Factors That Influence the Interests of Households in Medicinal Plants Farming in the Covid-19 Pandemic Situation

Aflahun Fadhly Siregar, Salsabila*, Ade Firmansyah Tanjung
Universitas Muhammadiyah Sumatera Utara
Medan, Indonesia
*salsabila@umsu.ac.id

Abstract—**Utilization of available yards is one effort that can be done to cultivate the plants, especially medicinal plants during the Covid-19 pandemic. Various kinds of medicinal plants can be planted in the available yard, such as ginger, temulawak, turmeric, piper betle, lemongrass, and others. The products of medicinal plants can be used for self-consumption or sold to the market. The objective of this study was to analyze interest and factors that influence the interest of households in medicinal plants farming and analyze the responses from each factor to the interest of households in medicinal plants farming during the Covid-19 pandemic. The research was conducted in Medan City purposively. The research sample was households using purposive sampling as a sampling method. Data collection techniques using structured questionnaires, observation, and interviews. Data were analyzed using the binomial logit model. The results of the omnibus test showed that the availability of yard, availability of time, knowledge, and gender influenced the interest of household in medicinal plant farming simultaneously. While the availability of time, knowledge, and gender influenced the interest of household in medicinal plant farming partially.**

Keywords—interest, household, medicinal plants, logistic regression

I. INTRODUCTION

Covid-19 pandemic has produced fear worldwide. It has caused concern and worries for the community [1]. Indonesia is also going within a complicated situation with the number of infected or positive cases increases every day. Limited activities outside the home because people spent more time at home.

Various other ways are also used by the community to maintain the immune system in order to stay healthy in pandemic situation. Consuming herbal medicine or "jamu" during a pandemic is one of the choices made by the community as a treatment and preventing epidemic diseases. This has been proven based on the results of previous studies which show significant results that herbal medicine can prevent disease and maintain endurance [2].

"Jamu" is one of the cultural heritages that is trusted by the community to overcome various health problems. The utilization of medicinal plants in curing some diseases is well known as herbal medicine. The natural resources used for herbal medicine come from medicinal plants to treat and prevent many diseases [3]. As a comparison, the National Health Commission in China also has announced the treatment by using herbal medicine combined with Western medicine in a pandemic situation [4].

Each individual has their way of consuming jamu. In Turkey, local people use these medicinal plants by drying and making infusion or decoction of these plants [3]. While in Indonesia especially in Medan City, a few people mixed some of the medicinal plants to make herbal medicine and some others buy it outside through "jamu gendong", "jamu gerobak", and "jamu depot".

Based on the results of observations and interviews with jamu's seller in Medan City, it was found that the demand for traditional herbal medicine is increasing from initial price. Red ginger and temulawak were favourites and most often bought by consumers.

Increasing consumer demand for jamu causes jamu sellers to be overwhelmed by consumer demand. As a result, some jamu's sellers have to increase their production of jamu to be sold to consumers. Along with the increase in consumer demand, the price of raw materials or medicinal plants in traditional markets has also increased.

The increasing price of medicinal plants in traditional markets during the pandemic has caused people, especially housewives to take the initiative and be interested in planting these medicinal plants in their home yards. The interest to do something is based on a sense of desire and also the need to achieve a certain goal [5]. In this case, the interest of the community to plant medicinal plants in home yard is due to the increasing need for medicinal plants that are beneficial for health. By utilizing their home yards, people can enjoy the harvest of medicinal plants from their homeyard.

Furthermore, the limited activities outside the home also caused people to spend more time at home. Therefore, the spare time can be used to plant medicinal plants. Medicinal plants that are easy and widely planted by people nowadays include ginger, lemongrass, turmeric, temulawak, and others. Based on the problems described above, this study aims to analyze the factors that influence household interest in Medan City to plant medicinal plants during the pandemic.

II. METHODOLOGY

Determination of the research location was carried out purposively in Medan Timur Subdistrict, Medan City with the consideration that it was purposely chosen based on certain objectives because based on the results of the survey in the field the researcher observed that there were some households interested to plant medicinal plants in their home yards.

Respondents in the study were households. In this case, they were part of family members who had an interest in planting medicinal plants in their home yards. As a comparison, in this study, the researchers also took samples of households that had home yards but for some reason did not have an interest in planting medicinal plants. So that the total number of respondents in this study amounted to 60 samples who were determined purposively.

In analyzing interest and factors that influence the interest of households in medicinal plants farming and analyze the responses from each factor to the interest of households in medicinal plants farming, we use the binary logit model. The logit model explains the change in the probability of the dependent variable due to changes in the independent variable [6]. The dependent variable in the logit model is qualitative or called the probability model so that the objective is to analyze the probability of response [7].

A. Model Spesification

In analyzing the factors that influence and the responses from each factor to the interest of households in medicinal plants farming, we specify a mathematical logistic regression model. The model is thus;

$$Y = ln\left\{\left[\frac{p}{1-pi}\right]\right\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \quad (1)$$

Where : $ln\left\{\left[\frac{p}{1-pi}\right]\right\}$ is odd ratio where (p) explains the predicted probability of the event which is coded with 1 (interest of the household), while (1-p) explains the predicted probability of the other decision which is coded with 0 (not interest).

B. Parameter Testing

The suitability of the logit model with the data to be estimated is done by comparing the percentage correct predicted value for the observed value and comparing the data distribution and logit distribution [6].

1) Percentage correct test/Change accuracy: This test is used to see whether the selected parameter is a parameter that maximizes the predicted observed values or minimizes the squared value of the error term. The best parameter is the parameter that can provide the highest percentage correct of the observed value.

2) Omnibus test: This test is used to determine whether the independent variables included in the equation model have an effect on the variation of the dependent variable. In the omnibus test the formula used is thus;

$$G = -2ln\frac{likelihood\ model\ B}{likelihood\ model\ A} \quad (2)$$

Where model A is a model that uses all the selected parameters or the estimation results, while model B is a model that assumes all parameters are 0 ($\beta_1, = \beta_2 = \beta_3 = \beta_4 = 0$). If the likelihood model B = likelihood model A, then the ratio of both = 1 and the value of ln obtained = 0, which means that none of the selected parameters is significant. As a result, the value of G = 0 which is the null hypothesis used [6]. If p-value < 0.05 it means that the null hypothesis is rejected.

3) Wald test: This test is used to determine the influence of each independent variables on the dependent variable. The formula used in the wald test is thus;

$$W_j = \left[\frac{\beta_j}{s_j(\beta_j)}\right]^2 \quad (3)$$

Where s is the standard error of the estimated parameter value. The statistic hypothesis used is the value $W_j = 0$. While the decision-making criteria if p-value < 0.05 means null hypothesis can be rejected and it can be concluded that the variable being tested affects the independent variable significantly [6].

4) Hosmer and Lemeshow test: This test is used to compare wheter logit models according to the distribution of observation data. The formula used is as follows;

$$X_{HL} = \sum_{g=1}^{n}\frac{(o_g - E_g)^2}{E_g(1 - Eg/nf)} \quad (4)$$

Where Og = observation value, Eg = prediction value and ng = number of observations. The null hypothesis used is $X_{HL} = 0$ and the decision-making criteria if the p-value > 0.05 which means the null hypothesis cannot be rejected. So it can be concluded that the logit model is very suitable with the distribution of observation data [6].

III. RESULTS AND DISCUSSION

TABLE I.   RESULT OF FACTORS THAT INFLUENCED THE INTEREST OF HOUSEHOLDS IN MEDICINAL PLANTS FARMING

Variables	B	S.E.	Wald	Sig.	Exp (B)
Available of Yard	0.540	1.349	0.160	0.689	1.716
Available of Time	4.109	1.634	6.321	0.012	60,88
Knowledge	3.533	1.552	5.187	0.023	34.22
Gender	3.711	1.452	6.535	0.011	40.892
Constant	0.054	1.065	0.003	0.960	1.055

The estimated model is thus:

$$\ln\left\{\left[\frac{p}{1-pi}\right]\right\} = 0,054 + 0,540X_1 + 4,109X_2 + 3,533X_3 + 3,711X_4 + e \tag{5}$$

The equation above showed that the coefficients of availability of yard, availability of time, knowledge and gender have the positive values. If the coefficient is positive, then the odds for interest (code 1) on dependent variables will increase.

Interpretation of result in logistic regression model:

A. Percentage Correct Test/Change Accuracy

The model prediction results are 30 respondents are not interested in planting medicinal plants (0) and there are 3 incorrect predictions. So the correct prediction is as much as 90.9%. As for household respondents who are interested in planting medicinal plants (1) is as many as 26 people and there is 1 wrong prediction. The correct prediction result is as much as 96.3%. Thus the overall percentage value is 93.3% which means the accuracy of this research model is 93.3%.

B. Wald Test

Table 1 showed that availability of time, knowledge and gender contributed significantly influenced the interest of household in medicinal plants farming but availability of yard did not. The p-value for availability of time, knowledge and gender are 0,012, 0,023 and 0,011 (<0,05) while p-value for availability of yard is 0,689 (>0,005).

C. Omnibus and Hosmer-Lemeshow Test

TABLE II.   OMNIBUS AND HOSMER-LEMESHOW FACTORS THAT INFLUENCE THE HOUSEHOLD INTEREST IN MEDICINAL PLANTS FARMING

Test	Omnibus	Hosmer and Lemeshow
Chi-Square	59.866	1.739
Sig	0.00	0.884

Table 2 gave showed the result which indicated whether the inclusion of variables contributed significantly to model fit. A p-value (sig) of less than 0,05. The null hypothesis was rejected; it means that the independent variables entered into the model are significant.

The Hosmer – Lemeshow statistic assumed sampling adequacy. The value of Hosmer and Lemeshow statistic has a significance of 0,884 (> 0,05) which means that was not statistically significant or there is no difference between the distribution of observations and the theory distribution. Therefore, the model was quite a good fit.

D. Interpretation of Category Variables Exp (B)

Determination of factors that influence household interest in planting medicinal plants during the pandemic is influenced by independent variables. The variable consists of the availability of yard, the availability of time, knowledge and gender. These four independent variables are categorically 0 and 1.

The category variables is interpreted by specifying when $X = 1$ dan $X = 0$ into this equation $\ln\left(\frac{pi}{1-pi}\right) = \beta_i X_i$. if $X = 1$ then $\ln\left(\frac{pi}{1-pi}\right) = \beta_i$, while if $X = 0$ then $\ln\left(\frac{pi}{1-pi}\right) = 0$. It means that $\ln\left(\frac{pi}{1-pi}\right)$ at $X = 1$ is greater as exp (β_i) compared by $X = 0$.

The first independent variable explained is the time availability variable which is a category variable ($X1 = 1$ dan $X2 = 0$), where $X1 = 1$ show that the respondent whose free time more than one hour and $X2 = 0$ show that the respondent whose a few time less than one hour. The value of β_i that we obtained in Table 1 is 4.109. We calculate the value of pi by antilog $ln\left(\frac{pi}{1-pi}\right) = 4.019$ then $\frac{pi}{1-pi} = e^{4.019}$. The value is obtained $\frac{pi}{1-pi} = 60.88$. By solving the previous equation, we get the value of $pi = 0.98$. The result obtained that the probability for respondent whose availability of time more than one hour is greater 0.48 or 48% compared with respondent whose availability of time less than one hour to have an interest planting medicines plants in pandemic situation.

Theoretically, free or spare time is a time that can be used for self-selected activities. The goal is to develop potential, increase self-satisfaction, and entertain yourself as compensation for less enjoyable work [8]. Free time is also defined as the time a person has when not working [9]. The result of this study is accordance with the previous study which explained stated that availability of time is one of the factors influencing students' interest in reading [10]. In this case, reading is one of the activity that chosen by students when they have availability of time or spare time. The availability of time also has a positive and significant influence on optimizing the utilization of home yards in West Pasaman Regency [11].

Knowledge variable consist of 2 variable $X1 = 1$ dan $X2 = 0$ where $X1 = 1$ showed that the respondent whose good knowledge dan $X2 = 0$ showed that the respondent whose poor knowledge. The level of knowledge is grouped into two groups if the respondents are the general public, namely: (1) The level of knowledge category is good value >50% and (2) The level of knowledge category is not good value $\leq$ 50% [12]. In this study, the measurement of respondents' knowledge was based on the results of interviews using a structured questionnaire

that asked about the material to be measured from the respondents [13].

The value of β_i.that we obtained in Table 1 is 3.533. By solving the previous equation, we get the value of pi = 0.97. The result obtained that the probability for respondent whose good knowledge (>50%) is greater 0.47 or 47% compared with respondent who's a poor knowledge (≤50%) to have an interest planting medicines plants in pandemic situation.

Knowledge is the amount of information that is interpreted by a person based on the experience he has [14]. Information related to new things obtained can influence a person in changing attitudes [15]. Knowledge is closely related to the development and increase of interest. Previously acquired knowledge can be a reference for increasing interest in gaining further knowledge [16]. The results of this study are in accordance with previous research which stated that knowledge has a positive and significant on optimizing the use of home yards in West Pasaman Regency [11]. The previous research also stated that interests can be influenced by knowledge. To increase household's interest in medicinal plant farming, they need to be educated about all the things related with medicinal plant such as how to plant, control pests and diseases, and post-harvest [17].

The last independent variable influenced to the interest of respondent in planting medicinal plants was gender. The value of β_i.that we obtained in Table 1 is 3.711. The result obtained that the probability for woman is greater 0.46 or 46% compared by man to have an interest planting medicines plants in pandemic situation.

The determination of the gender variable on the interest in planting medicinal plants is based on the assumption that women know more about medicinal plants and have more concern for the health of their families than men [18].

IV. CONCLUSION AND RECOMMENDATION

Based on the result of this study, we can conclude that availability of yard, availability of time, knowledge, and gender influenced the interest of household in medicinal plant farming simultaneously. While the availability of time, knowledge, and gender influenced the interest of household in medicinal plant farming partially.

Therefore, supporting by the government and academia is needed by providing counseling on the utilization of medicinal plants. It can increase the interest of households in planting medicinal plants, especially households whose yards in their home. This activity can be implemented to increase knowledge of society about medicinal plants such as ginger, red ginger, turmeric, sambiloto, and others that are beneficial for health.

REFERENCES

[1] L. Ang, H.W. Lee, J.Y. Choi, J. Zhang,and M.S. Lee, "Herbal medicine and pattern identification for treating COVID-19: a rapid review of guidelines," Integrative Medicine Research, vol. 9, no. 2, p. 100407, 2020.

[2] L. Ang, E. Song, H.W. Lee, and M.S. Lee, "Herbal Medicine for the Treatment of Coronavirus Disease 2019 (COVID-19): A Systematic Review and Meta-Analysis of Randomized Controlled Trials," Journal of Clinical Medicine, vol. 9, no. 5, p. 1583, 2020.

[3] M. Nicola, Z. Alsafi, C. Sohrabi, A. Kerwan, A. Al-Jabir, C. Iosifidis, M. Agha, and R. Agha, "The socio-economic implications of the coronavirus pandemic (COVID-19): A review," International Journal of Surgery, vol. 78, pp. 185–193, 2020.

[4] S.A. Sargin, E. Akçicek, and S. Selvi, "An ethnobotanical study of medicinal plants used by the local people of Alaşehir (Manisa) in Turkey," Journal of Ethnopharmacology, vol. 150, no. 3, pp. 860–874, 2013.

[5] A.F. Siregar and T. Supriana, "Factors that influence the interests of farmer in shallots farming at Cinta Dame village of Simanindo sub district of Samosir district," IOP Conference Series: Earth and Environmental Science, vol. 122, no. (1), 2018.

[6] D. Chalil, Qualitative Data Analysis. Medan: USU press, 2014.

[7] D. Gujarati, Fundamentals of Econometrics. Jakarta: Erlangga, 2006.

[8] Sukadji, Educational Psychology and School Psychology (Revised and Completed). Depok : Indonesia University, 2000.

[9] C. Bull, An Introduction to Leisure Studies, 2003.

[10] N. Hayati, "Factors Affecting Reading Interest in Sociology Subject Reference Books (Case of SMA Negeri 1 Sukorejo Kendal, 2008/2009 Academic Year)," vol. 3, no. 2, p. 94, 2009.

[11] I.K. Sukanata, D. Budirokhman, and A. Nurmaulana, "Factors that affecting the utilitazion of land yard in the activities of region sustainable food homei," Agrijati Journal, vol. 28, no. 1, pp. 1–16, 2015.

[12] Budiman and Riyanto, Knowledge and Attitudes Questionnaire in Health Research. Jakarta: Salemba Medika, 2013.

[13] S. Notoatmodjo, Health Research Methods. Jakarta: PT Rineka Cipta, 2012.

[14] I. Nurul, Knowledge Management: Theory and Practice. Yogyakarta: Gadjah Mada University Press, 2014.

[15] D.C. Gonçalves, J. Guedes, A.M. Fonseca, F.C. Pinto, I. Martín, G.J. Byrne, and N.A. Pachana, "Attitudes, knowledge, and interest: Preparing university students to work in an aging world," International Psychogeriatrics, vol. 23, no. 2, pp. 315–321, 2011.

[16] T. Zhang, A. Chen, S. Yli-Piipari, J. Loflin, S. Wells, R. Schweighardt, K. Moennich, D. Hong, and C.D. Ennis, "Prior knowledge determines interest in learning in physical education: A structural growth model perspective," Learning and Individual Differences, vol. 51, pp. 132–140, 2016.

[17] M. Laanen, D. Maes, C. Hendriksen, P. Gelaude, S. De Vliegher, Y. Rosseel, and J. Dewulf, "Pig, cattle and poultry farmers with a known interest in research have comparable perspectives on disease prevention and on-farm biosecurity," Preventive Veterinary Medicine, 2014.

[18] W. Torres-Avilez, P.M. De Medeiros, and U.P. Albuquerque, "Effect of Gender on the Knowledge of Medicinal Plants: Systematic Review and Meta-Analysis. Evidence-Based Complementary and Alternative Medicine," pp. 12–15, 2016.