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

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**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



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## 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

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 $\leq 0.2$ 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*)


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**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*)


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**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) |


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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.

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## 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.

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