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Economic Preferences of Medicinal Plants and Chemical Medicines by Communities in the Working Area of Dolago Tanggunung Forest Management Unit

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Abstract

This research investigates the economic patterns of expenditure and preferences regarding medicinal plants and chemical drugs by people living around the forest in the working area of the Dolago Tanggunung Forest Management Unit. This research aims to analyze people's economic preferences in the use of medicinal plants and chemical drugs by identifying the types of medicinal plants used, their economic value, and comparison of expenditure between the two types of drugs. This research used the Stratified Random Sampling method with 100 respondents, and data analysis was carried out using the paired t-test and multiple linear regression with the t test to measure the influence of various factors on the frequency of use of medicinal plants. The results of the research show that there are 60 types of medicinal plants from 35 families that are used by the local community. The effectiveness factor (β=0.30, p=0.003) has the strongest influence on the frequency of use of medicinal plants, followed by reasons for use (β=0.15, p=0.035) and the price of chemical drugs (β=-0.25, p=0.007). The high price of chemical drugs encourages people to turn to medicinal plants as an alternative. On the other hand, the level of trust in medicinal plants (p=0.215) did not have a significant effect on the frequency of use. Thus, economic and effectiveness factors are more dominant in determining people's preferences for medicinal plants compared to trust factors. Integration between traditional and modern medicine can be a solution to improve public health in a sustainable manner

Keywords: *Economic Preferences, Medicinal Plants, Chemical Medicines*

INTRODUCTION

Indonesia has abundant natural resources, including a diversity of plant species that are utilized by the community in various aspects of life. Each community has traditional knowledge about the plants around them, both cultivated and wild. Ethnic diversity, such as in the Merauke region, also affects variations in the use of plants for daily needs, including traditional medicine (Fitria Lestari et al., 2023). In this practice, the most commonly used plant part is the leaf, with the dominant habitus being herbaceous (Arham et al., 2016). The utilization of diverse medicinal plants not only contributes to public health, but also supports efforts to conserve biodiversity through sustainable use practices (Firmani & Aprilya, 2023).

Biodiversity conservation is an urgent global issue, as stipulated in the Convention on Biological Diversity, which aims to reduce the rate of biodiversity loss at the global, regional and national levels. This effort also plays a role in poverty alleviation and improving human and environmental welfare (Ginting et al., 2017). In the context of health, the utilization of biodiversity is reflected in the two main treatment systems known to the community, namely modern medicine and traditional medicine (Priyana, 2023). Traditional medicine based on medicinal plants not only

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offers an alternative to chemical drugs, but is also part of the cultural heritage that needs to be preserved to maintain ecological balance and public health.

Medicinal plants, often referred to as traditional medicine, refer to natural materials derived from plants, animals, minerals, or a mixture of various natural sources. Since ancient times, people have used medicinal plants for generations to maintain health, treat diseases, and increase endurance (Ermawati et al., 2022). Various studies have shown that herbal medicines have the potential to overcome various types of diseases, making them a more natural treatment option and minimal side effects compared to chemical drugs (Darwis et al., 2021). Therefore, the use of medicinal plants is not only important in supporting public health, but also part of a strategy to conserve biodiversity through sustainable use.

Various parts of the plant contain active compounds that play an important role in medicine. Medicinal plants are known to have the ability to relieve pain, increase endurance, fight infection, and help regenerate damaged organs (Machfiroh Setianing Hati et al., 2023) These active compounds are distributed in various parts of the plant, such as leaves, stems, roots, and skin, each of which has unique therapeutic benefits (Jawa La & Kurnianta, 2019). With their healing potential, medicinal plants are not only part of the cultural heritage in traditional medicine, but also contribute to the development of natural material-based therapies that are more environmentally friendly and sustainable.

In addition to their health benefits, medicinal plants also play a crucial role in maintaining ecosystem balance. The existence of plants is essential for the survival of humans and other organisms, as they provide oxygen, maintain the water cycle, and are a source of food and natural medicines. Medicinal plants, especially those used in herbal medicine, are part of biodiversity that must be conserved, both for health purposes and to maintain ecosystem stability (Jamshidi-Kia et al., 2018).

Since thousands of years before the discovery of modern medicine, medicinal plants have been used as solutions in the treatment of various diseases. These plant-based treatments are considered more culturally acceptable, safer, and have lower toxicity levels than synthetic drugs (Boakye-Yiadom et al., 2021). Indonesia, as a country with high biodiversity, has a long tradition of traditional medicine that has been passed down from generation to generation. However, modernization and lifestyle changes have led to the reduction of traditional knowledge possessed by the community, so the preservation of medicinal plants and traditional medicine practices has become a challenge (Susanti & Sukaesih, 2017)

People's lack of understanding about the benefits of medicinal plants also contributes to their tendency to prefer chemical drugs prescribed by medical personnel. In fact, the price of chemical drugs tends to be more expensive, while the use of drugs made from natural ingredients from medicinal plants often offers a more economical alternative and has minimal side effects (Fernandarisky et al., 2020). Since long ago, people have utilized plants from nature to concoct traditional medicines used in daily medicine (Marpaung & Prasetyo, 2022). Therefore, the use of medicinal plants as herbal medicines can be a solution in dealing with various health problems, both in prevention and treatment efforts, while supporting more sustainable health practices (Hamiyati & Laratmase, 2021).

This study aims to analyze the economic preferences of the community in choosing between medicinal plants and chemical drugs in the working area of the Dolago Tanggunung Forest Management Unit (KPH). By considering aspects of cost, availability, effectiveness, as well as social and cultural factors, this research seeks to identify the extent to which people still rely on traditional medicinal plants amidst the dominance of chemical drugs. It also explored the role of modernization and access to health services in influencing treatment choices. The results of this study are expected to provide insights for policy makers in designing strategies for conserving medicinal plants, as well as developing more inclusive and local wisdom-based health policies.

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LITERATURE REVIEW

Preference for the Use of Medicinal Plants and Chemical Drugs

Medicinal plants are plants that have been identified and recognized as agricultural commodities that are very popularly used as natural ingredients such as the pharmaceutical industry, food or beverage ingredients, ingredients for making cosmetics and traditional medicines The increasing knowledge of the Indonesian people about the benefits of consuming natural medicines has a positive impact on increasing the consumption of natural medicines. The existence of various kinds of processed medicinal plant products requires producers/companies to better understand consumer behavior. Consumers have many choices to determine what type of herbal medicine to buy. The variety of herbal medicine brands offered on the market makes consumers tend to have certain preferences before making decisions.(Novita et al., 2020).

In addition, chemical drugs are one of the drugs commonly consumed by the public because they have the advantage of being portable and not going through a long process of taking them (Putri et al., 2019). Consuming chemical drugs by the public is done because the reaction is so fast in overcoming an illness, so actually it is not the reaction to overcome the cause of the disease but only suppresses the symptoms that arise. The use of chemical drugs internally for a long period of time is also possible to cause new diseases because many organs of the body are affected (Puspariki & Suharti, 2019).

Factors Influencing Preference for the Use of Medicinal Plants and Chemical Drugs

Medicinal plants have long been known and utilized by the community in treating various types of diseases(Darwis et al., 2021). Many people assume that traditional medicine is safer than modern medicine because it comes from nature and has been used for generations. People's knowledge about medicinal plants is influenced by several factors such as age, education level, economic status, living environment, and sources of information obtained. One factor that plays an important role is age, where the older a person gets, the broader his understanding of various types of medicinal plants, processing methods, and their benefits (Adiyasa & Meiyanti, 2021). In Indonesia, the use of medicinal plants has become part of the culture passed down from generation to generation. Apart from being medicinal, plants also have many other functions such as food ingredients, fuel, and are even used in traditional ceremonies in various tribes. The diversity of cultures and tribes that exist in Indonesia has an impact on the variety of types and models of traditional medicinal materials. Although different tribes and cultures, the types of treatment carried out are almost the same, namely most of them use plants as medicines (Ismail et al., 2023)

In addition to the use of traditional medicine, chemical drugs are also widely consumed by the community because of their practicality (Putri et al., 2019). The main advantage of chemical drugs is the quick reaction in relieving symptoms of the disease so many people choose it as a more instant treatment solution. However, chemical drugs generally only suppress the symptoms of the disease without addressing the main cause. Long-term use of chemical drugs can also cause side effects or even new diseases due to their content that can affect various organs of the body (Puspariki & Suharti, 2019).

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RESEARCH METHODS

Research Approach

This research was conducted in 12 villages in the working area of the Dolago Tanggunung Forest Management Unit, namely Toboli Village, Pangi Village, Binangga Village, Lebo Village, Jono Kalora Village, Parigimpu Village, Lobu Mandiri Village, Kayu Boko Village, Air Panas Village, Olo Baru Village, Lemusa Village, and Gangga Village. Data collection was conducted from October to November 2024. Data collection used observation, interview and documentation techniques.

The research methods used were descriptive and statistical. Determination of respondents by stratified random method is done by maintaining the diversity of the population and ensuring that each is fairly represented in the sample. This sampling consists of dividing the population into several or groups according to certain characteristics, such as age, gender, education, occupation or marital status. Where the population of the plant user community is 100 respondents who are used as this research.

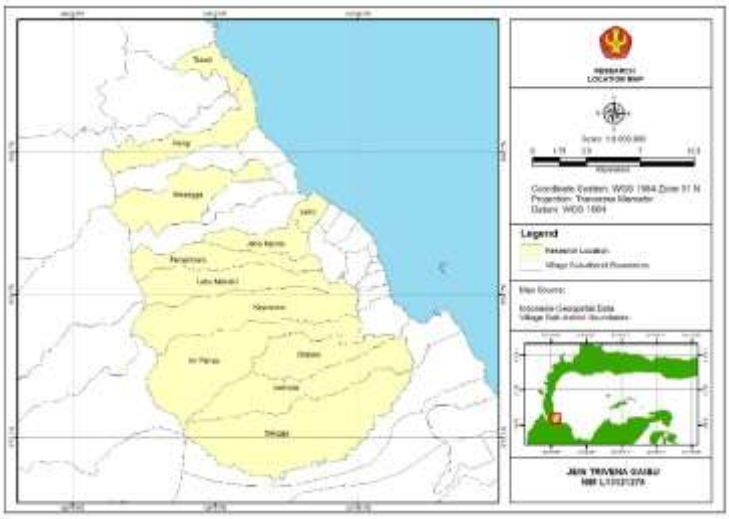

Figure 1: Research locations in 12 villages in the working area of the Dolago Tanggunung Forest Management Unit, Parigi Moutong District, Central Sulawesi.

Data analysis

Multiple linear regression analysis with t-test
Hypothesis Testing Two-sample t test. According to Riduwan (2003), using multiple linear regression with a t-test to test the significance of each independent variable (X1, X2, X3, X4) on the dependent variable (Y). The following are the steps and results of the analysis:

$$Y=\beta 0+\beta 1X1+\beta 2X2+\beta 3X3+\beta 4X4+\epsilon$$

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Description:
Y : Frequency of Use
X1 : Reason for Use
X2 : Effectiveness
X3 : Trust
X4 : Chemical Medicine Price

Null Hypothesis (H_0) and Alternative Hypothesis (H_1):
Effect of Reasons for Use (X1) on Frequency of Use of Medicinal Plants (Y):
- H_0: there is no significant effect on the frequency of use of medicinal plants ($\beta_1 = 0$).
- H_1: there is a significant influence on the frequency of use of medicinal plants ($\beta_1 \neq 0$).

RESULTS AND DISCUSSIONS

Types of medicinal plants

Medicinal plants are medicinal plants that can relieve pain, increase immunity, kill disease seeds and repair damaged organs. Medicinal plants are also a type of plant that in certain parts of the roots, stems, skin, leaves and excretions are believed to cure or reduce pain because these plants contain active substances that are efficacious for health that can be used as a cure for disease.(Machfiroh Setianing Hati et al., 2023). There were 60 types of plants used by the community as medicinal plants classified as herbaceous plants, shrubs, and trees (Table 1).

Table 1. Types of medicinal plants

No	Local Name	Scientific Name
1	Jahe	Zingiber officinale
2	kunyit putih	Curcuma zedoaria
3	kunyit mangga	*curcuma mangga*
4	Jahe	Zingiber officinale
5	Serai	Cymbopogon citratus
6	Temulawak	Curcuma zanthorrhiza
7	Lengkuas	Alpinia galanga
8	gedi hijau	Abelmoschus manihot
9	Sambiloto	Andrographis paniculata
10	Miana	Coleus scutellarioides
11	Balacai	Anredera cordifolia
12	kumis kucing	Orthosiphon aristatus
13	akar kucing	Tinospora crispa
14	Kencur	Kaempferia galanga
15	Kelor	Moringa oleifera
16	daun papaya	Carica papaya
17	daun jambu	Psidium guajava
18	daun salam	Syzygium polyanthum
19	daun sirih	Piper betle
20	daun sirsak	Annona muricata
21	daun tebal	Melaleuca leucadendra
22	daun delima	Punica granatum
23	daun kemangi	Ocimum basilicum
24	daun insulin	Smallanthus sonchifolius
25	Kersen	Muntingia calabura
26	Siranindi	Piper umbellatum
27	pecah beling	Strobilanthes crispus
28	Perselin	Apium graveolens
29	ketumbar hutan	Eryngium foetidum

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30	tembakau hutan	Lobelia chinensis
31	sirih cina	Peperomia pellucida
32	tali kuning	Arcangelisia flava
33	Meniran	Phyllanthus niruri
34	daun tumoni	Paederia foetida
35	Goraka	Garcinia atroviridis
36	kelapa muda	Cocos nucifera
37	jeruk nipis	Citrus aurantiifolia
38	Niram	Amaranthus spinosus
39	Tembelekan	Lantana camara
40	Cengkeh	Verbenaceae
41	alang-alang	Imperata cylindrica
42	kayu manis	Cinnamomum verum/Cinnamomum cassia
43	lidah buaya	Aloe vera
44	merica jawa	Piper retrofractum
45	Mengkudu	Morinda citrifolia
46	jambu biji	Psidium guajava
47	ruku-ruku	Ocimum tenuiflorum
48	binahong putih	Anredera cordifolia
49	jarak kepya	Jatropha curcas
50	nampu hijau	Curcuma aeruginosa
51	Lada	Piper nigrum
52	cocor bebek	Kalanchoe pinnata
53	Wijen	Sesamum indicum
54	gingesng jawa	Talinum paniculatum
55	Srikaya	Annona squamosa
56	kunyit hitam	Curcuma caesia
57	selasi merah	Ocimum basilicum var. purpurascens
58	meniran ciplukan	Physalis angulate
59	Lempuyang	Zingiber zerumbet
60	patikan kebo	Euphorbia hirta

Respondent Identity

Various types of medicinal plants in Table 1 above have been used by the community in the study location, especially by the respondents of this study. This research also provides the identity of respondents based on the study village as listed in Table 2 below:

Table 2. Average Number of Community Respondent Identities per Village

NO	Village	Average age	EDUCATION					EMPLOYMENT STATUS					MARITAL STATUS	
			NS	ES	JS	SS	RM	HW	MH	AS	FM	SE	MARRIED	NOT MARRIED
1	Toboli	50	1	8	7	11	2	17	6	4	1	1	28	1
2	Pangi	56		1	2	6		5	3	1			9	
3	Lebo	53		1	2	3		4	1	1			6	
4	Binangga	53		1	3	1	1	3	2			1	6	
5	Jono Kalora	48		5		1		1	5				5	1
6	Parigimpu	63	1	5	1			2	4			1	4	3
7	Lobu	48	1	6	1			3	5				7	1
8	Kayu Boko	46	1	3	2	1		3	4				6	1
9	Air Panas	47	2	2	1			3	1		1		5	
10	Olo Baru	46	1		2	1	1	4	1				5	
11	Lemusa	52			3	5		5	2	1			8	
12	Gangga	54	1	2			1	1	2			1	3	1

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Description:

NIS	= Not In School	HW	= Housewife
ES	= Elementary School	MH	= Merchant
JHS	= Junior High School	AS	= As a series
SHS	= Senior High School	FM	= Farmers
RM	= Retirement	SE	= Self-employed

Sources of Acquisition

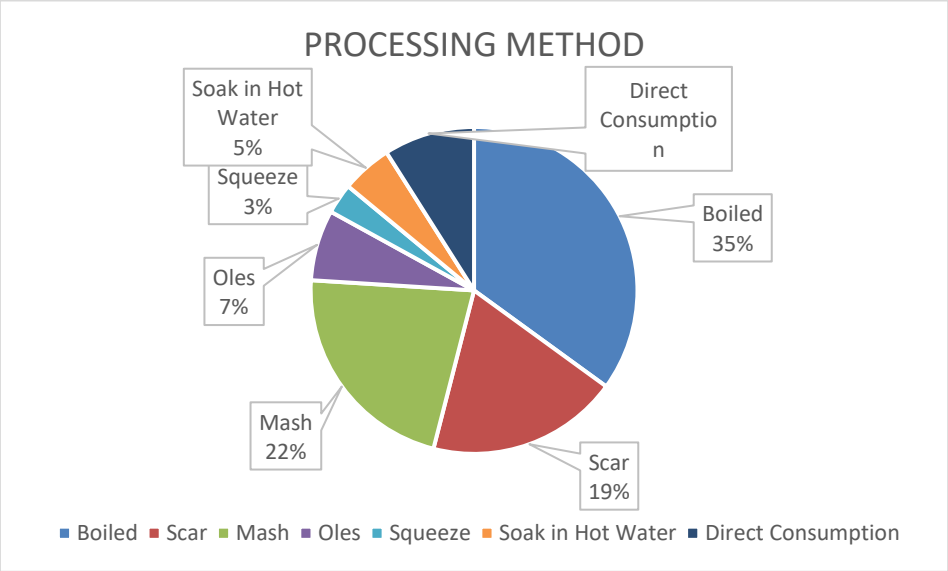

Figure 2. Sources of Acquisition

Medicinal Plant Utilization Section

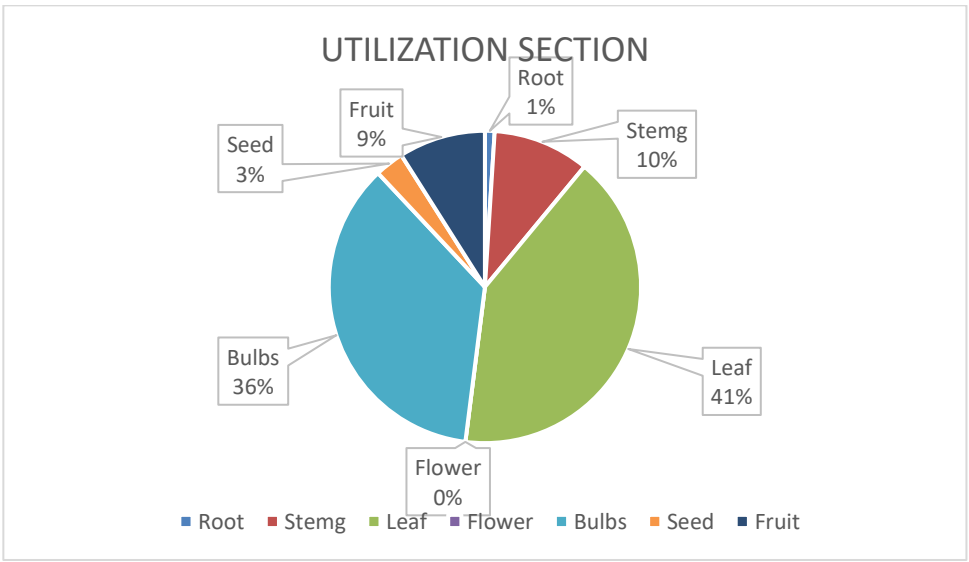

Figure 3. Utilization section

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How to process medicinal plants

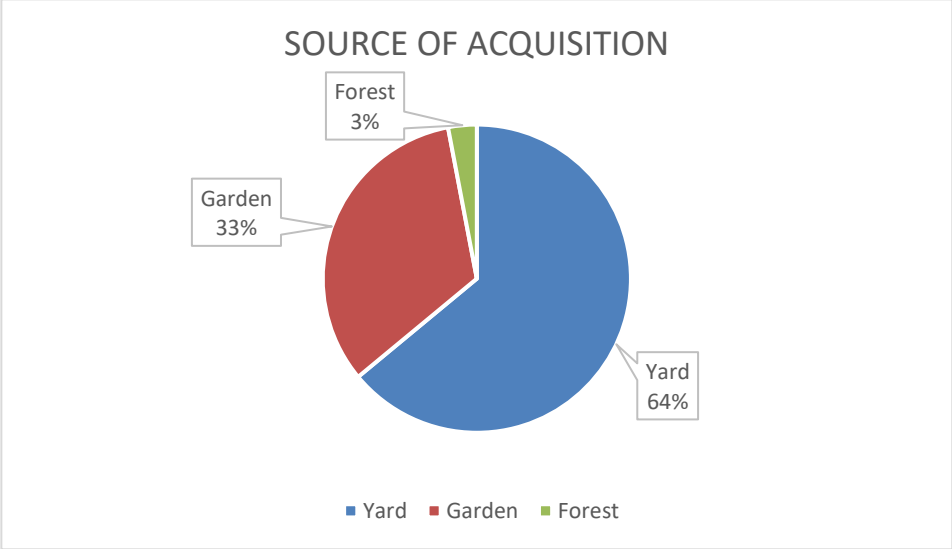

Figure 4. Processing method

Results of multiple linear regression analysis with t-test

Before the multiple regression analysis is carried out, the regression assumption test is carried out with the following results:

1. Linearity: Assumption of a linear relationship between Y and X1 through X4.
2. Homoscedasticity: Constant residual variance (tested with Breusch-Pagan test).
3. Residual Normality: Residuals are normally distributed (tested with Shapiro-Wilk/Kolmogorov-Smirnov).
4. Multicollinearity: There is no high correlation between independent variables (VIF < 10).

Table 3. Multiple Regression Coefficients and t Tests

Variable	Coefficient (β)	Std. Error	t-count	p-value	Significance (α=0.05)
X1	0.15	0.07	2.14	0.035	Significant
X2	0.3	0.1	3	0.003	Significant
X3	-0.1	0.08	-1.25	0.215	Not Significant
X4	-0.25	0.09	-2.78	0.007	Significant
Konstanta	1.5	0.2	7.5	<0.001	-

Discussion

As for the results of the research in Table 1, there are 60 types of medicinal plants from 28 different families, which are used by the community as ingredients for treatment, the results of research on the use of medicinal plants in 12 villages with a total of 100 community respondents show that medicinal plants are still the main choice of some people. While according to research (Sada & Tanjung, 2018) 48 species of medicinal plants from 32 families were found. These medicinal plants are an important

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resource in maintaining health and traditional medicine for residents in the region because they contain many diverse benefits according to the type of medicinal plant. The use of these traditional medicinal plants reflects the importance of local culture and the close relationship between humans and nature in the Dolago Tanggunung Forest Management Unit.

Based on Table 2 of the research data, it can be seen that the first in terms of age in the table is the average of the 12 villages of the age of respondents from the lowest to the highest, which ranges from 46 - 63 years, if you look at the average age that older ages tend to have broad and many understandings than young ones, this is comparable to research (Qasrin et al., 2020). Where currently the knowledge of the use of medicinal plants is only held by medicinal practitioners and the older generation, while the younger generation is less interested in preserving this local wisdom, this causes the community to be increasingly unfamiliar with the types of medicinal plants. Then the second in terms of educational status, the most education level of 100 community respondents is at the elementary level (elementary school) with a lot of 34 people and the least education level is the S1 education level as many as 5 people. Furthermore, from the employment status of the most respondents, the community works as housewives (housewives) as many as 51 people and the lowest is working as an entrepreneur who only amounts to 2 people out of 100 community respondents, there is a very significant difference from the results of the study. Then the last in terms of marital status, there were 92 respondents who had a married or married status while only 8 respondents were unmarried, this is in line with the research. (Asiimwe et al., 2021) of which 96% were married and 4% were unmarried. From the table above, it can be concluded that the identity of community respondents in terms of age, education, occupation and marital status, all greatly affect a person's level of understanding or knowledge of medicinal plants.

Based on Figure 2 there are 3 acquisitions of medicinal plants, namely in forests, yards and gardens. The acquisition of medicinal plants in the community based on the diagram is 64% of the acquisition of medicinal plants in the yard, indicating that medicinal plants in the community are more often found in the yard because most of the people plant medicinal plants more in the yard perhaps because the location is more easily accessed by the community every time it will be used. In addition, the acquisition of the second medicinal plant is the garden as much as 33%. Then the acquisition of the least medicinal plants is found in the forest as much as 3% of the 60 types of medicinal plants, this may be due to knowledge and access to locations that are fairly difficult and far from the community environment so as to make the acquisition of medicinal plants very little.

Based on Figure 3 Based on the results of the study, the utilization of medicinal plants in this region, leaves have a very dominant role, reaching 41% of the total utilization. In addition, tubers are the second most used, reaching 36%, indicating that plant parts related to tubers have an important value in traditional medicine. Stems and fruits were also used significantly, reaching 10% and 9% respectively. Meanwhile, other parts such as roots, seeds and flowers have a smaller contribution, about 1%, 3% and 0% respectively.

Based on Figure 4 of the results of the study there are types of plants with the highest level of processing methods, namely by boiling there are 35% of 60 types of plants. In addition, there are two processing methods that are not much different in the number of processing methods, namely, pounded and grated as much as 22% and 19%. Then the processing carried out by soaking with hot water, direct consumption, rubbing and squeezing, becomes the least processing process as much as 9%, 5%, 7%, and 3%. From the various ways of processing it can be seen that there is a significant difference where it can be concluded that each processing method has its own advantages in maintaining the integrity and effectiveness of the active substances of the plant, so that people often adjust the processing method to the type of plant and the complaint they want to handle.

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Based on Table 3, it shows several things, namely:

1) X1 (Reason for Use): Positive coefficient (β=0.15, p=0.035) this result shows that the stronger the reason for using medicinal plants, the higher the frequency of use.
2) X2 (Effectiveness): The strongest positive coefficient (β=0.30, p=0.003). this result shows that the effectiveness of using herbal medicine is significantly correlated with the frequency of use, meaning that the more often people use medicinal plants, the more effective the results.
3) X3 (Trust): Not significant (p=0.215). This result shows that the level of trust does not statistically affect the frequency of use, meaning that the frequency of using medicinal plants is not influenced by a person's trust.
4) X4 (Price of Chemical Medicine): Negative coefficient (β=-0.25, p=0.007). This result shows that higher prices of chemical drugs correlate with more frequent use of herbal medicine, meaning that if the price of chemical drugs has a high price, people will switch to consuming medicinal plants.

This finding confirms that the effectiveness and price of chemical drugs play an important role in people's decision to use medicinal plants. Meanwhile, reasons for use also influence consumption patterns, but belief in medicinal plants is not a major factor in increasing the frequency of use. These results can serve as a basis for various parties, including the government and health practitioners, to encourage the utilization of medicinal plants as part of the public health system. Educational campaigns on the effectiveness and use of medicinal plants can increase their adoption, especially in areas where it is difficult to access affordable chemical drugs. In addition, policies that support the conservation and management of medicinal plants can ensure the long-term availability of these resources.

CONCLUSION

This study reveals that communities in the working area of the Dolago Tanggunung Forest Management Unit show diverse economic preferences between the use of medicinal plants and chemical drugs. In general, the use of medicinal plants is more dominant because it is driven by local wisdom, the availability of abundant natural resources. Medicinal plants play a central role as the main source of health care in the Kulawi Forest Management Unit working area. With 60 species from 35 families of medicinal plants used extensively by the local community, it is apparent that medicinal plant use is strongly influenced by factors such as occupation, education, marital status, and age group. The majority of medicinal plant users are farmers, most have low education, the majority are married, and most are in the age range of 46-63 years. The main source of medicinal plant acquisition is the community yard.

On the other hand, chemical drugs are still preferred for certain conditions that require quick and effective treatment, especially in health emergency situations. These findings highlight the importance of integrating traditional knowledge with modern health systems to optimize local economic potential and improve the quality of public health services. In addition, the effectiveness of medicinal plant use plays an important role, where the more frequently used, the more effective the results are perceived. Reasons for use also had an influence in increasing the frequency of medicinal plant consumption, although not as much as effectiveness. Thus, economic and effectiveness factors are more dominant than belief factors in determining the use of medicinal plants.

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