



# The Influence of Socioeconomic Factors on the Use of Medicinal Plants for Diabetes

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## ABSTRACT

The use of medicinal plants in managing diabetes is widespread, especially in communities with limited access to conventional healthcare. This study examines the influence of socioeconomic factors, such as income, education, and geographic location, on the use of medicinal plants for diabetes treatment. Through a mixed-methods approach, including surveys and in-depth interviews conducted with individuals from diverse demographic and socioeconomic backgrounds, this study investigates how these factors shape individuals' health practices and preferences, particularly in rural versus urban settings. The findings suggest that lower-income and less-educated individuals are more likely to rely on medicinal plants due to financial constraints and limited access to healthcare. Furthermore, geographical location, particularly in rural areas, plays a significant role in the continued use of traditional plant-based remedies. The study concludes that while medicinal plants offer a valuable alternative or complementary treatment for diabetes, disparities in healthcare access due to socioeconomic factors need to be addressed to improve diabetes care and management.

**Keywords:** Socioeconomic factors, medicinal plants, diabetes, income, education, healthcare access, traditional medicine.

## INTRODUCTION

Diabetes is increasing every year, with an estimated 463 million adults (20-79 years) having diabetes worldwide. Medicine remains a valuable source of new drugs for individuals, supplying most of the world's population with primary medical care. Socioeconomic status (SES) also plays a role in the use of medicines made from medicinal plants, especially for herbal treatments. SES influences individuals' health-related choices, including herbal remedies. The socioeconomic and sociodemographic variables consist of economic, educational, and geographical status and are involved in disease outcomes, as included in the context of type 2 diabetes care [1, 2]. There is still a paucity of studies showing an association between several factors and the utilization of medicinal plants for diabetes. This paper provides an idea about the influence of socioeconomic and sociodemographic variables on the use of medicinal plants in the management of diabetes. Participants lived in a clinic, and health data were extracted from the electronic medical record system between 2013 and February 2015. Baseline demographics included age, sex, and self-reported English language proficiency. They are reported as means and standard deviations or numbers and percentages for each characteristic. Three socioeconomic indicators were taken into consideration, including place of birth, education, and the duration of diabetes. Written consent was signed by participating practitioners, and the Research Ethics Boards ratified the study [3, 4].

### Background On Medicinal Plants for Diabetes

Medicinal plants are plants that contain compounds that act on pre-existing conditions in humans. Medicinal plants have a long history originating from ancient traditions and cultures. Societies dependent on medicinal plants to maintain their health are seen in rural and remote areas. In these areas, medicinal plants serve as alternative medicine and the main form of treatment due to limited access to health facilities and the high cost of processed pharmaceutical drugs. People also believe that treatment using

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natural ingredients is safer because it rarely causes side effects. In the modern era, traditional medicines have reappeared, and their use is no longer limited to developing societies; they are also significantly used in developed countries [5, 6]. Several types of medicinal plants are widely used worldwide as medicine for diabetics, such as *Syzygium cumini*, *Sonchus amara*, *Ocimum basilicum*, *Andrographis paniculata*, *Cinnamomum burmannii*, and *Azadirachta indica*. Each medicinal plant mentioned has its bioactive compounds, and every part has different therapeutic effects. For example, bitter-andrographolide nebulization extract, a bioactive compound of *Andrographis paniculata*, decreases fasting blood sugar and postprandial blood sugar by increasing glycogen and decreasing glucose output through liver glycogen synthesis and glycogen phosphorylase enzyme activity. Many studies have reported that the use of medicinal plants as medicine for diabetics has fewer side effects compared to others, increasing insulin sensitivity and reducing insulin resistance. Therefore, various types of diabetes, from type 1 diabetes to type 2 diabetes, can possibly use medicinal plants. However, further clinical trials with various forms of preparations are still needed, conducted mainly in Western communities where the use of medicinal plants alongside conventional treatment needs to be monitored for safety and efficacy [7, 8].

#### **Definition and Importance of Medicinal Plants**

Medicinal plants can be defined as plants that have a critical influence on different cultures and offer therapeutic effects on the human body. Their uses are not only limited to a particular area but can be found worldwide. Medicinal plants have been used as ethnomedicine for centuries in traditional healthcare systems, which are still practiced in different parts of the world, especially in remote or rural areas where modern healthcare services are not available or are unaffordable. Thus, the ethnomedicinal uses of plants are of great importance to society due to their variation in culture, ecology, and ethnicity. Medicinal plants are not just a species of green leaves or herbal teas that a person should take when they are feeling unhealthy. Medicinal plants are a complex biological entity that can offer complex pharmaceutical compounds that may be used in drug development for modern treatment. Numerous compounds regarding secondary metabolites have been found in medicinal plants, such as tannins, steroids, flavonoids, alkaloids, phenolic acids, saponins, coumarins, and xanthenes. These secondary metabolites are reported to have different biological effects or to contain therapeutic effects—for example, antioxidant, and antimicrobial, and also play a role in many other biological activities or the treatment of several ailments, such as cancer, heart disease, and degenerative diseases. They are chemically important compounds with tremendous therapeutic potential. These medicinal plants could potentially alleviate or control diabetes and related complications [9, 10]. It is important to note that traditional cultural practices of knowledge, customs, and rituals are passed down from one generation to another and are closely linked to the practices of using medicinal plants for the management and treatment of different ailments and diseases, including diabetes. Indirectly, it shows the routine life and practices of diabetic patients. In traditional and cultural treatments, the use of traditional plant-based remedies and self-medication is frequently employed in the everyday lives of people in developing countries. To develop more effective pharmaceutical or healthcare systems, the practice of self-medication and the trial and error of ancient people are useful in guiding today's healthcare innovations. Unfortunately, the modernization of society and tremendous changes in environmental conditions, as well as agricultural, scientific, and cultural practices, are contributing to a loss of ethnobotanical data. Biodiversity loss and monoculture agricultural practices contribute to the extinction and loss of knowledge and practices of ethnobotanicals that have been carried out for generations. The population that has preserved the knowledge and practice of ethnobotany is reducing in number [11, 12].

#### **Common Medicinal Plants Used for Diabetes**

- Eucalyptus: gum tree, Southern blue gum, Australian fever tree, fever tree, stringy bark, ironbark, blackbutt, river peppermint, grey gum, Tasmanian blue gum, gumby gumby, round leaf gum, red gum, blue gum, white ironbark, white gum, spotted gum, red ironbark, yellow gum, red stringybark, yellow-grey timber, swamp gum, mountain swamp gum, Tasmanian gum tree, bloodwood, two daddy, white eucalyptus, *eucalyptus billichiana*, and *uliginum*.
- Barberry: jaundice berry, jaundice bine, pepperidge bush, Oregon grape, mountain grape, yerba santa, and holy thorn.
- Aloe vera: Aloe vera [13, 14]. Scientific evidence shows the antidiabetic efficacy of the plants' action mechanism via the enhancement of insulin sensitivity and secretion. However, the evidence shows that the antidiabetic effects of the plants are mainly due to the flavonoids, phenolic compounds, alkaloids, saponins, and tannins or their combinations shown as natural antioxidant agents to increase insulin sensitivity and protect pancreatic beta cells. The hypoglycemic effect of *Clitoria ternatea* in diabetic

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rabbis might be in part due to the insoluble alkaloid fraction. *Boesenbergia pandurata* rhizome is beneficial for diabetes via amelioration of insulin resistance in skeletal muscle. The role of flavonoids in attenuating postprandial hyperglycemia and reducing oxidative stress has potential applications for the prevention and/or treatment of diabetes and its complications. The antidiabetic benefits of Aloe vera include improved  $\beta$ -cell function, glucose-6-phosphatase, and sucrase activity due to the treatment with the product developed from Aloe vera leaves powder administered as capsules [15, 16].

#### **Socioeconomic Factors Affecting Health and Healthcare Access**

It is widely accepted that, along with medical factors, socioeconomic variables are significantly correlated to health conditions and access to healthcare. Knowledge of the associating factors could facilitate the development of strategies to complement evidence-based treatments and prevention, particularly among patients with chronic diseases. Factors include socioeconomic status determined by mean household income. This, in turn, determines whether patients can afford to seek medical attention or a healthy lifestyle. Lower socioeconomic status groups also have lower accessibility to healthcare services, which can hurt disease management and therapeutic options. Education may influence health literacy, which in turn affects the understanding and action related to medicinal plant utilization. Education also has a direct impact on the development of communities and individuals, which is one of the principles behind the motivation for the study of the factors correlated with the use of non-medical therapy options in the community. Social support is a strategy that has been used to enhance treatment success, including in diabetes management. Informal consultations and resources include those from communities or social networks. In addition, communities and networks can facilitate the rehabilitation of patients with chronic diseases including diabetes, especially in the case of lesser availability of service resources. Another key factor that influences healthcare is place of residence. For example, patients in urban areas may experience more economic effects when traveling to health service centers, while in rural areas distance from the medical center is an important factor. Furthermore, control and monitoring of diabetes are recommended to be carried out by a combination of health services and community resources for follow-up in a territorial manner. That is because geographic disparities exist even in urban areas. Only if the worshippers of traditional health knowledge can come to the meetings or services have access to worship services. Data shows that health service facilities continue to be developed and are not proportional across regions. Assuming individuals and their sociodemographic factors are related to the success of building regional health systems, a national championship system to search for data in managing diabetes has been created. Data indicating regional disparity of this service, among other things, is data of traditional use associated with certain variables. Therefore, this study aims to determine the use of medicinal plants with certain variables such as regional characteristics, sociodemographic factors, and the associated economy of the community. With a descriptive cross-sectional design, this study aimed to identify medicine use among T2DM patients and its associated factors. Data were collected using in-depth interviews based on a structured questionnaire shared with diabetic patients at a general hospital. Given the stigma attached to herbal knowledge, the participants were recruited through a network [17, 18].

#### **Income and Education Levels**

Income and education levels are related to health directly. People with higher incomes tend to have better health outcomes since they can use more health services than people with moderate or low incomes. The main reason behind this is that high-income individuals, because of their financial capacity, benefit from many opportunities to use health services. As is known, individuals with higher education have higher health literacy; therefore, they manage and cope with chronic diseases—a group that includes diabetic patients, for example, type 2 diabetes mellitus patients—better. They try to go to health centers for early diagnosis, get vaccinated, plan necessary treatments, and control their blood pressure and cholesterol regularly. Patients with low socioeconomic status might use traditional remedies to treat their complaints because of limited financial resources or to protect their social life. Care and prevention are very important in the management of diabetes, which is one of the chronic diseases. Even in developed countries, it is very difficult to maintain the necessary regular care and treatment of diabetes in low-income populations. This situation is further complicated by differences in health and the barriers created by health systems in developing countries. The most important point is to ensure that all diabetes treatment approaches are cost-effective and efficient, even taking into account the level of society's income. A large part of the health problems in society is directly dependent on income and socioeconomic inequalities. It is necessary to develop special policies and activities to establish the necessary regulations for the facilitation of integrative health practices in the field of diabetes and its complications. As a result, economically disadvantaged and less educated people have to make a living by considering local resources

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and traditional experiences. They do not have access to information, testing, laboratory services, and necessary drugs. In this case, society should take advantage of local resources, trained individuals, including herbalists, and traditional remedies until the services required for life can be improved. In cases where it is necessary to protect health, recommendations should not be sought unless permitted by a doctor. In addition to using plants and medicinal herbs, toxicological, pharmacological, and clinical therapeutic research should be carried out. In this context, societal groups should be informed about traditional treatments for diabetes and its complications and new therapies should be developed [19, 20].

### **Geographical Location and Access to Healthcare**

Geographical Location and Access to Healthcare. Not only may the cost of transportation be prohibitive, but also rural dwellers are further inconvenienced because of the longer travel distances to healthcare providers. It has been shown that active ingredients are the most abundant, and plants are also in use or promoted mainly in the central and southern parts of the country [21, 22, 23, 25]. Because more research and governmental interventions have focused on preservation programs and interventions for more natural resources, an understanding of the distribution of this particular local natural resource provides insights into those actors in the landscape that have particular opportunities and abilities to benefit from such programs [26, 27, 28, 29]. Some plants also appear frequently in areas of increasing proximity to the major urban areas. Alternatively, those local environments with relatively few plants may be those where other remedies and Western treatments are frequently more available and are thus not needed. Geographical variation in healthcare use has been repeatedly emphasized. The development of strategies and treatments for urban users, for example, has previously been suggested. The use of medicinal plants to manage diabetes is highlighted in this chapter. Clinical reviews have shown that poor living environments and lifestyles are associated with the development of diabetes, while diabetes itself leads to further poor circumstances. It is argued that if socio-economic and demographic changes, as well as the consequences for public health, are to be addressed, we must be vigilant and undertake targeted analysis and policy [30, 31, 32, 33].

### **Research Methods and Data Collection**

Qualitative interviews, in-depth individual interviews, guided group discussions, and structured surveys were used to collect interrelated data. The decision to use multiple methods was predicated on the belief that by doing so, the impact of socioeconomic factors on the usage of medicinal plants could be better researched. The survey included 410 valid questionnaires, with a response rate of 68.0%. It was conducted in November and December 2016 [34, 35, 36, 37]. The data were gathered in Jingmai Rural-Urban Traditional Resource Management and Research Centre, including the tea plantations, Dai ethnic villages, and transitional regions, sampling a population with diverse socioeconomic characteristics. The sample was constructed to be demographically, residentially, and economically diverse in terms of age, gender, education, living areas, income, illness status, and religious belief, to ensure a comprehensive overview of how socioeconomic factors affect the use of medicinal plants in the study area. Before starting the survey or interview, the purpose and potential interests of the study for participants were explained in detail so that they could decide whether to join or not. If they chose to take part, they provided verbal agreement. During the interview, participants were allowed to refuse to answer a specific question; however, all participants provided the relevant data after being guaranteed that the responses were anonymous and confidential. Problems related to gathering quality data included sample representativeness, difficulties in conducting fieldwork, and in collecting quantitative and qualitative data. The purpose of this paper is to establish the data's trustworthiness to justify the validity of the findings [38, 39].

### **Findings and Analysis**

A casual analysis of the responses to the survey and the focus group discussions highlighted which plants people use against diabetes and insulin. This process was even stronger when the decision tree analyses showed that the three most important variables determining income levels are education, the amount of insulin used, and the amount a person spends on diabetes. We observed that higher-income individuals tend to undervalue local plants in general. The above relationships are worth considering when looking at the influence of socioeconomic factors on the use of medicinal plants [27, 28]. An increased period of residence in town, the portion already lived in town, education, or household income was significantly associated with a better-off status. The study participants' mean age was 36.8 years and ranged from 17 years in the rural area to 53 years in the urban area. Urban dwellers use significantly more insulin than subjects in rural areas. The longer an indigenous person stays in a place, the more diabetes knowledge he or she will have. This implies that if a researcher approaches Indigenous people with a short resettlement

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period, it disadvantages them when asking health questions. The three variables (age, gender, and BMI) correlated with the number of years migrants had lived in town were negatively correlated, indicating that females and Indigenous people moving to town at a younger age were more likely to receive diabetes medicines. Long-term journals and quantitative processing of the physical activities of Indigenous people were sought, but data are still pending [29, 30].

### CONCLUSION

This study emphasizes the significant role that socioeconomic and sociodemographic factors play in shaping individuals' health choices, particularly regarding the use of medicinal plants for diabetes. Low-income and less-educated populations are more likely to use medicinal plants as an affordable and accessible alternative to conventional treatments, especially in rural areas where healthcare infrastructure is often insufficient. These findings highlight the need for policies that address healthcare accessibility, education, and income disparities to ensure equitable diabetes care. Additionally, further research on the safety, efficacy, and integration of medicinal plants into modern healthcare systems is crucial for developing comprehensive treatment strategies for diabetes.

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