The attitude, intention, and related factors of purchasing antibiotics without prescription: a survey in Vietnam

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Abstract

Background. *The abuse of antibiotics is a global problem, and the form of abuse varies among different countries and cultures. The study explored antibiotic self-medication attitudes and intentions to use antibiotics among the public in Can Tho City, Vietnam.*
Study design. *Questionnaire survey on a sample of volunteers.*
Methods. *Between February and August 2023, a paper-based questionnaire survey was conducted among the public in 4 districts of Can Tho City, Vietnam. The data was analyzed with SPSS version 20.0. Descriptive and analytical statistics using multivariate logistic regression analysis were performed to identify the factors associated with antibiotic self-medication.*
Results. *Of the 414 people interviewed, 56% were female, and the majority were aged 30-45 (48.49%). People with a university professional degree accounted for 39.4%, of whom 10.6% were the medical staff. The overall average score on attitude was 4.43±1.589 (on a 10-point scale), and 85.7% of people had inappropriate attitudes. Average scores of the indicators (a) Positive attitude towards the use of non-prescription antibiotics, (b) Negative attitude towards the use of non-prescription antibiotics, (c) Subjective norms, (d) Perceived behavioral control, and (e) Intention to purchase antibiotics without a prescription were 3.73±0.043, 2.29±0.944, 4.36±1.45, 3.4±1.027, and 3.63±1.145, respectively. The rate of people intending to buy non-prescribed antibiotics was 63.8%. Factors related to people's intention to purchase antibiotics without a prescription included place of residence, education level, occupation, and income. All three factors, attitude, subjective norm, and perceived behavioral control, impacted the intention to buy non-prescription antibiotics, of which the subjective norm factor had the most substantial impact.*
Conclusions. *The rate of people having incorrect attitudes about antibiotics, leading to the intention to buy antibiotics without a prescription, was relatively high. Factors affecting people's intention to purchase non-prescribed antibiotics included factors related to the impact of other people around them and factors originating from themselves.*

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Introduction

The World Health Organization (WHO) stated that we live in an era of antibiotic dependence and require global responsibility to protect valuable antibiotic resources for future generations. Currently, the abuse of antibiotics causes microorganisms to adapt to the drugs, creating conditions for many types of bacteria to become resistant to drugs, leading to less effective or fully ineffective drugs. Antibiotic resistance is not a new problem, but it has become dangerous and urgent, requiring worldwide efforts to help humanity avoid the risk of returning to the era without antibiotics. According to the WHO estimates and warnings, by 2050, drug resistance could be the cause of death for 10 million people globally each year. Additional medical costs each year of 1.2 trillion USD are expected, due to the increase in antibiotic resistance (1).

In Vietnam, despite a public healthcare system, antibiotics can be purchased without a prescription also for common viral infections (that cannot be cured by antibiotics). According to a research by Do et al., in Northern Vietnam, 88% of antibiotics in urban areas were sold without a prescription, and this rate was up to 91% in rural areas (2). Like in other countries, some reasons for inappropriate antibiotic use are patient's requests, pressure on examination time, and lack of knowledge. Furthermore, the costs that patients pay themselves account for many medical expenses based on the public healthcare policy, so people tend to look for the cheapest way to get healthcare (3). The rate of antibiotic resistance accounted for about 40%, ranking 4th in drug resistance rate among countries in Asia-Pacific (1). Most medical examination and treatment facilities face the problem of antibiotic resistance among bacteria.

In the face of increasing antibiotic resistance and the unreasonable use of antibiotics, raising awareness about antibiotic use is one of the essential stages of medical management. Suppose the knowledge, attitude, and intention of the drug buyer are not appropriate. In that case, it can lead to many consequences, directly affecting health, increasing the burden of treatment costs, and the most serious risk can regard the patient's life. Therefore, understanding the knowledge, attitudes, and intentions of people in the community to use non-prescription antibiotics is necessary in the current context, from which appropriate interventions can be made to reduce inappropriate antibiotic use in the community.

Behavioral intention theories are crucial when researching factors influencing people's intention to buy non-prescription antibiotics. Applying this theory helps researchers identify the main factors that determine the implementation of a specific intention so that they can develop effective intervention strategies to change actual behavior. Researchers put forward many different theories to explain individuals' practical behavior in health. The present study chose the theory of planned behavior to learn and analyze factors affecting the intention to purchase antibiotics without a prescription. This theory was developed based on the theory of reasoned action (TRA) introduced by Fishbein (1967) and then developed and published by Ajzen in 1991 (4). In addition to the attitude factor that leads to practical behavior, there are also belief factors about social norms (power of opinions, other people's behavior) and control factors that will lead to the behavior. This control factor can come from within the individual (ability to perform) or external to the individual (easy or difficult opportunities, economic conditions, etc.) (4). According to the theory of planned behavior, people will tend to adopt beneficial behaviors, are evaluated well by people they consider essential in society, and feel competent to act. Therefore, the research investigated the influence of four groups of factors including Attitude (including positive attitudes toward buying non-prescribed antibiotics A (+) and negative attitudes toward buying non-prescribed antibiotics A (–)), Subjective norm (SN), and Perceived behavioral control (PBC) to Intention to purchase non-prescription antibiotics (I).

Methods

Study subjects

A cross-sectional descriptive study was conducted by directly interviewing people who have used or knew about antibiotics, are at least 18 years old, have the full cognitive ability and the ability to answer questions, agree to participate in the study, and are the host or the person who decides to use medicine for themselves or in the home. The survey was conducted in 4 districts in Can Tho City, Vietnam, from February to August 2023. The convenience sampling method was utilized.

Sample size

Applying the sample size formula for descriptive research to determine a proportion:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

Where:
- n: sample size
- $Z_{(1-\alpha/2)}$: value of the confidence limit coefficient (1-α).
- α: level of statistical significance.
- d: deviation between sample parameters and population parameters.
- p: estimated overall rate value.

The p-value was chosen based on the results of a pilot study by Le et al (5) on 132 people, including the proportion of people with good knowledge about antibiotics (average knowledge score ≥ 7 points), p1 = 0.58, proportion of people with good attitudes about using antibiotics (average attitude score ≥ 7 points), p2 = 0.30, proportion of people intending to buy antibiotics without a prescription (average intention score ≥ 3.41), p3 = 0.57; absolute error is 5% (d = 0.05), confidence level is 95% (α = 0.05), then $Z_{(1-\alpha/2)}$ = 1.96 (5). Substituting into the formula gives the minimum sample size for each p-value as 375, 324, and 376. The largest sample size of 376 was chosen, and an additional 10% of the sample size was taken to ensure a sufficient number of samples. The total number of samples to be collected was 414.

Data collection

The interviewer asked for the surveyee's consent to participate and conducted direct interviews with people using a set of structured questions. Interviewers were trained before the survey. People who agree to participate in the interview will be asked questions about antibiotics to screen the suitable subjects. After that, they will answer the questions in the survey form. When the surveyed person answered, the information was recorded and re-checked immediately. During the interview process, the interviewer explained the meaning of the questions more precisely (if any).

The questionnaire has been built, and the scale has been standardized using qualitative research and a pilot study of Le et al (5). The questionnaire comprised three parts: part 1 included questions about general informations about people (such as gender, age, education level, and places of residence...), part 2 included 16 questions using the Likert scale, including Attitude toward the behavior (A) (8 questions), Subjective norm (SN) (5 questions), Perceived behavioral control (PBC) (3 questions), and part 3 included 4 questions used to survey intention to perform the behavior (Intention-I) of buying antibiotics without a prescription.

Questions within the interview were developed based on the "Theory of Planned Behavior" (TPB),
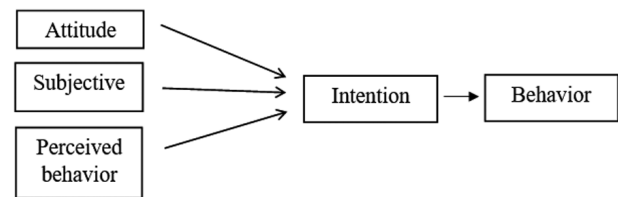

Figure 1 - "Theory of Planned Behavior" model of Ajzen (4).

which Ajzen first elaborated in 1991 (5). In short, this theory helped predict with a high degree of accuracy what the determinants of behavior were. Ajzen perceived three factors that accounted for the significant variation in behavior performance (Figure 1). According to the TPB, people tend to engage in activities that they view as beneficial, are well-appreciated by those they consider essential in society, and feel capable of acting with little resistance. In other words, A, SN, and PBC are independent variables, while Intention (I) is dependent. On a 5-point Likert scale, responses to the inquiries were scored as specified: 1 = strongly disagreed, 2 = disagreed, 3 = neutral, 4 = agreed, and 5 = strongly agreed.

Evaluation of attitudes to use antibiotics

The reality of people's attitudes toward purchasing antibiotics without a prescription was assessed through two variables:
- Average attitude score: 1 point was given with the correct answer, and 0 with the wrong or "no opinion" answer.

Average attitude score (calculated on a 10-point scale) = (total score/number of questions) × 10

- Classification of attitude levels, including three levels based on attitude score (%) (6):

1-Having a good attitude (% attitude score ≥ 70%);
2-Having an average attitude (70% > % attitude score ≥ 50%);
3-Having a poor attitude (% attitude score < 50%).

Evaluation of intention to purchase antibiotics without a prescription

The average score on Attitude toward behavior, Subjective norm, and Intention: calculating the total score based on the answers with increasing scores from Strongly disagree (Level 1: 1 point) to Completely agree (Level 5: 5 points), especially for questions with negative intentions like "Negative attitude toward the use of non-prescribed antibiotics"

will be encoded in reverse, and then divided by the total number of questions.

Average score = total score/number of questions

Intention to buy antibiotics without a prescription: converting the meaning according to the average score of Intention as follows (7):

- 1.0 – 1.8: strongly intentionless
- 1.81 – 2.6: intentionless
- 2.61 – 3.4: neutral
- 3.41 – 4.2: intention
- 4.21 – 5: strong intention

Identifying factors related to intention to buy non-prescribed antibiotics

Independent variables included qualitative variables and quantitative variables:

- Qualitative variables: including information about people participating in the study such as gender, age group, education level, occupation, location of residence, income level, status of having health insurance (categorical variable); Classification of attitude levels about antibiotic use as follows: Good attitude (average attitude score ≥ 7 points), poor attitude (average attitude score < 7 points) (6).

Quantitative variables: the average score of knowledge about antibiotics, the average score on Attitude toward the behavior (A), Subjective norm (SN), and Perceived behavioral control (PBC).

Dependent variable: average intention score (quantitative variable); Intention to perform the behavior (qualitative variable), including two levels: 0-no intention to buy non-prescription antibiotics (average intention score < 3.41) and 1-intention to purchase antibiotics without a prescription (average intention score ≥ 3.41).

To evaluate the impact of each factor on people's intention to buy non-prescription antibiotics in Can Tho City, the overall correlation model has the form:

$$I = f(F1, F2, F3, F4)$$

I: Dependent variables

F1, F2, F3, F4: Independent variables.

To consider which factors (F1 to F4) have a significant impact on people's intention to buy non-prescription antibiotics in Can Tho City, the following multivariate regression equation was used:

$$I = \beta 0 + \beta 1A(+) + \beta 2A(-) + \beta 3SN + \beta 4PBC$$

A(+), A(-), SN, and PBC are factors determined based on the Theory of Planned Behavior (TPB) model. The method of calculating the representative value for each factor according to the average was applied and included in linear regression analysis

(Appendix). These results were put into multivariate regression analysis using SPSS software.

Statistical analysis

The data were entered using Microsoft Excel 2013 and analyzed using SPSS, version 20.0. Descriptive statistical analysis was carried out to obtain summary tables and graphs containing the demographic characteristics of the study participants. A multivariate logistic regression analysis was used to adjust for the effects of all predictors shown to be significantly associated with using antibiotics for self-medication at the univariate logistic regression level. Odds ratios (ORs) were reported with their 95% confidence intervals (C. Is), with the level of statistical significance set at the 95% confidence level (p-value < 0.05).

Ethical considerations

The research was done following the guidelines in the Declaration of Helsinki. The study was approved by the Medical Ethics Council of the current institution (approval number 22.006.HV/PCT-HDDD on July 25th, 2022). A cover letter, which briefly outlined the purpose and ethics of the survey to beneficiaries, was also placed at the beginning of the SAQ. All participants gave their written informed consent before enrolling in this study.

Results

Demographic characteristics of the research population

In accordance with Table 1, 414 interviewers were engaged in the research. Of this, 232 (56%) were women, most under 60 (90.6%), and the majority (67.7%) of the respondents were from urban areas. Half of the interviewers had a university degree, and only 32.4% had a monthly income of 200-425 USD. The proportion of employees working at companies and agencies was 38.7%, of which 15% were medical staff.

Evaluation of attitudes to use antibiotics

The correct answer rate was at the following questions: "Antibiotic resistance is a hazardous problem for the community", "Using of antibiotics improperly may increase treatment costs", and "Do not use antibiotics indiscriminately; otherwise, the antibiotics will not be effective when needed",

Table 1 - Demographic characteristics of the research population

Characteristics		Quantity (n)	Percentage (%)
Gender	Female	232	56%
	Male	182	44%
Age	18 - < 30	136	32.90%
	30 - < 45	119	28.70%
	45 - < 60	120	29.00%
	≥ 60	39	9.40%
Place of residence	Urban district	280	67.70%
	Suburban district	134	32.30%
Educational level	Below high school	44	10.60%
	High school	69	16.70%
	Intermediate college/College	70	16.90%
	Undergraduate	228	55.10%
	Graduate	3	0.70%
Occupation	Farmer	23	5.60%
	Seller	80	19.30%
	Medical staff	62	15.00%
	Non-medical staff	98	23.70%
	Others	151	36.50%
Monthly income	< 200 USD	168	40.60%
	200 - < 425 USD	134	32.40%
	425 - < 850 USD	91	22.00%
	≥ 850 USD	21	5.10%
Health Insurance	Yes	405	97.80%
	No	9	2.20%

accounting for over 80%. Most people answered questions in the group "Positive attitude toward the use of antibiotics without a prescription" incorrectly, recording 80-90% (Table 2).

Table 2 - Percentage of people who answered attitude questions correctly

Questions	Desired answer	Frequency (Percentage)
Positive attitude toward the use of antibiotics without a prescription		
A1. Using antibiotics helps prevent infections	Disagree	24 (5.8%)
A2. Using antibiotics helps you recover faster	Disagree	26 (6.3%)
A3. Pharmacy staff is qualified to sell antibiotics to me/my family members without having to see a doctor	Disagree	79 (19.1%)
A4. Buying antibiotics without a prescription at a pharmacy will be more convenient and economical	Disagree	82 (19.8%)
Negative attitude toward the use of antibiotics without a prescription		
A5. Antibiotic resistance is a hazardous problem for the community	Agree	368 (88.9%)
A6. Using of antibiotics improperly may increase treatment costs	Agree	369 (89.1%)
A7. Do not use antibiotics indiscriminately; otherwise, the antibiotics will not be effective when needed (antibiotic resistance)	Agree	334 (80.7%)
A8. Only use antibiotics when examined and prescribed by a doctor	Agree	152 (36.7%)

Table 3 - Total average attitude score according to research population characteristics

Characteristics		Average attitude score (±SD)	p
Gender	Female	4.98 (±1.34)	0.223
	Male	4.76 (±1.65)	
Place of residence	Urban district	4.60 (±1.75)	< 0.001
	Suburban district	4.09 (±1,09)	
Age	18 - < 30	4.40 (±1.75)	0.048
	30 - < 45	4.20 (±1.44)	
	45 - < 60	4.55 (±1.46)	
	≥ 60	4.87 (±1.74)	
Educational level	Below high school	4.49 (±1.57)	0.688
	High school	4.57 (±1.73)	
	Intermediate college/College	3.87 (±1.60)	
	Undergraduate	4.53 (±1.62)	
	Graduate	6.17 (±1.58)	
Occupation	Farmer	4.06 (±1.78)	< 0.001
	Seller	4.12 (±1.81)	
	Medical staff	4.61 (±1.63)	
	Non-medical staff	3.91 (±1.39)	
	Others	4.93 (±2.01)	
Monthly income	< 200 USD	4.77 (±1.58)	0.221
	200 - < 425 USD	4.35 (±1.62)	
	425 - < 850 USD	4.00 (±1.45)	
	≥ 850 USD	4.16 (±1.59)	
Total average intention score: **4.43** (±1.589) Median: 4.30 Skewness: 0.324			

The average attitude score of the population was 4.43 (SD ± 1.589), with a normal distribution. The subject with the highest average attitude score still had a graduate degree. In contrast, the subjects with the lowest average attitude score had Intermediate college/College degrees (Table 3). The percentage of people with poor attitudes about antibiotic use was relatively high, at 77.3% (Figure 2).
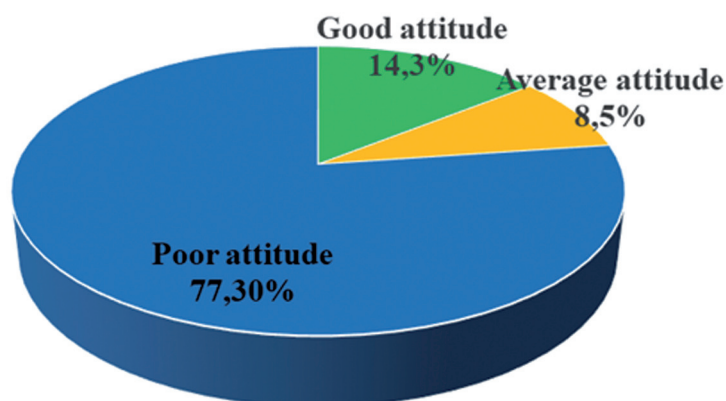

Figure 2. Classification of attitude levels

Table 4 - The score of Intention to buy antibiotics without a prescription

Questions	Average score (±SD)	Frequency (Percentage)				
		Level 1	Level 2	Level 3	Level 4	Level 5
I1. I intend to buy antibiotics if I think I need them, even without a doctor's prescription	3.78 (±1.235)	27 (6.5)	50 (12.1)	60 (14.5)	129 (31.2)	148 (35.7)
I2. I will buy antibiotics myself if I have an old prescription	3.42 (±1.182)	27 (6.5)	81 (19.6)	74 (17.9)	156 (37.7)	76 (18.4)
I3. I will buy antibiotics myself if I get advice from a pharmacy staff or someone I trust	3.66 (±1.116)	19 (4.6)	56 (13.5)	68 (16.4)	173 (41.8)	98 (23.7)
I4. I will buy antibiotics without a prescription when I cannot afford to see a doctor	3.65 (±1.047)	16 (3.9)	53 (12.8)	70 (16.9)	197 (47.6)	78 (18.8)
Total average score (±SD)	**3,63 (±1.145)**					

Evaluation of intention to purchase antibiotics without a prescription

As presented in Table 4, the high selection rate was mainly at levels 4 (Agree) and 5 (Completely agree), with the overall selection rate for both groups ranging from 56.1-66.9%.

Figure 3 showed that the rate of people intending to purchase antibiotics without a prescription was relatively high, up to 63.9%.

The average score of people's intention to buy antibiotics without a prescription was 3.63 (SD±0.942), with a normal distribution. The subjects with the highest average intention score were farmers and people living in suburban districts. The population with the lowest average intention score were graduate students with an average score of 2.25±0.661 (Table 5).
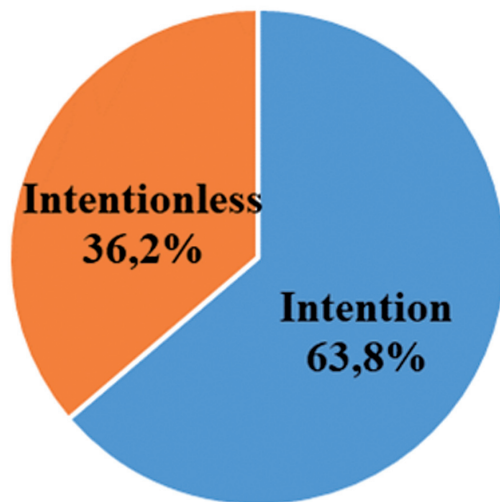

Figure 3. Percentage of people intending to buy antibiotics without a prescription

Measuring the impact of each factor on people's intention to buy non-prescription antibiotics

The impact of each factor on people's intention to buy non-prescription antibiotics in Can Tho City were presented in Table 6 and Figure S1.

When assessing the model's fit with the data sets expressed through the R coefficient, the results indicated that the adjusted $R^2 = 0.610$, meaning that the model explained 61% of the variation in the dependent variable "Intention to buy non-prescription antibiotics", the remaining 39% was due to variables outside the model and random errors.

The Durbin-Watson values (2.064) and VIF both met the requirements. There were no relations between the residuals and the dependent variables, and there were no changes in the variance of the residuals. Therefore, the regression equation had the form:

$$Y = 0{,}502 \, SN + 0{,}244 \, A^+ + 0{,}122 \, PBC - 0{,}067 \, A^-$$

Testing the difference in intention to purchase non-prescription antibiotics between groups of people

To test whether there is a difference in the average score of intention to buy non-prescription antibiotics between people with different characteristics, a hypothesis test was performed on the difference of the two overall averages (Independent samples t-test) with a significance level of 0.05. The results showed no difference in the average intention score between men and women (p = 0.601) and between age groups (p > 0.05). Meanwhile, there was a significant difference in the intention of buying antibiotics without a prescription between subjects with different places of residence, education levels, occupations, monthly incomes, and health insurance statuses (p < 0.05).

Table 5 - Average intention score according to research population characteristics

Characteristics		Average intention score (±SD)	p
Gender	Female	3.60 (±0.922)	< 0.001
	Male	3.65 (±0.961)	
Place of residence	Urban district	3.43 (±0.096)	0,000
	Suburban district	4.15 (±0.074)	
Age	18 - < 30	3.64 (±0.965)	> 0.05
	30 - < 45	3.75 (±0.844)	
	45 - < 60	3.59 (±0.995)	
	≥ 60	3.30 (±0.943)	
Educational level	Below high school	3.48 (±1.034)	< 0.05
	High school	3.51 (±1.048)	
	Intermediate college/College	3.58 (±0.761)	
	Undergraduate	3.72 (±0.929)	
	Graduate	2.25 (±0.661)	
Ocupation	Farmer	4.10 (±0.656)	< 0.001
	Seller	3.83 (±0.789)	
	Medical staff	3.50 (±0.868)	
	Non-medical staff	3.93 (±0.738)	
	Others	3.30 (±1.084)	
Monthly income	< 200 USD	3.34 (±1.027)	< 0.001
	200 - < 425 USD	3.62 (±0.827)	
	425 - < 850 USD	3.98 (±0.846)	
	≥ 850 USD	3.79 (±0.906)	
Health Insurance	Yes	3.61 (±0.921)	0.035
	No	3.41 (±0.196)	
Total average intention score: 3.63 (±0.942)	Median: 3.75	Skewness: 0.267	

The relationship between knowledge and attitude to people's intention to buy antibiotics without a prescription

The relationship between knowledge and attitude to the intention of buying non-prescription antibiotics revealed that people with poor attitudes were about 14 times more intent to purchase non-prescription antibiotics than those with good attitudes (Table 7).

Discussion

In Kotwani's research conducted in 2021 in New Delhi (India) with a sample size of 72 people, the majority of the population were employees at factories (37.5%), and the main interviewees belonged to the middle-income group, which accounted for 67% (8). The results were quite similar to our study. Research conducted across Sri Lanka by Zawahir and colleagues in 2021 also had quite similar research subjects, in which the average age of the sample was 40 (SD=14.7), and the majority of the people had a monthly income of less than 425 USD (9).

The scores that interview participants achieved in the test on antibiotic use attitudes were considered less diverse, ranging from 0-8.8 points; only 14.3% of the sample had a good attitude, and up to 77.3% of the sample achieved a poor attitude level. This result was much worse than the research conducted in Indonesia (2021) (10), with the average attitude score being 5.7 (out of 10 points), of which the good and poor levels

Table 6 - Results of multivariate regression analysis

Results of ANOVA analysis			
Model	Sum of squares	F	p-value
Regression	225.012	162.024	0.000[b]
Residual	142.347		
Total	367.359		
Results of multivariate regression model coefficients			
Representative variable	Unstandardized coefficients (B)	Multicollinearity	
		Acceptability	Variance Inflation Factors-VIF
(Constant)	0.001	0.059	
A-	-0.076	0.755	0.002
A+	0.345	0.619	0.002
PBC	0.209	0.056	0.932
SN	0.631	0.000	0.541

Table 7 - The relationship between knowledge and attitude to people's intention to buy antibiotics without a prescription

	Intention (n=237)			No intention (n=177)				
	n	Percentage by group	Percentag overall	n	Percentage by group	Percentag overall	OR	P
Inappropriate attitude	263	99.6%	63.5%	140	93.3%	33.8%		
							14.08	< 0.001
Appropriate attitude	1	0.4%	0.2%	10	6.7%	2.4%		

were 20.6% and 31.6%, respectively. In Sudan (2022), 24.8% had a good attitude, and 15% had a poor attitude toward antibiotic use (11).

The subjects with the highest average attitude score were still those with a graduate degree; those with the lowest average were those with an Intermediate/College degree with an average score of 3.87 (SD ±1.60). Similarly, the group with the highest rate of good attitude was still the group with a graduate degree (66.7%), and the lowest was farmers (0.0% of people achieving good attitude). The poorest attitude was the people living in the suburban district, accounting for 94.0%, and the lowest was those with a graduate degree (0.0%). This showed that educational level dramatically influences people's awareness of using antibiotics appropriately. From there, it is necessary to promote propaganda and education on these subjects and coordinate many measures to help people access information easily and raise awareness.

Regarding questions related to correct awareness of antibiotic use and antibiotic resistance, such as "Antibiotic resistance is a hazardous problem for the community", "Using of antibiotics improperly may increase treatment costs", and "Do not use antibiotics indiscriminately; otherwise, the antibiotics will not be effective when needed", most people gave the correct answer, over 80%. However, in the deep-seated problem, people must clearly understand the causes and behaviors that can lead to antibiotic resistance. Specifically, when asked about using antibiotics for prevention, the majority said, "Using antibiotics helps prevent infections", accounting for up to 94.2%. This

was incorrect because antibiotics should only be used if there is clinical or laboratory evidence of infection. Using antibiotics for undifferentiated viral or febrile illness is inappropriate in most cases; it causes drug side effects without providing any benefit and contributes to bacterial drug resistance. Similarly, up to 93.7% of interviewees agreed, "Using antibiotics helps you recover faster". Antibiotics are drugs derived from bacteria or molds or synthesized. Antibiotics sometimes interact with other drugs, increasing or decreasing serum concentrations of other medications by increasing or decreasing their metabolism or other mechanisms. Therefore, antibiotics should only be used in necessary cases, such as when infected. And there were many people interviewed who believed in the "prescribing" qualifications of drug sellers. More than 80% said, "Pharmacy staff is qualified to sell antibiotics to me/my family members without having to see a doctor" and they felt "Buying antibiotics without a prescription at a pharmacy will be more convenient and economical". This standpoint was proved in the research by Nguyen et al. (2023), who found that people intend to believe powerfully in pharmacists' knowledge to dispense antibiotics when in need (12).

In Ngo's research, when asked about the problem of antibiotic resistance, up to 96.4% of older people in Thai Nguyen province said they knew or had heard about it but did not clearly understand the cause as well as the dangerous level of the current antibiotic resistance problem (13). At the same time, a study by Nguyen et al. in 2019 revealed that using antibiotics shorter than the ordinary course of treatment is also one of the main causes of antibiotic resistance today (14).

Self-medication intention reflects individuals' desire to take responsibility for their health and treat minor illnesses. Some of the benefits of appropriate self-medication include reducing the use of prescription medications and saving on the costs and time of doctor visits. When screening people to participate in interviews, it was found that a very high proportion of the community in Can Tho City had used antibiotics before. However, inappropriate use of antibiotics can lead to potential risks for each individual, such as worsening health conditions and causing antibiotic resistance in the community. In Vietnam, in general, and in Can Tho City, in particular, buying antibiotics at drug retail establishments is relatively easy; many other favorable conditions help people have the intention to purchase and use antibiotics without a prescription.

The results showed that up to 63.9% of the sample intended to buy non-prescription antibiotics. This ratio was lower than the report of Do, in which arbitrarily using antibiotics among Vietnamese people in urban areas was 88%, while it was up to 91% in rural areas (2). These values were higher than those of research in neighboring countries. For example, in a study conducted in Indonesia (2021), the percentage of people who intend to purchase non-prescribed antibiotics was 48.5% (10). According to another systematic review study by Auta, the percentage of people globally who intend to buy non-prescription antibiotics was 62% (15).

According to Ajzen's TPB theory of planned behavior, developed and published in 1991, attitude factors, beliefs about social norms (power of opinions, other people's behavior), and perceived control factors will lead to intention. That is why the study surveyed these factors and measured the impact of each factor on people's intention to buy non-prescription antibiotics (4). The results showed that all three factors, including attitude, belief in social norms (subjective norms), and perceived control factors, all impact the intention to buy non-prescription antibiotics (Table S1-S3).

The factor with the most substantial impact was the subjective norm (SN) with a standardized ß coefficient of 0.502 (significance level 0.001). According to Fishbein and Ajzen (1975), in the theory of reasoned action, subjective norm refers to the influence of people related to the consumer on the consumer to perform or not perform a particular behavior (16). It can be said that the more someone feels that their specific behavior is accepted by relevant people (people they think are essential or have significant influence in their living environment), the more likely they are to perform that behavior. Therefore, the impact of people related to individuals can strongly impact the intention to buy antibiotics without a doctor's prescription. This is also relatively consistent with the customs and lifestyle of people in the Mekong Delta, specifically those in Can Tho City. For many generations, people have had the habit of living together, showing strong solidarity. Therefore, the advice and counsel of relatives, friends, and neighbors are critical to them. Thus, when asked about using antibiotics according to the direction of acquaintances, up to 39.4% of people answered "Agree" or "Completely agree". Compared to research conducted in Bac Tu Liem district - Hanoi in 2018, 56% of people responded that they used antibiotics from their own experiences and those around them (17). Similarly, people, especially those living in rural areas or with low educational levels, always trust the

advice of pharmacists selling drugs at retail drug establishments. Therefore, when receiving advice on using antibiotics, the majority will accept to follow this advice, with up to 68.1% of people answering "Agree" or "Completely agree" with the opinion "Use antibiotics as advised by pharmacy staff".

The second factor that affects people's intention to buy non-prescription antibiotics is a "Positive attitude toward buying non-prescription antibiotics" with a standardized ß coefficient of 0.244 (significance level 0.001). The third factor is behavioral control capacity, with a standardized ß coefficient of 0.122 (significance level 0.05). Behavioral control is an individual's or consumer's assessment of how difficult or easy it is to perform the behavior. According to Ajzen (1991), it was suggested that behavioral control factors directly impact the intention to perform the behavior. The higher the consumers' perception of performing a particular behavior, typically using antibiotics, the higher the intention to purchase non-prescription antibiotics (4).

The last factor is a Negative attitude towards buying non-prescribed antibiotics, which has a negative ß coefficient, meaning it has a negative impact, opposite to intention. The more agreement there is with questions that have a negative effect on buying non-prescription antibiotics, the lower the intention to purchase non-prescription antibiotics. It was stated that barriers to buying a product strongly influence purchasing intention; consumers' lack of confidence in the benefits that the product brings firmly influences purchasing intention (18, 19).

The intention of purchasing antibiotics without a prescription between people with different characteristics was also investigated. The results showed no difference in men's and women's average intention scores to purchase non-prescription antibiotics. This result is different from research conducted in Malaysia (20), in which gender has a significant impact on the intention to misuse antibiotics, with women in Ghana having the correct attitude rate 1.6 times higher than men. Similarly, there was no statistically significant difference in the intention to purchase non-prescription antibiotics between age groups, a result similar to that of research conducted in Indonesia (2021) (10). However, there was a difference in the intention to buy non-prescription antibiotics between people living in urban districts and suburban districts, similar to the results of research conducted in Ho Chi Minh City (2017), Malaysia (2012), and Indonesia (2021) (10, 20, 21). Among research subjects with different education

levels, the group with the highest intention to buy non-prescription antibiotics was the undergraduate group, and the lowest was the graduate group. In groups with different occupations, the highest intent to purchase non-prescription antibiotics belongs to the farmer group; the lowest is the group of other workers. People with an income of 425-850 USD have more intention to buy non-prescription antibiotics than other groups. This result differs from those recorded in Indonesia, where people with high incomes have more correct attitudes about antibiotics, making them less likely to use antibiotics without a doctor's prescription (10). The results of two groups of subjects with and without health insurance showed a difference in the intention to buy antibiotics without a prescription; people with health insurance tended to purchase antibiotics without a prescription more than the other subjects. This result can be explained by the difference in the study sample's proportion of people with and without health insurance. Only 9/414 (2.17%) of the population did not have health insurance so this result may be erroneous.

The relationship between knowledge and attitude to the intention to buy non-prescription antibiotics showed that people with poor knowledge had about 1.7 times higher intent to purchase antibiotics without a prescription than people with good knowledge. People with poor attitudes had about 14 times more intention to buy non-prescription antibiotics than people with good attitudes. According to pilot research results in Malaysia, people with good knowledge about antibiotics often use antibiotics themselves. This was similar to the research of Thuy and colleagues, who analyzed the relationship between knowledge, attitude, and antibiotic use behavior of pharmacy customers in Ho Chi Minh City (21). The study has indicated the connection between the pairs "Knowledge and Attitude", "Attitude and Behavior", and "Behavior and Knowledge" towards antibiotic use. Accordingly, people with poor knowledge often have poor attitudes, and people with good knowledge often have good attitudes, which leads to good behavior. Therefore, educational programs must pay more attention to raising people's awareness of antibiotic use.

Conclusions

The average scores on attitude and intention to buy non-prescription antibiotics were 4.43±1.589 and 3.63±0.942, respectively. There were 85.7% of people who have inappropriate attitudes and 63.8%

of people who intend to buy antibiotics without a prescription. Factors related to people's intention to purchase non-prescribed antibiotics included place of residence, education level, occupation, monthly income, and health insurance. All three factors, including attitude, subjective norm, and perceived behavioral control, impact the intention to buy non-prescription antibiotics, of which the subjective norm factor has the most substantial impact. There was a significant relationship between attitude and intent to purchase non-prescription antibiotics. People with poor attitudes have about 14 times more intention to buy non-prescription antibiotics than people with good attitudes. The results of this study could serve as a foundation for future research into more successful public education initiatives to improve knowledge and attitudes regarding antibiotic use among the general public. The respondents' knowledge and attitude show gaps regarding intention for antibiotics use. As a result, future educational initiatives should give particular consideration to these areas. Any future teaching initiatives should focus on those with low educational levels, living in rural areas, and having low income.

Riassunto

Atteggiamento, Intenzione e Fattori correlati all'acquisto di antibiotici senza prescrizione: un'indagine in Vietnam

Premessa. L'abuso di antibiotici è un problema globale e le modalità dell'abuso variano tra i diversi paesi e le diverse culture. Lo studio ha esplorato gli atteggiamenti e le intenzioni di automedicazione con gli antibiotici tra il pubblico nella città di Can Tho, in Vietnam.

Disegno dello studio. Indagine a questionario su campione di volontari.

Metodi. Tra febbraio 2023 e agosto 2023, è stato somministrato un questionario cartaceo tra il pubblico in 4 distretti della città di Can Tho, in Vietnam. I dati sono stati analizzati con SPSS versione 20.0. Sono state eseguite statistiche descrittive e analitiche utilizzando l'analisi di regressione logistica multivariata per identificare i fattori associati all'automedicazione antibiotica.

Risultati. Delle 414 persone intervistate, il 56% erano donne e la maggioranza aveva un'età compresa tra 30 e 45 anni (48,49%). I laureati professionali sono stati il 39,4%, di cui il 10,6% è costituito da personale medico. Il punteggio medio complessivo sull'atteggiamento era 4,43±1,589 (su una scala di 10 punti) e l'85,7% delle persone aveva atteggiamenti inappropriati. I punteggi medi degli indicatori (a) Atteggiamento positivo verso l'uso di antibiotici senza prescrizione, (b) Atteggiamento negativo verso l'uso di antibiotici senza prescrizione, (c) Norme soggettive, (d) Controllo comportamentale percepito ed (e) Intenzione ad acquistare antibiotici senza prescrizione erano pari a 3,73±0,043, 2,29±0,944, 4,36±1,45, 3,4±1,027 e 3,63±1,145, rispettivamente. La percentuale di persone intenzionate ad acquistare antibiotici senza prescrizione è stata del 63,8%. I fattori relativi all'intenzione delle persone di acquistare antibiotici senza prescrizione includevano luogo di residenza, livello di istruzione, occupazione e reddito. Tutti e tre i fattori - Atteggiamento, Norma soggettiva e Controllo comportamentale percepito - hanno influenzato l'intenzione di acquistare antibiotici senza prescrizione, e tra di essi il fattore Norma soggettiva ha avuto l'impatto più sostanziale.

Conclusioni. Il tasso di persone che hanno atteggiamenti scorretti nei confronti degli antibiotici, che portano all'intenzione di acquistarli senza prescrizione medica, è stato relativamente alto. I fattori che influenzano l'intenzione delle persone di acquistare antibiotici senza prescrizione includono fattori legati all'impatto di altre persone che li circondano e fattori originati da loro stessi.

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Supplementary materials

Table S1 - The score of Attitude to buy antibiotics without a prescription.

Questions	Average score/ Median (±SD)	Frequency (Percentage)				
		Level 1	Level 2	Level 3	Level 4	Level 5
Positive attitude toward the use of antibiotics without a prescription						
A1	3.92 (±0.753)	9 (2.2)	15 (3.6)	36 (8.7)	294 (71.0)	60 (14.5)
A2	3.84 (±0.802)	8 (1.9)	18 (4.3)	69 (16.7)	256 (61.8)	63 (15.2)
A3	3.62 (±1.107)	21 (5.1)	58 (14.0)	62 (15.0)	190 (45.9)	83 (20.0)
A4	3.53 (±1.112)	30 (7.2)	52 (12.6)	62 (15.0)	208 (50.2)	62 (15.0)
Total average score	**3.73 (±0.043)**					
Negative attitude toward the use of antibiotics without a prescription						
A5	1.72 (±0.044)	11 (2.7)	10 (2.4)	25 (6.0)	173 (41.8)	195 (47.1)
A6	1.89 (±0.035)	6 (1.4)	6 (1.4)	33 (8.0)	262 (63.3)	107 (25.8)
A7	2.00 (±0.042)	9 (2.2)	14 (3.4)	57 (13.8)	220 (53.1)	114 (27.5)
A8	3.53 (±0.051)	58 (14.0)	142 (34.3)	62 (15.0)	43 (10.4)	109 (26.3)
Total average score	**2.29 (±0.944)**					

Table S2 - The score of Subjective norms to buy antibiotics without a prescription.

Questions	Average score (±SD)	Frequency (Percentage)				
		Level 1	Level 2	Level 3	Level 4	Level 5
SN1. I bought the medicine myself because I had an old prescription from the doctor	3.44 (±1.206)	32 (7.7)	78 (18.8)	53 (12.8)	176 (42.5)	75 (18.1)
SN2. I bought antibiotics without a prescription because I used to buy antibiotics myself to cure my illness	3.36 (±1.267)	44 (10.6)	74 (17.9)	63 (15.2)	155 (37.4)	78 (18.8)
SN3. I bought antibiotics without a prescription because the pharmacy advised me to sell them to me	3.68 (±1.152)	26 (6.3)	50 (12.1)	56 (13.5)	181 (43.7)	101 (24.4)
SN4. I bought antibiotics without a prescription because friends and relatives advised me	2.94 (±1.247)	65 (15.7)	98 (23.7)	88 (21.3)	122 (29.5)	41 (9.9)
SN5. The pharmacy staff does not refuse when I buy antibiotics without a prescription	4.00 (±0.938)	8 (1.9)	22 (5.3)	43 (10.4)	173 (41.8)	168 (40.6)
Total average score	**4.36 (±1.45)**					

Table S3 - The score of Perceived behavioral control to buy antibiotics without a prescription

Questions	Average score (±SD)	Frequency (Percentage)				
		Level 1	Level 2	Level 3	Level 4	Level 5
PBC1. Information on the internet and newspapers helps me feel confident when buying and using antibiotics	3.06 (±1.140)	46 (11.1)	95 (22.9)	83 (20.0)	167 (40.3)	46 (11.1)
PBC2. I don't care if the pharmacy will be fined for selling antibiotics without a prescription	3.47 (±1.007)	18 (4.3)	39 (9.4)	153 (37.0)	139 (33.6)	18 (4.3)
PBC3. The media rarely reflects the purchase of antibiotics without a prescription	3.67 (±0.935)	13 (3.1)	31 (7.5)	99 (23.9)	206 (49.8)	13 (3.1)
Total average score	**3.40 (±1.027)**					
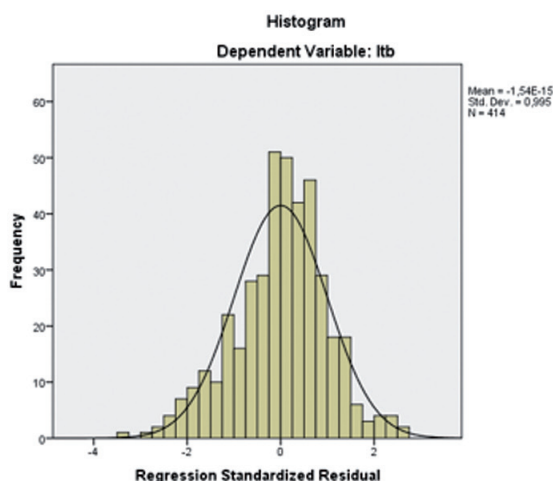
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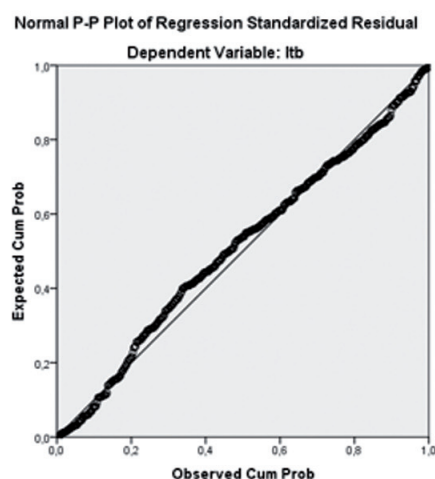
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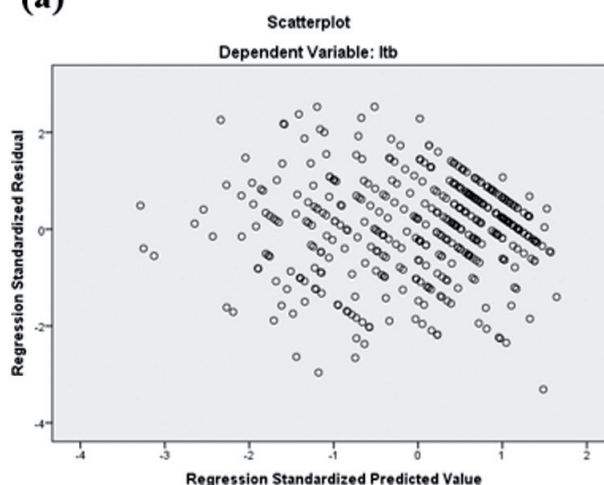
(c)

Figures S1 - Chart of results testing the residuals belonging to a normal distribution and the phenomenon of residual variance changing.

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