IJPST
Indonesian Journal of Pharmaceutical Science and Technology

Research Article
Vol. 12 Suppl. 1 (2025): 51-58
https://doi.org/10.24198/ijpst.v12s1.57953

Traditional medicines use among Indonesian young population: a Theory of Planned Behaviour study

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Abstract
Adolescents are a group that is very intensively exposed to changes from the Internet of Things, resulting in reduced exploration of nature, including medicinal plants. This study explores behavioral factors related to the use of herbals among Indonesian adolescents by applying the Theory of Planned Behavior (TPB). The study was an analytic with a cross-sectional design. The independent variables were attitude, subjective norm, and perceived behavioral control. The dependent variable was behavioral intention. The samples were adolescents aged 10 to 19 years, determined from 200 samples in each of Indonesia's five major island groups, so 1,000 respondents were recruited. The instrument was a validated questionnaire that refers to the TPB constructs. Data were analyzed with a chi-square test and regression. Nine hundred thirty-one respondents participated in the research; the response rate was 93.1%. Approximately 85.1% of the participants expressed an intention to use traditional medicine. There is a statistically significant association between attitude, subjective norms, perceived behavioral control, and the purpose of using traditional medicine. The combined effect of the three constructs accounts for 25.9% of adolescents' propensity for using traditional medicines. All the factors contributed partially, with the subjective norm being the most significant contributor.

Keywords: Adolescents, Herbals, Traditional medicine, Theory of planned behavior, Young population.

Article History:
Submitted 20 September 2024
Revised 11 December 2024
Accepted 13 December 2024
Published 06 February 2025

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Citation:
Widayati A, Rahajeng B, Wulandari ET, Abadi BBA. Traditional medicines use among Indonesian young population: a Theory of Planned Behaviour study. Indonesian Journal of Pharmaceutical Science and Technology. 2025: Vol. 12 Suppl. 1 : 51-58.

Penggunaan Obat Tradisional di Kalangan Remaja Indonesia: Studi Dengan *Theory of Planned Behaviour*

Abstrak
Remaja merupakan kelompok yang sangat intensif terpapar dampak dari Internet of Things, sehingga berkurang aktivitas dalam mengeksplorasi alam, termasuk tanaman obat. Penelitian ini mengeksplorasi faktor perilaku pemanfaatan herbal pada remaja Indonesia dengan menerapkan Theory of Planned Behavior (TPB). Penelitian ini analitik dengan desain cross-sectional. Variabel bebasnya faktor perilaku berdasarkan konstruk TPB yaitu sikap, norma subjektif, dan persepsi kontrol perilaku. Variabel terikat adalah intensi berperilaku. Sampel penelitian adalah remaja usia 10-19 tahun. Jumlah sampel ditentukan sebanyak 200 responden di masing-masing lima pulau besar di Indonesia, sehingga total jumlah responden yang direkrut adalah 1000. Teknik pengambilan sampel dengan convenience sampling. Instrumen yang digunakan adalah kuesioner yang mengacu pada konstruk TPB dan telah tervalidasi. Data dianalisis dengan chi square dan regresi. Dari 1000 responden yang dikontak, sebanyak 931 responden berpartisipasi dalam penelitian ini, sehingga response rate nya 93,1%. Sekitar 85,1% responden (n=931) menyatakan niat untuk menggunakan obat tradisional. Terdapat hubungan yang signifikan secara statistik antara sikap, norma subjektif, persepsi kontrol perilaku dengan niat remaja menggunakan obat tradisional. Efek gabungan dari ketiga variabel bebas menyumbang 25,9% terhadap kecenderungan remaja untuk menggunakan obat tradisional. Sementara itu, semua faktor memberikan kontribusi parsial. Norma subjektif menjadi kontributor parsial yang paling signifikan.

Kata Kunci: Remaja, Herbal, Obat tradisional, *Theory of planned behavior*, Populasi muda

1. Introduction

Based on the World Health Organization (WHO), traditional medicine is called Herbal Medicine. It includes herbs (Jamu), herb ingredients, processed herbs, and finished products containing plant parts, other plant ingredients, or their combinations as active ingredients. In some countries, herbal medicines may contain natural organic or inorganic active ingredients derived from plants and animals and mineral substances.[1] Traditional medicine in Indonesia can be grouped into three major groups: Jamu, Obat Herbal Terstandar (OHT), and Fitofarmaka (phytopharmaca). The level of scientific evidence distinguishes the three groups.[2]

In Indonesia, teenagers aged between 10 and 19 years amounted to around 17% of the total population in 2023.[3] The number is crucial given that teenagers serve as a link between the older generation and the population below the age of 10. The adolescent population, defined by their age, is highly susceptible to the profound impact of the Internet of Things.[4] Adolescents have decreased their everyday engagement in exploring nature, including their immediate surroundings. The young of today often overlook the presence of medicinal plants or herbs that typically grow in nearby areas of their residence. This problem occurs due to the growing number of electronic devices in the lives of today's youth, resulting in reduced interaction with nature. This occurrence is worrisome because teenagers are responsible for introducing and utilizing herbal remedies for future generations.[5–7]

Extensive research has been conducted to assess the potential impact of medicinal plants in addressing common health issues that frequently arise among adolescents. For instance, in cases of menstruation problems and acne.[8–11] Recent studies indicate a favorable attitude toward the use of traditional medicine among adolescents.[7,12–14] Nevertheless, some empirical evidence suggests that teenagers' understanding of traditional medicines and medicinal plants is still lacking and requires improvement.[15,16] These prior findings suggest a need for more investigation into strategies to enhance the usage of traditional medicine among teenagers.

This study aimed to determine the factors that impact the behavior of adolescents in Indonesia when it comes to using traditional medicines. Understanding these influential factors is essential for devising strategies to encourage the use of traditional medicine among adolescents. This study employed the Theory of Planned Behavior (TPB). The TPB idea has been widely utilized and has successfully identified the factors that impact the use of traditional medicine.[14,17] The Theory of Planned Behavior (TPB) includes attitude, subjective norm, perceived behavior control, and behavior intention.[18,19] This study hypothesized that attitude, subjective norms, and perceived behavior control would influence the intention of young people in Indonesia to use traditional medicines.

2. Methods

2.1. Design and Variables

This study applied an analytical approach and a cross-sectional research design. It aimed to examine the impact of attitudes, subjective norms and perceived behavioral control on adolescents' intentions to use traditional medicine in Indonesia.

The independent variables are X1, attitude; X2, subjective norms; and X3, perceived behavioral control. In this case, I, which stands for intention, is the dependent variable affected or determined by the independent variables.

Attitude (X1) refers to the respondent's perspective regarding the advantages and disadvantages of using traditional medicine. Attitude (X1) was indirectly measured by assessing two sub-variables, i.e., behavioral beliefs and outcome evaluation. An instance of a component of the behavioral beliefs and outcome evaluations is as follows: behavioral beliefs (BB), "The use of traditional medicines can promote health"; outcome evaluation (OE), "It is preferable for me to achieve health" (see Table 1).

Subjective norm (X2) pertains to the influence of individuals who have the power to either support or reject the respondent's actions. In this study, subjective norm (X2) was indirectly measured by assessing two sub-variables, i.e., normative beliefs and motivation to comply. An example of a normative belief item in this study was "People who can approve/disapprove of me using traditional medicines is my parent." As for motivation to comply, an example item is "Regarding using traditional medicines, I need to consider the suggestion of my parent" (see Table 1).

Perceived behavioral control (X3) refers to an individual's perception of their capacity to take action, which is influenced by their awareness of external influences that can either facilitate or impede their behavior. The indirect measurement of perceived behavioral control (X3) was conducted by assessing two sub-variables, i.e., control beliefs and the power of control beliefs. An illustration of an item representing the control belief is "The reason for making use of traditional medicines easier is they can be purchased nearby where I live." As for the power of control belief, an example is "I will choose to use traditional medicines if they can be pur-

Table 1. The questionnaire based on the Theory of Planned Behaviour (TPB) to investigate the use of traditional medicines among young people in Indonesia

The TPB questions	
Behavioural beliefs (BB)	**Outcome evaluation (OE)**
Each statement below refers to "the use of traditional medicines":	It is desirable for me:
BB1: It can promote health	OE1: to achieve health
BB2: It can improve immunity	OE2: to improve immunity
BB3: It can address health complaints	OE3: to address health complaints
BB4: It is safe from side effects	OE4: to avoid side effects
BB5: It is affordable	OE5: to save the money
BB6: It is easy to get	OE6: to get them easily
BB7: It does not taste good	OE7: to have a good taste
Normative beliefs (NB)	Motivation to comply (MC)
People who can approve/disapprove of me using traditional medicines are:	In regard to use traditional medicines, it is important for me to consider the suggestion of:
NB1: My parent	MC1: My parent
NB2: My family members	MC2: My family member/s
NB3: My friends	MC3: My friends
NB4: My teachers	MC4: My teachers
Control beliefs (CB)	Control beliefs power (P)
The reasons for making use of traditional medicines easier are:	I will choose to use traditional medicines, if:
CB1: They can be purchased nearby where I live	P1: They can be purchased nearby where I live
CB2: Information is easy to be obtained on the internet	P2: Information is easy to be obtained on the internet
CB3: Available in the online shop	P3: Available in the online shop
CB4: There are many advertisements for traditional medicines	P4: There are many advertisements for traditional medicines
CB5: There are many types of traditional medicines	P5: There are many types of traditional medicines
Intention	
On a scale of zero to six, how much do you intend to use traditional medicine?	

chased nearby where I live" (see Table 1).

2.2. Research Ethics

The Health Research Ethics Committee in the local area has approved the protocol of this study under the ethical clearance approvals numbered 141.3/FIKES/PL/IX/2022.

2.3. Subjects and Sampling Technique

The sample inclusion criteria were adolescents aged 10 to 19 years, fluent in reading and writing in Bahasa Indonesia (the official language of the Republic of Indonesia), and willing to participate in this research voluntarily. The exclusion criteria are those who are physically and mentally unhealthy. The sample size was set at 1,000 respondents. The number of samples was distributed non-proportionally as many as 200 samples in each of the five large island groups in Indonesia that have been determined: 1) Java, Madura, Bali; 2) Kalimantan; 3) Sumatra, Bangka, Belitung; 4) Papua, East Nusa Tenggara, West Nusa Tenggara; 5) Sulawesi, Maluku. Respondents were gathered using a convenience sampling technique. To recruit respondents in each of the island groups, assistance was used from several elementary, junior, and senior high school teachers known to the research team who were in the areas of the five island groups to help with the respondent recruitment process in the intended area. The research team briefly explained to the contact personnel the inclusion and exclusion criteria for respondents who would be recruited to be involved in this study.

Furthermore, the contact personnel recruited potential respondents in their schools. The research team determined the possible respondents recruited based on a quota of 200 people per large island group. The contact personnel distributed the questionnaire to the recruited respondents.

2.4. Research Instruments and Data Collection Techniques

The instrument was created based on a guideline for creating a questionnaire based on the Theory of Planned Behavior. [20,21] The instrument used in this research is a tested questionnaire. The questionnaire has undergone validity testing using a professional judgment approach. The professional appraisal was conducted by two experts: a pharmacist with expertise in social pharmacy and a psychologist proficient in behavioral measurement scales. The validity test was conducted in a single round, with expert assessments recommending that the questionnaire was valid within the context of the TPB framework. Following the validity assessment, a reliability test was administered to 30 vocational high school students in Demak, Central Java Province. The reliability test was conducted using the Cronbach Alpha approach. The obtained Cronbach Alpha score was 0.80, indicating that the questionnaire items are reliable, as the cutoff value is 0.6.[22]

Data were collected by distributing TPB questionnaires to respondents who agreed to participate by signing informed consent. Data were collected in May 2022. The contact persons distributed the questionnaire as a Google Form link to the recruited respondents. Potential respondents received a brief explanation about this research through a narrative on the first page of the questionnaire on Google Forms. On that page, the contact number of the research team is also written, which can be contacted by the respondents if they need further explanation about this research and their participation. Respondents had to complete a statement of willingness to participate in this research voluntarily by providing informed consent. Because the respondents were adolescents, not adults, the person who filled out the informed consent form was their parent or guardian. When the informed consent has been signed, the respondent continued filling out the questionnaire on the next page. The statement on the informed consent was made by "clicking" on the answer choices: willing or unwilling. Respondents took between 20 and 30 minutes to fill out this online TPB questionnaire. The respondents' responses were sent and automatically summarized into a spreadsheet.

2.5. Data Analysis Techniques

Variables calculation applied specific formulas according to TPB guidelines. Data were analyzed analytically, which included: 1) Data normality test using the Kolmogorov-Smirnov method; 2) The relationship between independent and dependent variables is tested using Chi-Square, which was determined based on the p-value. 3) Test the hypothesis with regression analysis to determine the effect of the independent variables on the dependent variable.

Independent variables, namely attitudes (X1), subjective norms (X2), and perceived behavioral control (X3), were measured using a combination of behavioral beliefs (BB) and outcome evaluation (OE), normative beliefs (NB), and motivation to comply (MC), control beliefs (CB), and control beliefs power (P), respectively.

Attitude (A) was expressed by seven items of behavioral beliefs (BB) and seven items of outcome evaluations (OE), i.e., BB1 to BB7 and OE1 to OE7. The behavioral belief score on the strongly disagree (score: 1) to strongly agree (score: 5) was multiplied by the relevant outcome evaluation score on the strongly disagree (score: -2) to strongly agree (score: 2), i.e., BBxOE. For seven items of behavioral beliefs and seven outcome evaluations, the belief-based attitude scores potentially ranged from -70 to +70.

Subjective norms were determined by four items assessing normative beliefs (NB) and four items assessing motivation to comply (MC), i.e., NB1 to NB4 and MC1 to MC4. The normative belief score on the strongly disagree (score: -2) –to strongly agree (score: +2) was multiplied by the relevant motivation to comply score on the strongly disagree (score: 1) to strongly agree (score: 5), i.e., NBxMC . The multiplications of NB and MC scores have produced belief-based subjective norms (SN1 to SN4). For four items, normative beliefs, and four items, motivation to comply with the belief-based subjective norm scores potentially ranged from -40 to +40.

Perceived behavioral controls (PBC) were determined by five items: control beliefs (CB) (i.e., CB1 to CB5) and five items that assess control belief power (P) (i.e., P1 to P5). The control belief score on the strongly disagree (score: 1) to – strongly agree (score: 5) was multiplied by the appropriate control belief power score on the strongly disagree (score: -2) to strongly agree (score: 2), i.e., CBxP. The multiplications of CB and P scores have produced belief-based perceived behavioral control (PBC1 to PBC5). For five items of control beliefs and five items of power of control beliefs, the belief-based perceived behavioral control scores potentially ranged from -50 to +50.

The dependent variable denoted I, which represents "intention," was determined by dichotomizing the responses into two categories – the zero (score: 0) category was named "non-intender," and the greater than zero (score: 1 to 6) was called "intender."

3. Results

Of the 1000 individuals who were approached, 931 respondents were involved in the study, resulting in a response rate of 93.1%. The demographic character-

Table 2. Respondents' characteristics

Characteristics	Number (N= 931)	Percentage (%) (N= 931)
Male	312	33.5
Female	619	66.5
Average of age (years)	15.97 ± 1.825 (range: 10 -19)	

istics of respondents (N=931) can be seen in Table 2. Description of attitude, subjective norm, perceived behavioral control, and intention are presented in Table 3. Table 4 presents the association between the variables of attitude, subjective norm, perceived behavioral control, and intention. Table 5 and Table 6 show the results of the contribution of attitude, subjective norm, and perceived behavioral control on the intention.

As shown in Table 4, most respondents with positive attitudes intend to use traditional medicines (84.1%). In contrast, most respondents with negative attitudes have no intentions of using traditional medicine (1.9%). The result also shows that the p-value of the chi-square test is 0.000 ($p<0.05$), which shows a significant relationship between attitude and intention to use traditional medicine among teenagers.

The majority of participants who have positive subjective norms demonstrate an intention towards using traditional medicine, with a percentage of 82.0%. Conversely, individuals who hold negative subjective norms show no intention of using traditional medicine, with only 4.6% expressing intentions to do so. The data demonstrates that the p-value of the chi-square test is 0.000 ($p<0.05$), suggesting a significant relationship between subjective norms and intentions to use traditional medicine among teenagers.

About 75.2% of respondents who positively perceived behavioral control expressed an intention to utilize traditional medicines. Conversely, individuals who have negative perceived behavioral control confirm they have no intentions of using traditional medicine, with only 6.9% expressing such intentions. The data show that the p-value of the chi-square test is 0.000 ($p<0.05$), indicating a significant relationship between perceived behavioral control and the use of traditional medicine among adolescents.

A logistic regression was conducted to test the impact of attitude, subjective norms, and perceived behavioral control on the intention to use traditional medicines among young people in this study. The Omnibus Tests of Model Coefficients result showed that the whole model, including all independent variables, was statistically significant, with a Chi-Square value of 148.307, df=3, N= 931, $p < 0.000$. This result indicates that all three independent variables significantly impact the dependent variables. The attitude variable shows an odds ratio (OR) of 4.912 ($p<0.000$). The perceived behavior control has an odds ratio of 4.892. The subjective norm variable shows the highest odds ratio among other independent variables, so the factor most related and influential to teenagers' intention to use traditional medicine is the subjective norm. The subjective norm variable shows an odds ratio of 6.786, indicating that respondents with positive subjective norms are 6.786 times more likely to have the intention to use traditional medicine than respondents with negative subjective norms.

The model explained between 14.7% (Cox & Snell R Square) and 25.9% (Nagelkerke R Square) of the intention variance, correctly classifying 85.9% of cases. The Nagelkerke R Square value of 0.259 indicates that the contribution of attitude, subjective norm, and perceived behavioral control to the intention to use traditional medicine is 25.9%.

4. Discussion

This study is a cross-sectional survey applying the Theory of Planned Behavior (TPB) to explore factors contributing to using traditional medicines among young people in Indonesia. The findings of this study

Table 3. Description of Attitude, Subjective norm, and perceived behavioral control regarding the use of traditional medicines among young people in Indonesia

Variables	Category	Percentage (N=931)
Attitude	Negative	2.9 %
	Positive	97.1%
Subjective Norm	Negative	7.7%
	Positive	92.3%
Perceived Behaviour Control	Negative	16.8%
	Positive	83.2%
Intention	Non-intender	14.9%
	Intender	85.1%

Table 4. Association between attitude, subjective norm, perceived behavioral control, and intention to use traditional medicines among young people in Indonesia analyzed by Chi-Square test (N=931)

Factors		Intention		p-value
		Non-intender	Intender	
Attitude	**Negative**	1.9%	1.0%	0.000
	Positive	13.0%	84.1%	
Subjective Norm	**Negative**	4.6%	3.1%	0.000
	Positive	10.3%	82.0%	
Perceived Behaviour Control	**Negative**	6.9%	9.9%	0.000
	Positive	8.1%	75.2%	

reveal that most participants (85.1%) intend to use traditional medicines. Most respondents (97.1%) have positive attitudes toward using traditional medicines. Most (92.3%) have positive subjective norms about using traditional medicines. Most (83.2%) also have positive perceived behavioral control regarding using traditional medicines. Generally, young people in this study favor using traditional medicines, as shown by the overall score of attitudes. The overall score of the subjective norms indicates that they experienced support from their social networks in using traditional medicines. They also expressed that using traditional medicines is easy, as noted in the overall score of perceived behavior control. The further result shows that high scores of attitudes, subjective norms, and perceived behavioral control are associated with having the intention to use traditional medicines. For an increase in scores for these three factors, respondents would be more likely to increase their intention to use traditional medicines. Specifically, intenders favor using traditional medicines, experience more support for using traditional medicines, and are more confident in using traditional medicines than non-intenders. The three factors (attitude, subjective norm, and perceived behavioral control) combined contribute to the intention to use traditional medicines. Their simultaneous contribution is accounted for 25.9%. Meanwhile, these factors also contribute partially to the intention among young people to use traditional medicine in this study. The subjective norm factor provides an immense partial contribution with an odds ratio of 6.786.

The large proportion of traditional medicine users and the intention or willingness to use traditional medicine among Indonesian teenagers has been shown by previous research.[12,14] The intention to use traditional medicine, as demonstrated by teenagers, suggests that traditional medicine has a promising opportunity to be developed. Moreover, traditional medicine is considered a cultural heritage and natural wealth in Indonesia.[23] This is especially important because teenagers are responsible for passing on the baton of preserving this cultural heritage to the next generation.

It is exciting when the younger generation has a positive attitude towards using traditional medicine. The positive attitude is measured through the belief that traditional medicine is safe, has relatively few side effects, is easy to obtain, is affordable, and has an impact on overcoming health complaints.[12–15] Since the COVID-19 pandemic, certain traditional medicines are believed to improve the body's immune system to avoid virus attacks.[24] This seems to be inherent in the young population in this study, where one of the beliefs that emerged was the ability of traditional medicine to improve the immune system.

Young people generally receive influence from their families when making decisions about themselves and their activities.[12,14] In this study, young respondents also admitted that they received support for using traditional medicine from those closest to them, their social environment, teachers, and friends at school.

The ease of using traditional medicines, as believed by young people in this study, is that they are available in online shops, information is easily accessible on the internet, there are lots of advertisements, and there are many types of traditional medicines to choose from. It cannot be denied that the younger generation is currently very dependent on the internet. Everything available online makes it easier to act, including using traditional medicine.[5,25,26]

Attitudes, subjective norms, and perceived behavioral control have been proven positively affect the intention to use traditional Chinese medicine among adults in China during COVID-19 pandemic.[27] Likewise, such factors are significant predictors of the intention to use herbal medicines in adult anxious patients in Australia.[28] A review found that attitudes, subjective norms, and perceived behavioral control significantly influence the intention to use herbs among Southeast Asian individuals. Many Southeast Asian individuals hold positive attitudes towards herbal remedies, often viewing them as effective and safe alternatives to conventional medicine. The attitudes of peers and family members also play a crucial role in the context of the Southeast Asian community.[29] A study among Thai community members guided by the TPB, with an addi-

tional factor of personal experience with organic herbs products and involving 452 participants, showed that subjective norms, perceived behavior control, and attitudes towards organic herbs influence the intention to adopt organic herb cordyceps.[30] However, these studies did not calculate the percentage of simultaneous contribution of the three TPB factors to the intention to use herbs. Such factors make a 22.8% simultaneous contribution to the intention to use traditional medicine among adult rural communities in Indonesia,[17] while in this reported study, it is 25.9%. The relatively small simultaneous contribution of these three factors indicates that many factors outside the three contribute to traditional medicine use. The utilization of herbal medicine among teenagers is affected by factors beyond those encompassed in the three TPB categories analyzed in this study, such as household economic status, parental education level, health status, and gender inequality. [31,32]

Besides, the subjective norm is the most prominent partial contribution, compared to attitude and perceived behavioral control. It is important to note that among young people, the behavior of using traditional medicine is predominantly influenced by subjective norms. In this study, it was found that young people with support from their social environment were 6.786 times more likely to have the intention to use traditional medicine compared to those who did not receive support from important people in their lives. It is understandable that teenagers still rely on support from the important people in their circle of life, especially parents and family members. Increasing knowledge, understanding, and use of traditional medicine in the social environment of adolescents, in this case, parents, siblings, teachers, and friends, will increase positive social pressure among adolescents regarding the use of natural medicine and herbs.

5. Conclusion

This study concludes that health promotion strategies related to the use of traditional medicine among adolescents can be developed by explicitly considering the dominant factor of subjective norms. To increase the use of traditional medicine among young people in Indonesia, approaches through families and schools to support adolescents in the use of traditional medicine become urgent.

Acknowledgment

The authors thank the respondents who voluntarily participated in this study and acknowledge the research grant provided by DRTPM Kemendikbud Ristek Dikti under the Fundamental Research scheme for 2022.

Conflict of Interest

The authors declare no conflicts of interest related to this work.

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