies, indicating a preference for regulated and standardized herbal products. Conversely, those with no formal education relied on traditional healers, which reflects a strong cultural trust in indigenous medicine. These findings align with studies showing that education increases awareness of regulatory standards and safety concerns regarding herbal medicines (Ekor, 2014). Occupation was another significant factor, with unemployed individuals sourcing herbal medicines primarily from vendors, while employed individuals used traditional healers. This suggests that accessibility and affordability influence purchasing decisions. Vendors provide cost-effective options for herbal medicine users, whereas employed individuals may seek personalized treatment from traditional healers.

Religion and ethnicity also played significant roles in determining sources of herbal medicines. Christians predominantly used traditional healers, while traditional worshippers had a more diverse distribution of sources. This may be due to varying religious beliefs regarding health and healing, with some faith traditions incorporating herbal medicine as part of spiritual practices. Additionally, ethnicity influenced herbal medicine sourcing, with Edo respondents favoring herbal vendors. This finding highlights the cultural specificity of herbal medicine use, as different ethnic groups have distinct preferences for how they access and use traditional remedies.

Overall, the results indicate that demographic factors significantly shape where individuals obtain herbal medicines in Nigeria. Traditional healers and herbal vendors remain key sources, but

education, employment, and cultural influences determine alternative sources such as pharmacies and self-prepared remedies. Given these findings, there is a need for regulatory oversight to ensure the safety and efficacy of herbal medicines, particularly those obtained from vendors. Public health initiatives should also focus on integrating traditional healers into the healthcare system to improve the quality and safety of herbal treatments.

This study had some limitations. The limited sample size may restrict the generalizability of findings to a broader population. Additionally, accessibility to respondents in Uhunmwode Local Government Area, Benin City, posed a challenge, potentially leading to the underrepresentation of their perspectives on herbal medicine use. The study was also constrained by time, as the undergraduate pharmacy school calendar allowed only a short period for data collection and analysis. This limited timeframe may have restricted the depth of the investigation. Future studies with larger, more diverse samples and extended research periods could provide a more comprehensive understanding of herbal medicine use in the region.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study highlights the usage, challenges, attitudes, knowledge, and willingness toward herbal medicine among adult patients. Findings indicate that while many older adults in Uhunmwonde Local Government Area use herbal medicines, barriers such as accessibility, safety concerns, and lack of proper guidance hinder their optimal use. Despite these challenges, a significant proportion of respondent's express willingness to integrate herbal medicines into their healthcare regimen. Addressing knowledge gaps and improving regulatory frameworks can enhance confidence in herbal medicine use among adult patients. Strengthening awareness, accessibility, and collaboration between healthcare providers and traditional medicine practitioners can further promote safe and informed herbal medicine usage.

5.2. Recommendations

- Increase Awareness and Education: Implement community-based education programs to improve knowledge of herbal medicine benefits and risks.
- Improve Regulation and Quality Control: Strengthen policies on herbal medicine safety, standardization, and quality assurance.
- Enhance Collaboration Between Practitioners: Foster partnerships between conventional healthcare providers and herbal medicine practitioners.
- Promote Accessibility and Affordability: Improve availability and affordability of safe and effective herbal medicines for adult patients.
- Encourage Further Research: Support more studies on the efficacy, safety, and potential interactions of herbal medicines in elderly populations.

REFERENCES

Adisa, R., Fakeye, T. O., & Musa, I. E. (2020). Attitudes and use of herbal medicines among adults in Nigeria: A cross-sectional study. *BMC Complementary Medicine and Therapies, 20*(1), 1-12.

Akinyemi, O. O., Olatunji, O. O., & Odugbemi, T. O. (2018). Herbal medicine use in Nigeria: A sociocultural perspective. *African Journal of Traditional, Complementary and Alternative Medicines, 15*(4), 1-9.

Al Akeel, M. M., Al Ghamdi, W. M., Al Habib, S., Koshm, M., and Al Otaibi, F. (2018). Herbal medicines: Saudi population knowledge, attitude, and practice at a glance. *Journal of Family Medicine and Primary Care*, *7*(5), 865-875.

Alsubaie, S. F., Alshehri, M. G., and Ghalib, R. H. (2017). Awareness, use, and attitude towards herbal medicines among Saudi women-cross sectional study. *Imp J Interdiscip Res*, *3*(2), 285-290.

Amine, L. S., and Chao, M. C. (2005). Managing country image to long-term advantage: The case of Taiwan and Acer. *Place Branding*, *1*, 187-204.

Awodele, O., Agbaje, E. O., Akintonwa, A., & Coker, H. A. B. (2018). Use of complementary and alternative medicine in Nigeria: A survey of healthcare providers. *Journal of Clinical Pharmacy and Therapeutics, 43*(5), 720-726.

Barnes, J., Mills, S. Y., Abbot, N. C., Willoughby, M., and Ernst, E. (2013). Different standards for reporting ADRs to herbal remedies and conventional OTC medicines: Face-to-face interviews with 515 users of herbal remedies. British Journal of Clinical Pharmacology, 55(5), 515-521.

Capasso, L. (1998). 5300 years ago, the Ice Man used natural laxatives and antibiotics. *The Lancet*, *352*(9143), 1864.

Carmona, F., and Pereira, A. M. S. (2013). Herbal medicines: old and new concepts, truths and misunderstandings. *Revista Brasileira de Farmacognosia*, *23*(2), 379-385.

Coulter, I. D., and Willis, E. M. (2004). The rise and rise of complementary and alternative medicine: a sociological perspective. *Medical journal of Australia*, *180*(11), 587-589.

Ekor, M. (2014). The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in pharmacology*, *4*, 177.

Elachouri, M. (2018). Ethnobotany/ethnopharmacology, and bioprospecting: Issues on knowledge and uses of medicinal plants by Moroccan people. In *natural products and drug discovery* (pp. 105-118). Elsevier.

El-Dahiyat, F., Rashrash, M., Abuhamdah, S., Abu Farha, R., and Babar, Z. U. D. (2020). Herbal medicines: a cross-sectional study to evaluate the prevalence and predictors of use among Jordanian adults. *Journal of pharmaceutical policy and practice*, *13*(1), 2.

Fakeye, T. O., Adisa, R., & Musa, I. E. (2009). Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complementary and Alternative Medicine, 9*, 53.

Fouladbakhsh, J. M., and Stommel, M. (2013). Using complementary and alternative medicine to manage breast cancer symptoms: Results of a national survey. Cancer Nursing, 33(3), 181-194.

Hardy, K., Buckley, S., Collins, M. J., Estalrrich, A., Brothwell, D., Copeland, L., ... and Rosas, A. (2012). Neanderthal medics? Evidence for food, cooking, and medicinal plants entrapped in dental calculus. *Naturwissenschaften*, *99*, 617-626.

Houghton, P. J. (1998). Establishing identification criteria for botanicals. *Drug Information Journal*, *32*(2), 461-469.

Hsiao, A. F., Wong, M. D., Goldstein, M. S., Becerra, L. S., Cheng, E. M., Reuben, D. B., and Wenger, N. S. (2014). Complementary and alternative medicine use among Asian-American subgroups: Prevalence, predictors, and lack of relationship to acculturation and access to conventional health care. Journal of Alternative and Complementary Medicine, 12(10), 1003-1010.

Kennedy, J., Wang, C. C., and Wu, C. H. (2015). Patient disclosure about herb and supplement use among adults in the US. Evidence-Based Complementary and Alternative Medicine, 6(4), 45-56.

Koehn, F. E., and Carter, G. T. (2005). The evolving role of natural products in drug discovery. *Nature reviews Drug discovery*, *4*(3), 206-220.

Krenzelok, E. P., and Mrvos, R. (2011). Friends and foes in the plant world: a profile of plant ingestions and fatalities. *Clinical Toxicology*, *49*(3), 142-149.

Kumar, R., Goyal, A., Padhy, B. M., and Gupta, Y. K. (2016). Self-medication practice and factors influencing it among medical and paramedical students in India: A two-period comparative cross-sectional study. *Journal of natural science, biology, and medicine*, *7*(2), 143.

Lindquist, L. A., Ramirez-Zohfeld, V., Sunkara, P. D., Cameron, K. A., and Vandergriff, T. (2012). Advanced health literacy among older adults. Journal of General Internal Medicine, 27(8), 1041-1046.

Mafimisebi, T. E., Oguntade, A. E., Ajibefun, I. A., Mafimisebi, O. E., and Ikuemonisan, E. S. (2013). The expanding market for herbal, medicinal and aromatic plants in Nigeria and the international scene. *Med Aromat Plants*, *2*(144), 2167-0412.

Manojkumar, V. C. (2013). Virechana (purgation therapy)-a review.

Marinac, J. S., Buchinger, C. L., Godfrey, L. A., Wooten, J. M., Sun, C., and Willsie, S. K. (2007). Herbal products and dietary supplements: a survey of use, attitudes, and knowledge among older adults. *Journal of Osteopathic Medicine*, *107*(1), 13-23.

Mensah, M. L., Komlaga, G., Forkuo, A. D., Firempong, C., Anning, A. K., and Dickson, R. A. (2019). Toxicity and safety implications of herbal medicines used in Africa. *Herbal medicine*, *63*(5), 1992-0849.

Nguyen, P. H., De Tran, V., Pham, D. T., Dao, T. N. P., and Dewey, R. S. (2021). Use of and attitudes towards herbal medicine during the COVID-19 pandemic: A cross-sectional study in Vietnam. *European Journal of Integrative Medicine*, *44*, 101328.

Oreagba, I. A., Oshikoya, K. A., & Amachree, M. (2011). Herbal medicine use among urban residents in Lagos, Nigeria. *BMC Complementary and Alternative Medicine, 11*, 117.

Orisatoki, R. O., and Oguntibeju, O. O. (2010). The role of herbal medicine use in HIV/AIDS treatment. *Archives of Clinical Microbiology*, *1*(3).

Osemene, K. P., Elujoba, A. A., & Ilori, M. O. (2011). A comparative assessment of herbal and orthodox medicines in Nigeria. *Research Journal of Medical Sciences, 5*(5), 280-285.

Osuchukwu, N., Eko, J., Abia, R., and Ochei, K. (2017). Use of herbal medicine among adult residents in Calabar Metropolis, Cross River State, Nigeria. *Journal of Complementary and Alternative Medical Research*, *2*(3), 1-14.

Ozioma, E. O. J., and Chinwe, O. A. N. (2019). Herbal medicines in African traditional medicine. *Herbal medicine*, *10*, 191-214.

Pan, S. Y., Litscher, G., Gao, S. H., Zhou, S. F., Yu, Z. L., Chen, H. Q., ... and Ko, K. M. (2014). Historical perspective of traditional indigenous medical practices: the current renaissance and conservation of herbal resources. *Evidence-Based Complementary and Alternative Medicine*, *2014*(1), 525340.

Posadzki, P., Watson, L., and Ernst, E. (2013). Herb-drug interactions: An overview of systematic reviews. British Journal of Clinical Pharmacology, 75(3), 603-618.

Purushotham, K. G., Arun, P., Jayarani, J. J., Vasnthakumari, R., Sankar, L., and Reddy, B. R. (2010). Synergistic in vitro antibacterial activity of Tectona grandis leaves with tetracycline. *International journal of pharmtech research*, *2*(1), 519-523.

Raskin, I., and Ripoll, C. (2004). Can an apple a day keep the doctor away?. *Current pharmaceutical design*, *10*(27), 3419-3429.

RH, R. U. (2015). Traditional herbal medicine, pharmacognosy, and pharmacopoeial standards: a discussion at the crossroads. In *Evidence-based validation of herbal medicine* (pp. 45-85). Elsevier.

Saboo, S. S., Chavan, R. W., Tapadiya, G. G., and Khadabadi, S. S. (2014). An Important Ethnomedicinal Plant Balanites aegyptiaca Del. *Am. J. Ethnomed*, *1*(3), 122-8.

Saggar, S., Mir, P. A., Kumar, N., Chawla, A., Uppal, J., and Kaur, A. (2022). Traditional and herbal medicines: opportunities and challenges. *Pharmacognosy Research*, *14*(2).

Schmidt, B., Ribnicky, D. M., Poulev, A., Logendra, S., Cefalu, W. T., and Raskin, I. (2008). A natural history of botanical therapeutics. *Metabolism*, *57*, S3-S9.

Sen, S., and Chakraborty, R. (2017). Revival, modernization and integration of Indian traditional herbal medicine in clinical practice: Importance, challenges and future. *Journal of traditional and complementary medicine*, *7*(2), 234-244.

Sen, S., Chakraborty, R., and De, B. (2011). Challenges and opportunities in the advancement of herbal medicine: India's position and role in a global context. *Journal of Herbal medicine*, *1*(3-4), 67-75.

Sendker, J., and Sheridan, H. (2017). History and current status of herbal medicines. *Toxicology of herbal products*, 11-27.

Shaw, D., Graeme, L., Pierre, D., Elizabeth, W., and Kelvin, C. (2012). Pharmacovigilance of herbal medicine. *Journal of ethnopharmacology*, *140*(3), 513-518.

Sofowora, A., Ogunbodede, E., and Onayade, A. (2013). The role and place of medicinal plants in the strategies for disease prevention. *African journal of traditional, complementary and alternative medicines*, *10*(5), 210-229.

Tilburt, J. C., & Kaptchuk, T. J. (2008). Herbal medicine research and global health: An ethical analysis. *Bulletin of the World Health Organization, 86*(8), 577-656.

Wanjari, A. S., and Wanjari, D. S. (2019). An overview on herbal medicine. *Research Journal of Pharmacognosy and Phytochemistry*, *11*(1), 14-17.

WHO (2013). WHO traditional medicine strategy: 2014-2023. World Health Organization.

Williamson, E. M. (2001). Synergy and other interactions in phytomedicines. *Phytomedicine*, *8*(5), 401-409.

World Health Organization. (2019). *WHO global report on traditional and complementary medicine 2019*. World Health Organization.

Yoon, S. L., Horne, C. H., and Adams, C. (2013). Herbal product use by African American older women. Journal of Advanced Nursing, 39(6), 641-646.