ORIGINAL RESEARCH

Knowledge, Attitude, and Practice Towards Responsible Self-Medication Among Pharmacy Students: A Web-Based Cross-Sectional Survey in Uganda

Bukoli Brian[1], Narayana Goruntla [1], Bhavana Reddy Bommireddy [2], Bhavani M Mopuri [2], Vigneshwaran Easwaran [3], Mohammad Jaffar Sadiq Mantargi [4], Durga Prasad Thammisetty [5], Sarad Pawar Naik Bukke [6], Tadele Mekuriya Yadesa [1], Ebere Emilia Ayogu [7]

[1]Department of Clinical Pharmacy and Pharmacy Practice, School of Pharmacy, Kampala International University, Western Campus, Ishaka, Uganda; [2]Research Scholar, Department of Pharmacy Practice, Raghavendra Institute of Pharmaceutical Education and Research (RIPER) – Autonomous, Anantapur, AP, India; [3]Department of Clinical Pharmacy, College of Pharmacy, King Khalid University, Abha, Kingdom of Saudi Arabia; [4]Department of Pharmacology, Pharmacy Program, Batterjee Medical College, Jeddah, Saudi Arabia; [5]Department of Pharmacy Practice, Sri Padmavathi School of Pharmacy, Tiruchanoor, Tirupathi, AP, India; [6]Department of Pharmaceutics and Pharmaceutical Technology, School of Pharmacy, Kampala International University, Western Campus, Ishaka, Uganda; [7]Department of Clinical Pharmacy and Pharmacy Management, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Nigeria

Correspondence: Narayana Goruntla; Bukoli Brian, Department of Clinical Pharmacy and Pharmacy Practice, School of Pharmacy, Kampala International University, Western Campus, Ishaka, Uganda, Tel +256760060453, Email narayanagoruntla@gmail.com; drgoruntla@kiu.ac.ug; bukoli.brian@gmail.com

Purpose: Rational self-medication (SM) practice among healthcare students is essential to promote the safe, effective, and economical use of medicines for self-diagnosed conditions. The study aimed to assess pharmacy students' knowledge, attitude, and practice about responsible self-medication.

Methodology: A cross-sectional online survey was conducted among Ugandan pharmacy students for one month from March 1 to March 31, 2024. The study included students enrolled in diploma, bachelor, and master of pharmacy programs in Uganda. Informed consent was obtained online by asking a question regarding willingness to participate. A non-probable snowball sampling technique was used to recruit students. A pre-validated questionnaire was used to obtain socio-demographics, self-medication practices, knowledge, attitudes, and practices about responsible self-medication. We used binary and multivariable logistic regression analysis to identify the factors associated with KAP regarding responsible self-medication.

Results: The prevalence of self-medication practice among pharmacy students was 96.73%. The self-medication is most common in headache (78.97%), cold, and cough (79.91%) illnesses. Painkillers (90.19%) and antibiotics (53.97%) are the most common medicines used for self-medication. Most pharmacy students have good knowledge (87.38%) and a positive attitude (96.03%) toward responsible self-medication. However, only 27.34% of students practice rational self-medication. Participants' university and parents' professions were significantly associated with good knowledge of responsible self-medication. Whereas factors such as gender, residence, and type of illness were significantly associated with rational self-medication practice.

Conclusion: The prevalence of self-medication was high among pharmacy students in Uganda. Painkillers and antibiotics are the most preferred drugs for self-medication. About 87.38% of pharmacy students have good knowledge, and 96.03% have a positive attitude toward responsible self-medication. Rational self-medication practice was low among students. We recommended training sessions to enhance safe self-medication practices among pharmacy students.

Keywords: attitude, knowledge, pharmacy students, practices, self-medication, Uganda

Introduction

According to the World Health Organization (WHO), the consumption of medicines to treat self-diagnosed diseases or symptoms or the reuse of prescribed medicines for recurrent disease conditions is called self-medication (SM).[1] It involves using over-the-counter (OTC) medicines, prescription-only medicines, and complementary and alternative medicines (CAM).[2] Different forms of SM practices include taking medicines without a prescription, using a previous prescription for a similar illness, using medicines available at home without a doctor's advice, and sharing medicines with relatives or friends having similar conditions.[3]

Globally, SM practice is a major public health concern that was triggered by cultural, economic, and political factors.[4] SM is one of the more common practices observed in developing countries (12.7% to 95%) than in developed countries (3%).[5] The wide difference in SM practices between developed and developing nations is due to variations in cultural and socioeconomic factors, as well as differences in healthcare systems, including compensation rules, healthcare accessibility, and medicine dispensing policies.[6,7] In low- and middle-income countries (LMICs), most of the illnesses are treated by SM, which increases the burden of irrational drug use.[8] Nowadays, SM is becoming an unavoidable option to reduce the healthcare costs associated with the majority of illnesses in developing nations.[7] Evidence shows that the most common reasons for raising SM practice include lack of time to visit a doctor, inexpensiveness of practice, easy accessibility of drugs, mild symptoms, having previous prescriptions for the same illness, suggestions from peers or friends, and knowledge about the use of medicines.[7–10]

SM cannot be considered a completely safe practice, and it may cause many problems, such as wastage of resources, antibiotic resistance, drug interactions, adverse drug reactions, polypharmacy, the wrong diagnosis, prolonged use of medicine, and prolonged suffering.[3,7,9] Though SM is not considered safe, responsible SM has several advantages, such as saving time and money, avoiding unnecessary consultations, saving patients' lives in certain acute conditions, saving scarce medical resources from being wasted on minor conditions, and active involvement of the patient for his/her health.[11]

The previous studies' findings indicate that the most common symptoms and illnesses for self-medication practices are headache, abdominal pain, cold, cough, fever, sore throat, cramps, and diseases such as respiratory infections, urinary tract infections, eye infections, malaria, and gastrointestinal disorders.[10,12,13]

Several studies have been published worldwide investigating the prevalence of SM practices. The prevalence of SM practices varied in different countries, in Bangladesh (88%), Jordan (86.7%), Egypt (52.7%), Ethiopia (72.2%), India (71%), Spain (12.7%), Chile (75%), Iran (76%), China (47.9%), and Vietnam (83.3%).[12–17] Studies conducted among pharmacy and medical students in various countries show a diverse range of self-medication practices, ie, Bangladesh (88.0), Jordan (86.7%), Saudi Arabia (63.9%), Ghana (55.2%), Turkey (79.0%), Iran (57.1%), Serbia (81.3%), and Kabul (38.0%).[3,18–24] The prevalence of SM among university students in Mbarara (63.5%), Lira (74.2%), and Busitema (93.8%) was found to be very high in Uganda.[25–27] The participants in these studies were either university-enrolled or medical students. It demonstrates an evidence gap in self-medication practice among Ugandan pharmacy students.

Pharmacy students differ from other non-healthcare university students in terms of exposure to knowledge about medicines and diseases, which enables them to practice SM. Therefore, it is essential to assess pharmacy students' knowledge, attitude, and practices (KAPs) regarding safe SM practice. Upon graduation, pharmacy students who become practicing pharmacists can offer patients suitable guidance about responsible SM. The current study addresses the gaps among pharmacy students about KAP toward responsible SM. As a result, the study can be used to develop and implement educational interventions to improve responsible SM practice among pharmacy students directly and patients indirectly in the coming years through practicing pharmacists. To the best of our knowledge, no study was conducted to assess the knowledge, attitude, and practice (KAP) toward self-medication (SM) among pharmacy students in Uganda. The study aimed to assess the KAP towards self-medication among pharmacy students and to examine the predictors of responsible SM in terms of KAP.

Materials and Methods

Study Design and Ethical Considerations

A cross-sectional online survey was conducted among Ugandan pharmacy students for one month from March 1 to March 31, 2024. The Kampala International University School of Pharmacy Research Committee (KIU SPRC/004/24) approved the research protocol, questionnaire, and informed consent procedure. This online study followed the ethical principles outlined in the Declaration of Helsinki for research involving human participants.

Study Participants

The study included students enrolled in diploma, bachelor's, and master's pharmacy programs at three Ugandan universities: Kampala International University (KIU), Mbarara University of Science and Technology (MUST), and Makerere University (MU). Before initiating the online survey, we sought permission from the deans or heads of the pharmacy schools or departments in the respective universities. Informed consent was obtained online. Before taking the survey, students must read the study background and objectives on the first page and select "yes" to the first two questions in the online form: 1. Are you a pharmacy student? 2. Are you willing to participate in this online self-medication survey among pharmacy students?

Sample Size and Sampling Technique

The number of pharmacy students to participate in this online survey was determined using a single-population proportion formula. It was assumed that 50% of students practice responsible self-medication, with a margin of error of 5%, a design effect of 1%, and a power of 80%. The calculated number of students required for the survey was 384. After considering a non-response rate of 5%, the total sample size was calculated to be 403. A non-probability snowball sampling method was employed to recruit pharmacy students, whereby invited participants were requested to disseminate the invitation to their familiar contacts. Although this sampling technique has limitations in terms of generalizing the findings, it can capture the maximum sample size as required by the study.

Questionnaire

The questionnaire consists of five sections: 1) Socio-demographics of pharmacy students; 2) Knowledge of responsible self-medication; 3) Attitude toward responsible self-medication; 4) Practice of responsible self-medication; and 5) Self-medication practices among pharmacy students.

Socio-Demographics of the Pharmacy Students

The socio-demographic characteristics, such as age, gender, pharmacy division, name of the educational institute/university, location, marital status, type of accommodation, parent's profession, presence of any medical illness, and monthly household income, were included in this section.

Knowledge of Responsible Self-medication

The knowledge regarding responsible self-medication among pharmacy students was assessed by using seven questions: one regarding SM definition (K1), four regarding the safety of SM (K2-K5), one regarding the interference of SM with other medications prescribed by the doctor (K6), and one on how SM can mask the symptoms of other disease conditions (K7). These questions had two options (True/False or Yes/No) for answers. A correct response received one point, whereas an incorrect answer received zero points. Everyone's total points ranged from 0 to 7. After assessment of the knowledge points, Bloom's cut-off criteria were used to categorize knowledge levels into good (80–100% correct response; score 6–7), moderate (60–79% correct response; score 4–5), and poor (<60% correct response; score <4) knowledge toward responsible self-medication.[28]

Attitude Toward Responsible Self-medication

Attitude toward responsible self-medication among pharmacy students was assessed by using 10 statements: one regarding SM as a component of self-care (A1), two regarding SM-induced ADRs and monitoring (A2 and A3), one

 9

regarding long-term use of SM (A4), one regarding use of OTC medicines (A5), one regarding training for SM (A6), one regarding SM advice in all age groups (A7), one regarding SM advice during pregnancy (A8), one regarding the role of professional advice in SM (A9), and one regarding the influence of access to information on SM (A10). Each statement was rated on a 5-point Likert scale, with positive and negative responses such as strongly agree 5, agree 4, neutral 3, disagree 2, and strongly disagree 1. Statements 5 and 6 were reversely scored. The maximum expected score for all statements was 50, with a minimum of 10. Students with scores above or equal to 25 were deemed positive, while those with scores <25 were deemed negative towards responsible self-medication practices.[10]

Practice of Responsible Self-Medication

Practice toward responsible self-medication among pharmacy students was assessed by using six questions: one about the practice of reading leaflets or package inserts before self-medication (P1); one about sharing medicines with others having similar symptoms (P2); one about self-medicating without professional advice (P3); one about self-medication practice for a long period without medical advice (P4); one about the practice of self-medication in all types of illnesses (P5); and one about having undergone responsible self-medication training (P6). These questions had two options (True/ False or Yes/No) for answers. A correct response received one point, whereas an incorrect answer received zero points. Everyone's total points ranged from 0 to 6. Students who scored 5 or more in the practice domain were considered to have responsible self-medication practice, and those who scored less than 5 were considered to have irrational self-medication practice.

Self-medication Practices Among Pharmacy Students

Under this section, questions were asked about the frequency of SM per annum, preferred medical system for SM, the specific medical problems for which SM is practiced, drugs used for SM, reasons for choosing SM, the sources of information relied upon for SM practice, and side effects encountered with SM.

Development and Validation Of Questionnaire

A suitably designed, self-administered English version KAP questionnaire on self-medication was developed based on the previous studies conducted on self-medication among pharmacy and healthcare students.[3,10,18,29] Then the questionnaire was subjected to face validity and reliability assessment. Face validation was done by a panel of experts comprising; clinical pharmacist (1), community pharmacist (1), physician (1), clinical pharmacologist (1), and epidemiologist (1). A total of 30 questions (knowledge = 7; attitude = 10; practice = 6; self-medication details = 7) are present in the questionnaire. Expert judgment of the inclusion of each statement or question in the survey instrument was rated on a four-point Likert scale in the ranges of strongly agree (4), agree (3), disagree (2), and strongly disagree (1). Finally, scale-level content validity index (S-CVI) indicators such as S-CVI/average number and S-CVI/utility agreement were calculated for the questionnaire's knowledge (0.86, 0.9), attitude (0.9, 1), practice domains (0.9, 1), and self-medication details (0.94, 0.9). The S-CVI indicators that are equal to or greater than 0.8 represent the minimum criteria for accepting the content included in the questionnaire. A pilot sample survey's reliability test results showed acceptable internal consistency with Cronbach's alpha coefficients of 0.78 for the knowledge domain, 0.8 for the perception domain, and 0.76 for the practice domain.

Data Collection

Data were collected online by sending pharmacy students a link to a Google Forms questionnaire. The online questionnaire was distributed via various messenger groups (WhatsApp, WeChat, and IMO) and social media networks (Twitter, Instagram, and LinkedIn). The first page of the form provided information about the survey's background, core objectives, expected results, and time (5–10 minutes) taken to fill out the online form for the enrollment of participants. Of 1160 pharmacy students (KIU = 650, MUST = 235, and MU = 275), 497 pharmacy students participated in this online survey with a response rate of 42.8%. After removing 69 incomplete responses, the final analysis included 428 responses (KIU = 288, MUST = 59, and MU = 81).

Data Analysis

To analyze the data collected from the pharmacy students, IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY, USA) was used. Before commencing the analysis, the data underwent cleaning, sorting, and processing within an Excel spreadsheet. Descriptive statistics such as frequency, percentages, mean, and standard deviation were used to represent the socio-demographics, knowledge, attitudes, and practices toward responsible self-medication and the adequacy level of KAP toward self-medication.

We used a bivariate and then a multivariate logistic regression analysis to investigate the relationship between the independent variables (socio-demographics) and the dependent variable (good knowledge, positive attitude, rational practice toward responsible self-medication, and prevalence of self-medication). Furthermore, good knowledge, a positive attitude, and rational practice of responsible self-medication among pharmacy students were linked to self-medication practice. Variables with a P value ≤ 0.2 in bivariate analysis were subjected to multivariate logistic regression analysis to adjust for potential confounders associated with the dependent variable. A two-way p-value of <0.05 was considered statistically significant.

Results

A total of 497 pharmacy students participated in this online survey. After removing 69 incomplete responses, the final analysis included 428 responses. The mean age of the study participants was 24.8 ± 2.92. Most of the students were Christians (85.75%), not suffering from any type of medical illnesses (75.70%), and their parents were in non-medical professions (84.11%). The socio-demographic profile of the pharmacy students is represented in Table 1.

The prevalence of self-medication practice among pharmacy students was found to be 96.73%. It was observed that self-medication is most common in headache (338), cold, and cough (342) illnesses. Painkillers (386) and antibiotics (231) are the common categories of medicine that are preferred for self-medication purposes. Students believe that the

Table 1 Socio-Demographic Characteristics of the Pharmacy Students (n=428)

Characteristics	Frequency (%)
Age in years (Mean ± SD)	24.28 ± 2.92
≤ 24	272 (63.55)
> 24	156 (36.45)
Gender	
Male	252 (58.88)
Female	176 (41.12)
Pharmacy division	
Diploma in Pharmacy	123 (28.74)
Bachelor of Pharmacy	301 (70.33)
Master of Pharmacy	4 (0.93)
University / Institute	
Kampala International University	288 (67.29)
Mbarara University of Science and Technology	59 (13.79)
Makerere University	81 (18.92)

(*Continued*)

Table 1 (Continued).

Characteristics	Frequency (%)
Residence of the pharmacy students	
Rural	70 (16.35)
Semi-urban	175 (40.89)
Urban	183 (42.76)
Religion	
Christian	367 (85.75)
Islam	50 (11.68)
Others	11 (2.57)
Marital status	
Single	397 (92.76)
Married	31 (7.24)
Accommodation	
Hostilities	97 (22.66)
Resident student	61 (14.25)
Reside in rental	270 (63.08)
Parents profession	
Medical	68 (15.89)
Non-medical	360 (84.11)
Medical illness	
Yes	104 (24.30)
No	324 (75.70)

Abbreviation: SD, Standard Deviation.

disease is not very serious (346) and is the most common reason to prefer self-medication. Distribution of the self-medication practices among pharmacy students is represented in Table 2.

The majority of students were aware of self-medication, and its safety. Students know that all types of medicines and medicines possess adverse effects and require medical attention upon experience of adverse effects during self-medication. Students are also aware that SM interferes with other medication prescribed by doctors, sometimes it will mask the symptoms of another disease. The distribution of pharmacy student's knowledge about self-medication is presented in Table 3.

The majority of the pharmacy students perceived positively toward all attitude statements of responsible self-medication. The distribution of pharmacy student's attitudes toward responsible self-medication is presented in Table 4. The majority of pharmacy students practice self-medication for all types of illnesses (381), over a longer period (335). More the half of the students have a habit of reading leaflets or package inserts (251) while SM. One-third of the students have a practice of sharing medicines for similar symptoms (164), SM without professional advice (177), and have undergone training for responsible SM (141). The distribution of self-medication practices among pharmacy students is presented in Table 5.

Table 2 Self-Medication Practices of Pharmacy Students

Self-medication practices	Frequency (%)
How often do you self-medicate annually?	
0	14 (3.27)
1	94 (21.96)
2	112 (26.17)
3	66 (15.42)
> 3	142 (33.18)
What kind of medicine do you typically use for self-medication?	
Modern medicine	299 (69.86)
Traditional medicine	111 (25.93)
Others	18 (4.21)
For which diseases do you usually prefer self-mediation?	
Cold and cough	342 (79.91)
Headache	338 (78.97)
Allergy	154 (35.98)
Vomiting	115 (26.87)
Diarrhea	162 (37.85)
Constipation	151 (35.28)
Fatigue	59 (13.79)
Abdominal pain	191 (44.63)
Cutaneous or skin problems	102 (23.83)
Sleeplessness	29 (6.78)
Stress	43 (10.05)
Fitness	17 (3.97)
Body pains	182 (42.52)
Sore muscle	43 (10.05)
Fever	149 (34.81)
Oral sores	57 (13.32)
Others	47 (10.98)
Which drugs do you usually prefer for self-medication?	
Painkillers	386 (90.19)
Antibiotics	231 (53.97)
Contraceptive pills	78 (18.22)
Antacids	183 (42.76)

(*Continued*)

Table 2 (Continued).

Self-medication practices	Frequency (%)
Sleeping pills	52 (12.15)
Multivitamins	148 (34.58)
Cough suppressants	210 (49.07)
Anti-histamines	155 (36.21)
Antipyretics	102 (23.83)
Corticosteroids	58 (13.55)
Topical applicants	141 (32.94)
Hormonal drugs	28 (6.54)
Cardiovascular drugs	4 (0.93)
Neuronal drugs	4 (0.93)
Others	37 (8.64)
What are the most common reasons for you to prefer self-medication?	
Disease is not serious	346 (80.84)
Save time	235 (54.91)
Save money	253 (59.11)
Maintain confidential	114 (26.64)
Urgent need to use medicine	172 (40.19)
Confident upon my knowledge	214 (50.00)
Not believing in physician advice	31 (7.24)
What information source do usually you use for self-medication?	
Academic knowledge	161 (37.62)
Advertisements	2 (0.47)
Friends and relatives	32 (7.48)
Information from pharmacist	50 (11.68)
Internet	40 (9.35)
Other medical and pharmacy students	17 (3.97)
Previous prescriptions of others having similar illness	41 (9.58)
Previous prescriptions of mine	76 (17.76)
Others	9 (2.10)
Have you ever experienced a side effect after self-medication?	
Yes	170 (39.72)
No	258 (60.28)

Table 3 Knowledge of Responsible Self-Medication Among Pharmacy Students

Question	Correct No. (%)
K1. Self-medication is taking medicine without advice from a physician?	410 (95.79)
K2. Is self-medication safe?	352 (82.24)
K3. All types of medicines (prescription, OTC, herbal) possess adverse effects.	390 (91.12)
K4. Without a doctor's advice, changing a drug's dose can be dangerous.	414 (96.73)
K5. Experience of adverse effects on self-medication required medical attention.	410 (95.79)
6. Self-medication could interfere with other medications that your doctor has prescribed.	418 (97.66)
K7. Self-medication can mask the symptoms of some diseases.	381 (89.02)

Abbreviation: OTC, Over The Counter.

Table 4 Attitude Toward Responsible Self-Medication Among Pharmacy Students

Statement	Frequency (%)
A1. Self-medication is a component of self-care	
Strongly agree	92 (21.50)
Agree	125 (29.20)
Neutral	76 (17.76)
Disagree	85 (19.86)
Strongly disagree	50 (11.68)
A2. Self-medication is not free from ADRs	
Strongly agree	205 (47.90)
Agree	119 (27.80)
Neutral	29 (6.78)
Disagree	33 (7.71)
Strongly disagree	42 (9.81)
A3. Self-medication requires close monitoring of symptoms and possible adverse effects	
Strongly agree	185 (43.22)
Agree	156 (36.45)
Neutral	44 (10.28)
Disagree	25 (5.84)
Strongly disagree	18 (4.21)
A4. Long-term use of self-medication is not advised	
Strongly agree	274 (64.02)
Agree	115 (26.87)

(*Continued*)

Table 4 (Continued).

Statement	Frequency (%)
Neutral	11 (2.57)
Disagree	17 (3.97)
Strongly disagree	11 (2.57)
A5. It is safe to use any over-The-counter medication for self-medication	
Strongly agree	65 (15.19)
Agree	110 (25.70)
Neutral	56 (13.08)
Disagree	112 (26.17)
Strongly disagree	85 (19.86)
A6. No training is needed for self-medication	
Strongly agree	50 (11.68)
Agree	90 (21.03)
Neutral	28 (6.54)
Disagree	145 (33.88)
Strongly disagree	115 (26.87)
A7. Self-medication is not safe for all age groups	
Strongly agree	228 (53.27)
Agree	136 (31.77)
Neutral	18 (4.21)
Disagree	28 (6.54)
Strongly disagree	18 (4.21)
A8. It is not safe to self-medicate during pregnancy	
Strongly agree	316 (73.83)
Agree	75 (17.52)
Neutral	10 (2.34)
Disagree	16 (3.74)
Strongly disagree	11 (2.57)
A9. Self-medication under professional advice will give better outcomes.	
Strongly agree	196 (45.79)
Agree	158 (36.92)
Neutral	33 (7.71)
Disagree	23 (5.37)
Strongly disagree	18 (4.21)

(*Continued*)

Table 4 (Continued).

Statement	Frequency (%)
A10. Pharmacy students self-medicate because of easy access to healthcare information.	
Strongly agree	186 (43.46)
Agree	171 (39.95)
Neutral	25 (5.84)
Disagree	28 (6.54)
Strongly disagree	18 (4.21)

Abbreviation: ADRs, Adverse Drug Reactions.

Table 5 Practice Toward Responsible Self-Medication Among Pharmacy Students

Question	Correct No. (%)
P1. Do you self-medicate without reading leaflets or package inserts?	251 (58.64)
P2. Have you shared your medicines with someone experiencing similar symptoms?	164 (38.32)
P3. Do you self-medicate without any professional advice	177 (41.35)
P4. Do you self-medicate for long periods without any medical advice?	335 (78.27)
P5. In all types of illnesses, do you prefer self-medication?	381 (89.02)
P6. Have you undergone any training about responsible self-medication?	141 (32.94)

The findings of the adequacy of KAP show that the majority of the pharmacy students have good knowledge (374), and a positive attitude (411) toward responsible self-medication. Whereas, very few students have a rational practice (117) toward self-medication. The distribution of adequacy levels of KAP toward responsible self-medication was presented in Table 6.

Table 6 Adequacy of KAP Toward Responsible Self-Medication Among Pharmacy Students

Variable	Frequency (%)
Knowledge	
Good	374 (87.38)
Moderate	50 (11.68)
Poor	4 (0.94)
Attitude	
Positive	411 (96.03)
Negative	17 (3.97)
Practice	
Rational	117 (27.34)
Irrational	311 (72.66)

Logistic regression analysis findings revealed that studying university (AOR = 2.76; 95% CI = 1.08–7.08), and parent's profession (AOR = 0.28; 95% CI = 0.14–0.57) were significantly associated with pharmacy student's knowledge of responsible self-medication. Whereas, factors such as gender (AOR = 0.55; 95% CI = 0.35–0.88), residence of the students (Rural: AOR = 0.48; 95% CI = 0.24–0.96, Semi-urban: AOR = 0.54; 95% CI = 0.32–0.89) and not suffering from any medical illness (AOR = 2.20; 95% CI = 1.18–4.11) were significantly associated with rational self-medication practice. Multivariate regression findings revealed that no factor was associated with positive attitude toward responsible self-medication among pharmacy students. Factors associated with good knowledge, positive attitude, and rational practice toward responsible SM are presented in Table 7. Bivariate and Multivariate Logistic Regression analyses of variables predicting good knowledge, positive attitude, and rational practices toward responsible self-medication among pharmacy students were presented with their P values in (Supplementary Tables 1-3).

Table 7 Bivariate and Multivariate Logistic Regression Analysis of Variables Predicting Good Knowledge, Positive Attitude, and Rational Practice Toward Responsible Self-Medication Among Pharmacy Students (n=415)

Characteristics	Good knowledge		Positive attitude		Rational practice	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Age in years						
≤ 24	1.23 (0.69–2.21)	NA	1.58 (0.60–4.18)	NA	1.09 (0.69–1.69)	NA
> 24	Ref	NA	Ref	NA	Ref	NA
Gender						
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female	1.64 (0.93–2.92)	1.40 (0.75–2.64)	2.34 (0.75–7.30)	2.34 (0.75–7.30)	**0.54 (0.35–0.85)****	**0.55 (0.35–0.88)***
Pharmacy division						
Diploma in Pharmacy	5.83 (0.77–44.09)	1.49 (0.13–16.60)	0.00 (0.00-NV)	NA	1.56 (0.16–15.42)	NA
Bachelor of Pharmacy	7.85 (1.07–57.58)	4.85 (0.47–50.67)	0.00 (0.00-NV)	NA	0.98 (0.10–9.54)	NA
Master of Pharmacy	Ref	Ref	Ref	NA	Ref	NA
University / Institute						
Kampala International University	**3.96 (1.88–8.34)*****	**2.76 (1.08–7.08)***	0.39 (0.05–3.11)	NA	**2.53 (1.19–5.36)***	2.19 (0.98–4.89)
MUST	Ref	Ref	Ref	NA	Ref	Ref
Makerere University	1.02 (0.46–2.24)	0.44 (0.17–1.14)	0.33 (0.04–3.01)	NA	1.59 (0.66–3.84)	1.12 (0.45–2.81)
Residence of the pharmacy student						
Rural	2.86 (0.96–8.48)	1.69 (0.52–5.55)	1.97 (0.42–9.20)	NA	0.62 (0.33–1.18)	**0.48 (0.24–0.96)***
Semi-urban	1.44 (0.63–2.08)	0.78 (0.39–1.59)	1.97 (0.66–5.87)	NA	0.66 (0.42–1.06)	**0.54 (0.32–0.89)***
Urban	Ref	Ref	Ref	NA	Ref	Ref
Marital status						
Single	Ref	NA	Ref	NA	Ref	Ref
Married	2.19 (0.51–9.43)	NA	0.00 (0.00-NV)	NA	0.49 (0.18–1.31)	0.49 (0.18–1.33)
Accommodation						
Hostilities	0.86 (0.37–2.01)	0.77 (0.29–2.01)	0.52 (0.05–5.14)	NA	1.05 (0.52–2.14)	NA

(*Continued*)

Table 7 (Continued).

Characteristics	Good knowledge		Positive attitude		Rational practice	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Resident student	Ref	Ref	Ref	NA	Ref	NA
Reside in rental	1.84 (0.84–4.05)	0.79 (0.31–2.00)	0.33 (0.04–2.57)	NA	0.94 (0.51–1.75)	NA
Parents profession						
Medical	**0.20 (0.11–0.38)*****	**0.28 (0.14–0.57)*****	0.88 (0.25–3.14)	NA	0.72 (0.39–1.33)	NA
Non-medical	Ref	Ref	Ref	NA	Ref	NA
Medical illness						
Yes	Ref	Ref	Ref	NA	Ref	Ref
No	**2.94 (1.63–5.31)*****	1.78 (0.88–3.58)	0.96 (0.31–3.00)	NA	**2.75 (1.50–4.94)****	**2.20 (1.18–4.11)***

Notes: * <0.05; ** <0.01 *** <0.001. All significant values were bolded.
Abbreviations: AOR, Adjusted Odds Ratio; COR, Crudes Odds Ratio; CI, Confidence Interval; MUST, Mbarara University of Science and Technology; NV, No value; Ref, Reference; NA, Not Applicable.

Discussion

Our study shows that the prevalence of self-medication practice among pharmacy students was 96.73%. In contrast with our findings, studies conducted in Ethiopia (38.5%), India (78.6%), Malaysia (57.2%) and Egypt (62.9%) show less prevalence of self-medication among medical students.[30–33] Few studies conducted in developed countries such as the Netherlands (59.4%) and Colombia (34.3%) also reported a very low prevalence of self-medication.[34,35] Studies conducted in Saudi Arabia revealed the prevalence of self-medication among university students of Riyadh (55.2%), and Najran (60.0%).[36,37] The findings of our study were nearly similar to those of a study conducted among Palestinian students (98.0%).[38] Overall, we observed a higher practice of self-medication among developing nations compared to developed nations. This could be attributed to the availability of higher-quality healthcare services, increased financial capacity to cover healthcare costs, and more efficient drug supply chain monitoring programs tailored to the specific needs of developed nations.

Previous studies conducted in Uganda about self-medication reported a prevalence of 63.5% at the Mbarara University of Science Technology (MUST), 74.2% at Lira University, and 79% of internet-enabled self-antibiotic use among patients of Kawempe private clinics.[25,26,39] The variations observed in self-medication practice within the country are due to differences in the design, data collection techniques, type of medication assessed, location, and participants enrolled. Our study is a self-administered, online survey that was conducted among pharmacy students of three universities. Self-medication practices are higher among students than the general population. In the student category, pharmacy students have more chances to go for self-medication because of their clinical knowledge, exposure to more information about medications, and access to medicines. Additionally, students have better access to the internet and media advertising pharmaceutical products, which in turn promotes self-medication practice. The current study reveals that pharmacy students most commonly prefer headache relievers, cough and cold remedies, and antibiotics for self-medication. Similar findings are also observed in studies conducted in Uganda, Nigeria, Pakistan, and India. The rate of antibiotic self-medication use was reported to be 53.97% in our study, which was higher than the studies conducted in Ethiopia (35.2%), Serbia (44.0%), Palestine (50.0%), and Malaysia (39.3%).[29,38,40,41] Self-antibiotic use is more common in developing nations than in developed nations. Ugandan standard treatment guidelines dictate that antibiotics are only available with a prescription from a licensed healthcare provider. These are inadequately enforced due to a variety of socioeconomic factors that may allow for indiscriminate access to antibiotics throughout the country.[42] Evidence supports that using antibiotics for self-medication was higher among healthcare students and professionals than the general population.[43] Antibiotic use without an appropriate diagnosis and prescription from authorized medical practitioners can increase the risk of antibiotic resistance in the country. In addition to traditional teaching modules in the

coursework, we recommend providing educational interventions like workshops, seminars, and symposiums that highlight the role of pharmacists in combating antimicrobial resistance.

Many pharmacy students informed that the disease is not very serious (80.8%), saving time (54.9%), and saving money (59.11%) are the most common reasons for self-medication. Contrary to our study findings, a Nigerian study reveals that university students cite the behavior of healthcare providers, the distance of the clinics from the location, and the ineffectiveness of prescribed medicines as reasons for self-medication.[6] An Iranian study revealed that the availability of stored medicines at home and having a history of the same illness were possible reasons for self-medication.[12] Like our study's findings, studies conducted in Iran, China, Brazil, and Rwanda also highlighted financial constraints, early management of the condition, and the disease's lack of seriousness as major reasons for self-medication.[44–46] In a Brazilian study, unawareness about possible consequences or side effects of the medicines was a reason for self-medication among nursing students.[45] Though the symptoms expressed in acute conditions are limited by self-medication, it is very important to sensitize the students to consult medical practitioners if the symptoms are long-lasting. This will facilitate a rational approach to diagnosing and managing diseases among the student community.

The important finding of our study is that many students are using their academic knowledge as a resource of information for safe self-medication. Though the students have greater exposure to knowledge about diseases and medication management, students need to take advice from a registered medical practitioner or pharmacist while taking self-medication. During self-medication, there is a risk of taking excessive dosages, not following instructions in the use of medicines, and simultaneous administration of both prescription and non-prescription medicines that have potential interactions that can enhance the health-threatening complications. So, all medical and pharmacy students must be aware of responsible self-medication practices.

The findings of the adequacy level of KAP revealed that most pharmacy students have good knowledge and positive attitudes toward responsible self-medication. Whereas rational practice of self-medication is very low among pharmacy students. Similar findings, such as a high level of positive attitude about responsible self-medication and a low level of rational self-medication practice, were observed in a study conducted among pharmacy students in India.[10] There is a wide gap in transforming good knowledge and a positive attitude into rational practices of self-medication in pharmacy students. The study recommends providing training modules and workshops on safe self-medication practice to pharmacy students. Thereby, the gap can be filled and students can acquire a high level of KAP about responsible self-medication.

Participants studying at KIU university were significantly associated with good knowledge about responsible self-medication. The higher odds of good knowledge among KIU students can be attributed to the greater number of responses from final-year pharmacy students compared to those from other universities. Factors such as gender, residence, and type of medical illnesses were significantly associated with rational self-medication practice among pharmacy students. Evidence about lower odds of rational self-medication practice in females was justified in a systematic review conducted on self-medication among university students.[47] This review shows higher odds of self-medication in females compared to males. This could be due to females using more medications for their menstrual and gynecological illnesses, which in turn lessens the rational self-medication practice. Students from rural areas lack access to medical facilities, so these students try to self-medicate before getting initial medical care in the health facility.[48] This could explain the high rate of rational self-medication among urban residents. An Indian study also found a connection between the residence and self-medication practices.[10] Student parents who are practicing medical professionals can give appropriate guidance on conditions that can be self-diagnosed and require a medical practitioner's attention for the diagnosis. This parental guidance can promote safe self-medication practices among pharmacy students. However, we found contrasting results in our study that students whose parents are non-medical-related have higher odds of good knowledge than those with medical-related parents. The factors identified in our study help in preparing targeted educational interventions to improve rational self-medication practices among pharmacy students.

Strengths and Limitations

The primary strength of our study is that the sample represented students from three top universities in Uganda with different socio-demographic backgrounds. Thus, the findings can be generalizable to similar settings. One more notable

advantage of our study lies in the utilization of an online survey, which facilitated a heightened response rate and enabled us to obtain a substantial sample size.

The potential limitation of this study is using an online platform for data collection, which may have unknowingly excluded students residing in areas with limited social media and Internet accessibility. Again, the voluntary nature of the online survey has introduced selection bias, because the sample is not a representation of the targeted population. One of the researchers and the study participants were from the same university. This could have created some bias, especially in responses given by friendly participants from that university. Due to the cross-sectional nature of the survey, a temporal relationship cannot be established between factors and KAP levels of responsible self-medication. The knowledge, attitude, and practices of students can change with time and experience. So, it is advised to carry out prospective longitudinal studies to investigate the trends of student's tendency towards self-medication practices and factors associated. The study used a non-probable snowball technique to capture the required participants, which can affect the generalizability of the findings. Furthermore, it is important to note that the data collected in this study were obtained through a self-administered online questionnaire rather than through interviews. This method of data collection may have introduced a potential bias, as participants may have provided information that is not entirely accurate or reflective of their true beliefs and intentions regarding self-medication practice. In any study, only subjective-based measures will introduce bias, it can be ruled out by including using objective-based measures, obtaining medicines left over in their home, and collecting of data at community pharmacy settings. The study captured self-medication practice for the past one year, this might have introduced recall bias in the study.

Conclusion

The study concludes that the prevalence of self-medication was very high among pharmacy students of three universities in Uganda. Painkillers and antibiotics are the most common drugs preferred for self-medication. It was observed that 87.38% of pharmacy students have good knowledge and 96.03% have a positive attitude toward responsible self-medication. However, the level of rational self-medication practice among students is very low. We recommended preparing training modules on safe self-medication practice, addressing the factors identified in our study, and implementing them among pharmacy students in Uganda to enhance their rational self-medication practices. Though they have heightened knowledge and positive attitudes that were acquired through their educational curriculum, transforming this into rational practice requires didactic training programs.

Ethical Considerations

The study protocol, data collection tools, and informed consent procedure were approved by the KIU-Research and Ethics Committee (KIU SPRC/004/24). This study was conducted following the provisions of the Declaration of Helsinki for research on human subjects. All subjects were informed of the study and its objectives, and informed consent was obtained from each participant.

Acknowledgments

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no conflict of interest and no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria, educational grants, participation in speakers' bureaus, membership,

employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements) or non-financial interest (such as personal or professional relationships, affiliations, knowledge, or beliefs) in the subject matter or materials discussed in this manuscript.

References

1. Organization WH. Guidelines for the regulatory assessment of medicinal products for use in self-medication. Published online 2000. Available from: https://iris.who.int/handle/10665/66154. Accessed January 27, 2024.
2. Torres NF, Chibi B, Middleton LE, Solomon VP, Mashamba-Thompson TP. Evidence of factors influencing self-medication with antibiotics in low and middle-income countries: a systematic scoping review. *Public Health*. 2019;168:92–101. doi:10.1016/j.puhe.2018.11.018
3. Alduraibi RK, Altowayan WM. A cross-sectional survey: knowledg e, attitudes, and practices of self-medication in medical and pharmacy students. *BMC Health Serv Res*. 2022;22(1):352. doi:10.1186/s12913-022-07704-0
4. Filho AI de L, Lima-Costa MF, Uchôa E. Bambuí Project: a qualitative approach to self-medication. *Cad Saude Publica*. 2004;20(6):1661–1669. doi:10.1590/s0102-311x2004000600025
5. Saha A, Zam D, Khan AA, Dutta P, Mannan A, Alam N. Prevalence and determinants of self-medication practices among general population: a cross-sectional study in Thimphu, Bhutan and Chattogram, Bangladesh. *J Public Health Res*. 2023;12(1):22799036231152327. doi:10.1177/22799036231152327
6. Osemene K, Lamikanra A. A study of the prevalence of self-medication practice among university students in Southwestern Nigeria. *Trop J Pharm Res*. 2012;11(4):683–689. doi:10.4314/tjpr.v11i4.21
7. Araia ZZ, Gebregziabher NK, Mesfun AB. Self medication practice and associated factors among students of Asmara college of health sciences, Eritrea: a cross sectional study. *J Pharm Policy Pract*. 2019;12(1):3. doi:10.1186/s40545-019-0165-2
8. Gelayee DA. Self-medication pattern among social science university students in Northwest Ethiopia. *J Pharm*. 2017;2017:8680714. doi:10.1155/2017/8680714
9. Abdelwahed RNK, Jassem M, Self-Medication Practices AA. Prevalence, and associated factors among Syrian adult patients: a cross-sectional study. In: Okosun IS, editor. *J Environ Public Health*. 2022; 2022. 1–7. doi:10.1155/2022/9274610
10. Susheela F, Goruntla N, Bhupalam PK, Veerabhadrappa KV, Sahithi B, Ishrar SMG. Assessment of knowledge, attitude, and practice toward responsible self-medication among students of pharmacy colleges located in Anantapur district, Andhra Pradesh, India. *J Educ Health Promot*. 2018;7(1):96. doi:10.4103/jehp.jehp_175_17
11. Hughes CM, McElnay JC, Fleming GF. Benefits and risks of self medication. *Drug Safety*. 2001;24(14):1027–1037. doi:10.2165/00002018-200124140-00002
12. Karimy M, Rezaee-Momtaz M, Tavousi M, Montazeri A, Araban M. Risk factors associated with self-medication among women in Iran. *BMC Public Health*. 2019;19(1):1033. doi:10.1186/s12889-019-7302-3
13. Mohammed SA, Tsega G, Hailu AD. Self-medication practice and associated factors among health care professionals at debre markos comprehensive specialized hospital, northwest Ethiopia. *DHPS*. 2021;13:19–28. doi:10.2147/DHPS.S290662
14. Figueiras A, Caamaño F, Gestal-Otero JJ. Sociodemographic factors related to self-medication in Spain. *Eur J Epidemiol*. 2000;16(1):19–26. doi:10.1023/a:1007608702063
15. Fuentes Albarrán K, Villa Zapata L. Analysis and quantification of self-medication patterns of customers in community pharmacies in southern Chile. *Pharm World Sci*. 2008;30(6):863–868. doi:10.1007/s11096-008-9241-4
16. Zhu X, Pan H, Yang Z, Cui B, Zhang D, Ba-Thein W. Self-medication practices with antibiotics among Chinese university students. *Public Health*. 2016;130:78–83. doi:10.1016/j.puhe.2015.04.005
17. Ha TV, Nguyen AMT, Nguyen HST. Self-medication practices among Vietnamese residents in highland provinces. *J Multidiscip Healthc*. 2019;12:493–502. doi:10.2147/JMDH.S211420
18. Seam MOR, Bhatta R, Saha BL, et al. Assessing the Perceptions and Practice of Self-Medication among Bangladeshi Undergraduate Pharmacy Students. *Pharmacy*. 2018;6(1):6. doi:10.3390/pharmacy6010006
19. Alsous M, Elayeh E, Abdel Jalil M, Alhawmdeh E. Evaluation of self-medication practice among pharmacy students in Jordan. *Jordan J Pharm Sci*. 2018;11:15–19.
20. Amponsah SK, Odamtten G, Adams I, Kretchy IA. A comparative analysis of pattern and attitude towards self-medication among pharmacy and non-pharmacy students in University of Ghana. *Pan Afr Med J*. 2022;41:254. doi:10.11604/pamj.2022.41.254.31013
21. Albayrak A. Assessment of pharmacy students' knowledge, attitudes and practices on self medication. *Bezmialem Science*. 2024;12(1):38–45. doi:10.14235/bas.galenos.2023.70446
22. Hashemzaei M, Afshari M, Koohkan Z, Bazi A, Rezaee R, Tabrizian K. Knowledge, attitude, and practice of pharmacy and medical students regarding self-medication, a study in Zabol university of medical sciences; Sistan and Baluchestan province in south-east of Iran. *BMC Med Educ*. 2021;21(1):49. doi:10.1186/s12909-020-02374-0
23. Tomas Petrović A, Pavlović N, Stilinović N, et al. Self-medication perceptions and practice of medical and pharmacy students in Serbia. *IJERPH*. 2022;19(3):1193. doi:10.3390/ijerph19031193
24. Daanish AF, Mushkani EA. Influence of medical education on medicine use and self-medication among medical students: a cross-sectional study from Kabul. *DHPS*. 2022;14:79–85. doi:10.2147/DHPS.S360072
25. Niwandinda F, Lukyamuzi EJ, Ainebyona C, Ssebunya VN, Murungi G, Atukunda EC. Patterns and practices of self-medication among students enrolled at Mbarara University of Science and Technology in Uganda. *Integr Pharm Res Pract*. 2020;9:41–48. doi:10.2147/IPRP.S237940
26. Ikwara AE, Atwijukiire H. Self-medication and medication storage practices among Lira University students in Lira city, Northern Uganda. *Front Public Health*. 2023;11:1259279. doi:10.3389/fpubh.2023.1259279
27. Nakato G, Adongo PR, Iramiot JS, Epuitai J. Practices and drivers of self-medication with antibiotics among undergraduate medical students in Eastern Uganda: a cross-sectional study. Fadare JO, ed. *PLoS One*. 2023;18(12):e0293685. doi:10.1371/journal.pone.0293685

28. Narayana G, Suchitra M, Sunanda G, Ramaiah J, Kumar B, Veerabhadrappa K. Knowledge, attitude, and practice toward cervical cancer among women attending Obstetrics and Gynecology Department: a cross-sectional, hospital-based survey in South India. *Indian J Cancer.* 2017;54(2):481. doi:10.4103/ijc.IJC_251_17

29. Bekele KM, Abay AM, Mengistu KA, et al. Knowledge, attitude, and practice on over-the-counter drugs among pharmacy and medical students: a facility-based cross-sectional study. *IPRP.* 2020;9:135–146. doi:10.2147/IPRP.S266786

30. Abay SM, Amelo W. Assessment of Self-Medication Practices Among Médical, Pharmacy, Health Science Students in Gondar University, Ethiopia. *J Young Pharm.* 2010;2(3):306–310. doi:10.4103/0975-1483.66798

31. Kumar N, Kanchan T, Unnikrishnan B, et al. Perceptions and practices of self-medication among medical students in coastal south India. Al Naggar RA, ed. *PLoS One.* 2013;8(8):e72247. doi:10.1371/journal.pone.0072247

32. Jamshed SQ, Wong PS, Yi HC, Yun GS, Khan MU, Ahmad A. Self-medication practices among female students of higher educational institutions in Selangor, Malaysia: a quantitative insight. *J Pharm Bioallied Sci.* 2016;8(3):217–222. doi:10.4103/0975-7406.172662

33. Helal RM, Abou-ElWafa HS. Self-medication in university students from the City of Mansoura, Egypt. *J Environ Public Health.* 2017;2017:9145193. doi:10.1155/2017/9145193

34. Mulder LTC, Busch M, Kristoffersen AE, Hök Nordberg J, Van Der Werf ET. Prevalence and predictive factors of complementary medicine use during the first wave of the COVID-19 pandemic of 2020 in the Netherlands. *BMC Complement Med Ther.* 2022;22(1):43. doi:10.1186/s12906-022-03528-x

35. Gaviria-Mendoza A, Mejía-Mazo DA, Duarte-Blandón C, et al. Self-medication and the 'infodemic' during mandatory preventive isolation due to the COVID-19 pandemic. *Therap Adv Drug Safety.* 2022;13:204209862210723. doi:10.1177/20420986221072376

36. Mannasaheb BA, Al-Yamani MJ, Alajlan SA, et al. Knowledge, attitude, practices and viewpoints of undergraduate university students towards self-medication: an institution-based study in Riyadh. *IJERPH.* 2021;18(16):8545. doi:10.3390/ijerph18168545

37. Al-Qahtani AM, Shaikh IA, Shaikh MAK, Mannasaheb BA, Prevalence A-QFS. Perception, and practice, and attitudes towards self-medication among undergraduate medical students of Najran University, Saudi Arabia: a cross-sectional study. *RMHP.* 2022;15:257–276. doi:10.2147/RMHP.S346998

38. Naseef H, Joza' D, Awawdeh A, et al. Evaluation of self-medication with antibiotics in primary care clinics in Palestine. *Patient Prefer Adherence.* 2022;16:2877–2892. doi:10.2147/PPA.S384671

39. Nakakande J, Taremwa IM, Nanyingi M, Mugambe S. The utility of internet-enabled antibiotic self-medication and its associated factors among patients attending private clinics in kawempe division in Kampala capital city, Uganda: community-based cross-sectional study. *Drug Healthc Patient Saf.* 2023;15:85–91. doi:10.2147/DHPS.S405072

40. Muratovic S, Curcic J, Milosevic N. Use and misuse of antibiotics among students in Serbian province Vojvodina. *European Journal of Public Health.* 2016;26(suppl_1). doi:10.1093/eurpub/ckw174.236

41. Haque M, Rahman NAA, McKimm J, et al. Self-medication of antibiotics: investigating practice among university students at the Malaysian National Defence University. *IDR.* 2019;12:1333–1351. doi:10.2147/IDR.S203364

42. Jackson M, Namuwenge Okure G, Namusisi M, Mukanga D. Over-the-counter suboptimal dispensing of antibiotics in Uganda. *JMDH.* 2013;303. doi:10.2147/JMDH.S49075

43. Kassa T, Gedif T, Andualem T, Aferu T. Antibiotics self-medication practices among health care professionals in selected public hospitals of Addis Ababa, Ethiopia. *Heliyon.* 2022;8(1):e08825. doi:10.1016/j.heliyon.2022.e08825

44. Lei X, Jiang H, Liu C, Ferrier A, Mugavin J. Self-medication practice and associated factors among residents in Wuhan, China. *IJERPH.* 2018;15(1):68. doi:10.3390/ijerph15010068

45. Gama ASM, Secoli SR. Self-medication among nursing students in the state of Amazonas - Brazil. *Rev Gaucha Enferm.* 2017;38(1). doi:10.1590/1983-1447.2017.01.65111

46. Tuyishimire J, Okoya F, Adebayo AY, Humura F, Lucero-Prisno DE. Assessment of self-medication practices with antibiotics among undergraduate university students in Rwanda. *Pan Afr Med J.* 2019;33. doi:10.11604/pamj.2019.33.307.18139

47. Behzadifar M, Behzadifar M, Aryankhesal A, et al. Prevalence of self-medication in university students: systematic review and meta-analysis. *EMHJ.* 2020;30(846–857):846–857.

48. Subashini N, Udayanga L. Demographic, socio-economic and other associated risk factors for self-medication behaviour among university students of Sri Lanka: a cross sectional study. *BMC Public Health.* 2020;20(1):613. doi:10.1186/s12889-020-08622-8